The Protective Factor of Social Company in State Rumination

- An Experience Sampling Method Study -

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Abstract

Background. It is crucial to understand and approach the determinants of major depressive disorder, as even a few depressive symptoms can significantly impair a person's life. One of these symptoms that is arising in daily life is rumination. This study investigated whether social company could reduce state rumination in daily life within people with depressive symptoms at baseline.

Methods. Using the experience sampling method (ESM) over a course of one week, 31 participants (M_{age} = 23.7) answered 10 daily questionnaires about their social company, state rumination and negative affect. At baseline, level of depressive symptoms and trait rumination was assessed. For the analysis, two simple linear regression and two linear mixed models were applied.

Results. Depressive symptoms were associated with higher trait rumination [β = .22, p = .02], however, results showed a non-significant association between depressive symptoms and state rumination [β = 1.73, p = .06]. State rumination significantly predicted levels of negative affect over time [β = .31, p > .01]. But, this effect was not significantly moderated by previous social company [β = > .01, p = .91]. Further, pleasurably perceived social company did not predict levels of state rumination over time [β = .02, p = .89] and this effect was not moderated by different levels of depressive symptoms [β < -.01, p = .73].

Discussion. These findings partially support current conceptualisations of rumination as a vulnerability factor for depressive symptoms that acts through increased negative affect. However, the buffering role of social company on this association could not be confirmed. Future studies should investigate more specific social variables, such as social interaction, and differentiate between state rumination modes to examine possible protective factors for the relationship between state rumination and depressive symptoms.

Keywords: depressive symptomatology, rumination, social company, negative affect, ESM

Depressive disorder is one of the most common, debilitating, and burdensome mental disorders. In Europe, approximately 6.4 percent of people are experiencing a major depressive disorder (MDD) (Arias-de la Torre et al., 2021). But not all forms of depressive disturbances can be categorised as full MDD. Experiencing even a few depressive symptoms can lead to significant distress and impairment in daily functioning (Backenstrass et al., 2006; Rucci et al., 2003) and quality of life (Rivas et al., 2011). Experiencing depressive symptoms that are not severe or persistent enough for a MDD diagnosis, is defined as subclinical symptoms of depression (Ji, 2012). Research has shown that subclinical depressive symptoms are a potential precursor and early warning sign of MDD (Horwath et al., 1992).

In order to support individuals in dealing with depression, it is crucial to identify risk factors that amplify or maintain depressive symptoms and find protentional factors that can alleviate or buffer against those. This is particularly significant for individuals on the subclinical spectrum, as it can help prevent the progression into MDD.

Rumination

One of the main factors in the etiology of depressive symptomology is rumination (Altan-Atalay et al., 2022; Kuehner & Weber, 1999; Nolen-Hoeksema, 2008). Rumination can be defined as a specific form of cognitive processing that involves repeated thinking about negative emotions and problems that create negative affect (Nolen-Hoeksema et al., 2008; Watkins, 2008). Despite this repetition, ruminating individuals typically do not engage in proactive problem solving, hence maintaining the original problem and further deteriorating their mood (Nolen-Hoeksema et al., 2008; Watkins, 2008). So-called ruminative thought cycles can act as negative feedback loops that maintain depressive feelings (Nolen-Hoeksema & Davis, 1999).

In rumination, a distinction can be made between trait and state rumination. Trait rumination (TR) refers to a general tendency to engage in self-focused ruminative thoughts (Zoccola et al., 2010). This means that individuals high in TR are overall more likely to

ruminate than individuals low in TR. On the other hand, rumination can also be triggered by situational factors that arise throughout an individual's day, so-called state rumination (SR) (Hjartarson et al. 2021; Key et al., 2008). Thus, SR describes a more temporary aspect of rumination, which can significantly fluctuate throughout the day and is dependent on stressors (Janoff-Bulman, 2010; Lavallee & Campbell, 1995; Zoccola et al., 2010). For example, some people start ruminating after engaging in social events (Smith & Alloy, 2009). Others ruminate in response to daily fluctuations in negative mood (Hjartarson et al. 2021), or stress levels (Ruscio et al., 2015). In sum, TR and SR together describe the rumination construct, whereby TR expresses the person's general tendency to ruminate, and SR describes to what extent a person is ruminating at one moment in time.

Given the dynamic between these two facets of rumination, people who are higher in TR are also more likely to experience higher SR in response to environmental factors (Pasyugina et al., 2015). Yet, some of the negative effects of SR on mood and psychological functioning have been found to be independent of TR (Altan-Atalay et al., 2022). Previous research on rumination has predominantly focused on the stable trait-like characteristic related to a depressed mood. However, more recent research has begun to increasingly look at the role of SR within depression. Many of these studies used the experience sampling method (ESM) (Hoebeke et al., 2022; Kircanski et al., 2018; Pillai et al., 2014). With ESM, it is possible to capture the moment-by-moment experiences in an individual's daily life, which provides the opportunity to examine fluctuations of thought processes and the connections between the external environment and thought processes, like SR (Hektner, et al., 2007; Myin-Germeys & Kuppens, 2022). These ESM studies have found negative effects of SR on the experience of depressive symptoms, when controlled for TR (Hoebeke et al., 2022; Kircanski et al., 2018). It is presumed that this effect is due to increased negative affect (NA) that is a product of rumination (Kircanski et al., 2018). In line with this, SR has been found to significantly predict and increase NA (Aldao et al., 2010; Young & Dietrich, 2015). Since

increased NA is one of the main symptoms of major depressive disorder (American Psychiatric Association, 2013), SR has become an important vulnerability factor for depressive symptoms (Lewis et al., 2015).

Importantly, SR is not just exclusively linked to depressed individuals. Instead, healthy people are known to also experience high levels of SR from time to time (Gerteis & Schwerdtfeger, 2016). Accordingly, SR can also become a risk factor for people who do not yet classify for full MDD but experience high SR regularly. Therefore, individuals on the subclinical spectrum are particularly vulnerable to the negative effects of high SR on mood and to develop full MDD as a consequence. Gaining an understanding about protective factors against this risk becomes important to assist this subgroup.

Social Company

One factor that has the potential to reduce SR, and thus the risk of developing MDD from a subclinical depression, is social company. Generally, social variables, such as social interaction, or perceived social support, are some of the strongest predictors for mental well-being (Cohen & McKay, 2020; Kobau et al., 2011; Schwanen & Wang 2014; Teo et al., 2015). As the differentiations of such social variables are difficult to disentangle in ESM studies that often employ single item measures, this study investigates the overarching construct social company which describes whether a person is currently accompanied by someone. Therefore, social company does not differentiate between but summarises the different forms of social variables. Yet, the evidence for the beneficial effects of these social aspects on depression and rumination is promising.

For example, social interaction was found to positively influence affect (Sandstrom & Dunn, 2014), the factor that is negatively impacted through rumination (Aldao et al., 2010; Kircanski et al., 2018; Young & Dietrich, 2015). Thus, social interaction holds the theoretical potential to protect against the negative effect of rumination on NA. Next to this, an early study showed that social support moderated the relationship between rumination and

depression (Nolen-Hoeksema & Davis, 1999). A later study by Puterman and colleagues (2010) found that people who felt supported by their social relationships were less likely to ruminate on a daily basis. And when they ruminated, the effect on NA was buffered. Also, lower levels of social support were found to be associated with higher scores in TR (Puterman et al., 2010). The authors argue that the social interaction allows people to talk about their feelings and thoughts, thereby preventing rumination from occurring. If rumination had already occurred, people might find comfort in the interaction and break their ruminative thought cycles (Nolen-Hoeksema & Davis, 1999; Puterman et al., 2010; Rimé, 1995). In a longitudinal study by Vélez and colleagues (2016), seeking social support was associated with reductions in depressive symptoms at lower rumination levels. At moderate rumination levels, this protective effect of social support disappeared, and at a high rumination level, social support was in fact associated with greater depressive symptoms.

Given this empirical evidence, it seems that social company can serve as a protective factor against rumination and its increasing impact on negative affect. Still, the current empirical for the relationship between social variables and rumination is limited to TR. It is therefore unclear whether this association holds for the momentary experience of SR.

Present Study

To be able to capture the fluctuating nature of SR and the broad concept social company, ESM was chosen for this study. This does not only give the opportunity to measure SR and social company in daily life, but also allows to capture individual differences within participants over time. This way, intraindividual variations can be investigated in a time-concurrent manner. Based on findings of prior research and the possibly positive effect of social company on depressive symptoms, the following research question is investigated: What is the association between social company, rumination, and depressive symptoms in daily life.

H1: *People with higher levels of depressive symptoms at baseline are ruminating more on a trait and state level on subsequent measures than people with lower levels of depressive symptoms at baseline.*

H2: *After people have engaged in social company at one measurement point, the effect of SR on NA in the following measurement point is reduced.*

H3: *The level of depressive symptoms at baseline moderates the relationship between pleasurable social company at one measurement point and SR at the subsequent measurement point, so that reductions in SR after pleasurable social company are greater for individuals with higher levels of depressive symptoms than for those with lower levels of depressive symptoms.*

Methods

Participants

Participants were recruited by convenience sampling; they have been asked by the researcher's social environment to participate in the study. This method of recruiting is particularly useful for a long-term study, as a high time investment is expected from the participants (Myin-Germeys & Kuppens, 2022). In order to participate in the study, participants had to provide their email address to receive a registration link. Additionally, participants needed a mobile device, a stable internet connection and had to be proficient in English.

Procedure

The data was obtained digitally via a mobile device to allow direct response after receiving a notification from the application (Van Berkel et al., 2017). An invitation via email was sent to all participants with an access link to download the Ethica app, with which the data collection was conducted. After downloading the app, a registration was needed. In the following days after registration, the participants were asked to fill in the daily momentary

questionnaires 10 times a day. When receiving the first daily questionnaire on the first day, a baseline questionnaire had to be filled in. This took the participants approximately 20 minutes. The study lasted seven days, including weekdays and the weekend. This helps to eliminate potential differences between weekdays and weekends, since most people have more time for leisure activities and social interactions on weekends (Myin-Germeys & Kuppens, 2022). The questionnaires started at 7:30 in the morning and were prompted until 22:30 in the evening. Within this daily time frame, 10 blocks of 1,5 hours were created, in which the questionnaire was prompted at a random moment. If participants would not have filled in a momentary questionnaire after 15 minutes, this questionnaire was blocked and could not be answered anymore. Each questionnaire took approximately one to two minutes to fill out.

Measures

Baseline Questionnaires

Demographics. Before filling in the baseline questionnaire, participants were asked to fill in their age, gender, nationality, and type of current occupation.

Subclinical Depression. Depressive symptoms were measured with the baseline questionnaire using the Patient Health Questionnaire (PHQ-9) (Kroenke et al., 1999), which consists of nine items. Each of the nine items corresponds to one of the DSM-IV diagnostic criteria for MDD. The participants were asked how often over the course of the last two weeks they were bothered by depressive symptoms. The response could be given on a four-point Likert-scale ranging from "not at all" (0), to "nearly every day" (3). With the help of these items, four different levels for depression symptomatology can be created. A sum score of 1-4 indicates the lowest level, 5-9 a mild level of depressive symptoms, a sum score of 10-14 a level of moderate depression, and a score of 15- 27 a level for heavy depressive symptoms (Kroenke et al., 2001). A score of 0 indicates no depressive symptoms. For the present sample Cronbach's alpha was acceptable $\alpha = .732$.

Trait Rumination. To measure trait rumination, the Cognitive Emotion Regulation Questionnaire (CERQ) was used as a baseline questionnaire (Garnefski et al., 2006). The questionnaire consisted of four items, measured on a 5-point Likert scale, ranging from "Almost never" (1) to "Almost always" (5). The level of trait rumination was calculated by using a sum score, ranging from 4 to 20. A higher sum score indicates a higher level of TR. Cronbach's alpha for the items of TR was acceptable, $\alpha = .752$.

Daily Momentary Questionnaires

State Rumination. SR was measured by one item asking: "In the last hour, I have been thinking about my problems". This item could be answered on a 7-point Likert scale ranging from "not at all" (1) to "very much" (7), whereby a higher score indicates a higher level of SR. Thus, the level could range from 1 to 7.

For the analysis, a participants-mean-centred (PMC) variable was calculated. To calculate PMC values, first a person mean (PM) has to be created. To do that, each measurement per person was added and divided by the number of measurements. This PM represents the overall mean per person based in all their SR measurements. To then calculate the PMC scores, each original measurement score is subtracted from the PM. This way, the PMC values represents the within-person variation in SR relative the subjects individual SR mean across all measurements.

Social Company. Social company was measured with two items. The first item asked participants if they are currently in social company, and if so, with whom. Secondly, it was asked if they perceived this company as pleasurable. More specifically, it first was asked: "Who are you with right now?". Different response options were given: "family member", "friend", "romantic partner", "co-worker/fellow-student", "unknown people/others", or "I am alone". If subjects were not alone, they subsequently rated the pleasantness of their company on a 7-point Likert scale ranging from "not at all" (1) to "very much" (7). The pleasantness of

social company could vary on a level from 1 to 7. For the analysis of the second hypothesis, a dummy variable was created for *social company* (1) and *no social company* (0).

Negative Affect. To measure negative affect, four items have been used, which could be answered on a 7-point Likert scale ranging from "not at all" (0) to "very much" (6). The items were "How anxious do you feel right now?", "How irritable do you feel right now?", "How down do you feel right now?" and "How sad do you feel right now?". To measure the level of momentary levels of participants' NA, a sum score was created which could range from 0 to 24, by which a higher scored indicated a higher NA. Cronbach's alpha value was calculated and showed a good internal consistency of $\alpha = .876$. For the analysis, PM scores and PMC scores were calculated.

Data Analysis

To analyse the collected data, IBM SPSS (version 28.0) was used. Descriptive statistics were calculated for the sample characteristics, as well as for the variables depressive symptoms, TR, SR, social company, and NA. Furthermore, a lagged variable (lag= -1) for the momentary measurement of social company was created, as well as for the pleasurableness of that social company (lag= -1). In practice, this means that these variables are moved one row lower in long format, so that they correspond with the subsequent measurement of all other variables. With the lagged variables, it is possible to investigate the influence of social company at the previous moment (t-1) on SR in the current moment (t0). For both measurements, the first momentary questionnaire of the daily measurements was not included as no lagged variable was available.

To answer the first hypothesis, two simple linear regression models were employed. In the first model, the level of depressive symptoms was used as an independent variable to predict TR. In the second model, the level of depressive symptoms was used to predict the participants' PM for SR.

To test the second hypothesis, a LMM was used. In this model, the PMC variable of NA was the dependent variable. SR served as the independent variable and while time lagged social company (t-1) was introduced as a moderator.

To test the third hypothesis, a second linear mixed model (LMM) was performed. In this model levels of SR were the dependent variable, pleasurable social company the independent variable, and depressive symptoms as a moderator. Because it was investigated whether pleasurable social company in the previous measurement point (t-1) was associated with lower levels of SR at the current measurement point (t0), the variable pleasurable social company was time lagged to one timepoint later (from t-1 to t0). This way, each measurement of pleasurable social company of a previous measurement (t-1) adhered to the its subsequent measurement for SR (t0).

Results

In total, 111 participants took part in the study. Out of this number, 80 participants had to be excluded, because they did not fill in a baseline questionnaire or did not complete enough momentary questionnaires (cut-off: ≤ 30 %), resulting in a final data set of $N = 31$. The age ranged from 19 to 53 ($M = 23.7$, $SD = 6.21$). Demographics of the final sample can be found in Table 1.

Table 1

Demographics of Participants

Baseline characteristics	*n*	%
Gender		
Female	12	39
Male	18	58
Other	1	3
Nationality		
German	19	61
Dutch	10	32
Other	2	7

To have an overview about the scale distributions, descriptive statistics for depressive symptoms, TR and SR, social company and NA have been calculated (see, Table 2).

Table 2

Scale Distribution for Levels of Depressive Symptoms, Rumination, Pleasurable Social Company, Negative Affect

Scale	*M*	*SD*	Range	Min	Max
Depressive symptoms	9.38	5.10	0 -25	1	25
Trait rumination	10.54	2.68	4 -20	4	16
State rumination	2.45	1.55	1 - 7	1	7
Pleasantness of social company	5.32	1.61	1 - 7	1	7
Negative affect	7.89	3.99	0 -24	4	27

At baseline, all participants reported to have at least one depressive symptom "for several days" in the previous two weeks. In total, 17 % of the participants could be categorised within the lowest level of depressive symptoms, 40 % within mild depressive symptoms, 33 % with moderate depressive symptoms, and 10 % scored within the level of heavy depressive symptomatology. This distribution of the percentages is somewhat more pronounced when compared to the European norm (Hapke et al., 2019).

For being in social company or not, it could be found that for 60 % of the measurement points, people were in social company and for 40 % of the time, people were alone. For a more detailed display of social company see Table 3.

Table 3

Distribution of Social Company over the Course of Seven Days

Variable	Percentage	Mean pleasurable social company
Social company	60	5.32
Family members	14	
Friends	15	
Romantic partner	15	
Co – workers/ fellow students	10	
Stranger	7	

Note: 40 percent of the of the measurement points were spent alone.

Hypotheses Testing

It was examined whether higher levels of depressive symptoms are associated with higher levels of TR and SR. The simple linear regression analysis showed that depressive symptoms [$\beta = .22, p = .02$] was significantly associated with TR. Thus, people with a higher level of depressive symptoms were ruminating more on a trait level than people with lower levels of depressive symptoms. For the relationship between depressive symptoms and SR, no significant association was found [$\beta = 1.73, p = .06$]. Based on these results, *H1* was only partially supported as the level of depressive symptoms predicted TR but not SR.

Furthermore, the first LMM tested whether social company lowered the effect of SR on NA. The analysis showed a significant association between SR and NA [$\beta = .31, p > .01$]. Hence, higher levels of SR were associated with higher levels of NA over time. Lagged social company did not significantly predict NA [$\beta = .05, p = .69$]. Thus, whether individuals experienced social company or not in the previous moment did not predict their level of NA in the current measurement point. Additionally, there was no significant interaction between SR*lagged social company on NA [$\beta < .01, p = .91$]. As can be seen in Figure 2, whether people had social company or not in the previous moment did not have a decreasing effect on the relationship between SR and NA in the current moment. Therefore, *H2* was rejected.
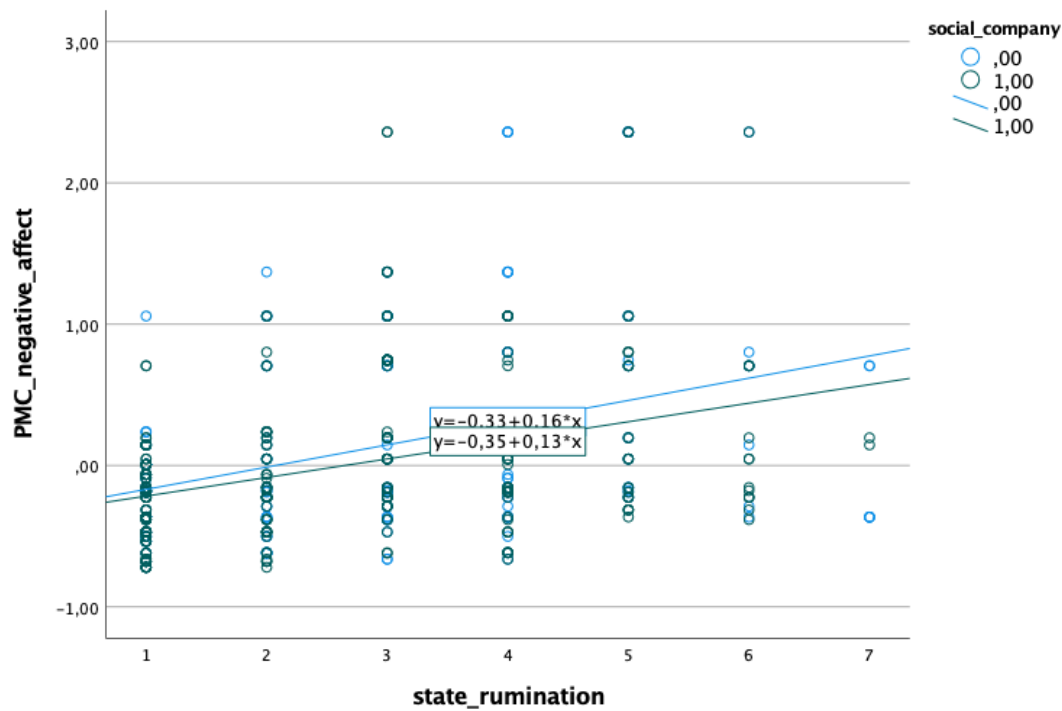
Figure 2. Level of state rumination with negative affect by social company

Note: 0 = no social company, 1 = social company.

With the second LMM, it was investigated whether levels of depressive symptoms would moderate the relationship between pleasurable social company and SR. In this model, lagged pleasurable social company did not predict SR [$ß$ = .02, p = .89]. Thus, whether individuals had pleasurable social company at the previous measurement point did not decrease levels of SR at the current measurement point. Next, the level of depressive symptoms did not have a significant effect on levels of SR [$ß$ = .05, p = .49]. Accordingly, the level of participants' depressive symptoms at baseline did not predict their levels of SR over time. No significant interaction of depressive symptoms*lagged pleasurable social company on SR [$ß$ < -.01, p = .73] was found. Therefore, the level of depressive symptoms at baseline did not moderate the relationship between pleasantly perceived social company at the previous timepoint and SR at the current timepoint. Therefore, *H3* was rejected.

Discussion

This study aimed to investigate the role of social company on the relationship between rumination and depressive symptoms. The findings do not support the notion of social company as a protective factor in this relationship, although SR and NA were significantly associated. Further, the level of depressive symptoms at baseline did not moderate the relationship between pleasurable social company in one moment and the level of SR at the subsequent moment. However, the findings showed that people with higher depressive symptoms ruminated more on a trait level then people with lower levels of depressive symptoms.

The Influence of Social Company on State Rumination and Negative Affect

The findings of this study indicate that SR predicted NA over time, while the presence of earlier social company did not moderate this association in the following moment. A reason for this finding might be the broad conceptualisation of the social company construct and its measurement. We asked participants who they were with "right now", whereby they could choose from six options (see, *Methods*). Although participants could indicate this way whether they were, for example, with their family or with co-workers, this did not allow to assess the personal relevance or meaning of their social company to the participants. Likewise, we were not able to measure the reasons for why a certain social company was perceived as pleasurable or not. This might be crucial for the impact of social company because more specific social constructs, such as perceived social support, are dependent on individual interpretation (Bell et al., 2018). Participants may rate their company with co-workers as highly pleasant compared to previous experiences, but they may not perceive any social support from that particular company. In this case, social company might not capture the underlying factor of social support that was found to be buffering the amplifying effect of SR on NA (Nolen-Hoeksema & Davis, 1999; Puterman et al., 2010; Rimé, 1995; Vélez et al., 2016). Moreover, social company alone does not indicate whether participants actively

engaged with that company. Even if participants found the company of their family pleasant, it is still plausible that they did not interact enough to distract them from their ruminating thoughts and increase their mood (Nolen-Hoeksema et al., 2008). Again, social company may have not been a sensitive enough construct to differentiate between the mechanisms that are thought to decrease the influence of SR on NA. Taken further, social company did not allow measure whether participants co-ruminated, which has been found to even increase the negative impact of SR on NA (Ames-Sikora et al., 2017). In this case, the inverse effect of moments in which subjects engaged in co-ruminated could have obscured the positive effect of moments in which people perceived social support, leading to a null finding.

In sum, the broadness of the social company construct could have gathered different components with opposite effects without the capability to distinguish between them. To investigate these options, upcoming studies should narrow their constructs, e.g., to social support or social interaction, in combination with more in-depth items that allow to measure the participants' personal interpretation of these interactions.

The Pleasurableness of Social Company Related to State Rumination

Pleasurable social company at one moment did not decrease SR in the subsequent moment, and this was not moderated by depression levels at baseline. Normally, pleasurable social company is seen to serve as a cognitive distraction from ruminating thoughts for individuals with severe depression (LeMoult, et al., 2016). As depressed people experience deteriorated cognitive functioning, including self-regulation of thoughts and mood (Liu & Thompson, 2017), social company offers an opportunity to exit the ruminative thought cycle. This idea is supported by findings showing a positive effect of instructed external distraction on mood in MDD patients but not in those without a full diagnosis (Whitmeret al., 2012). For individuals who are not depressed, or fall within the subclinical spectrum, cognitive functioning is less diminished (Liu & Thompson, 2017). Hence, people with lower symptomatology may have more cognitive resources to distract themselves from rumination.

For them, social company may not be a requirement to reduce their rumination and thus it may only serve as a protective factor for highly depressed individuals.

Since the current sample contained only a small proportion of strongly depressed participants, it is possible that the buffering effect of social company on the relationship between SR and depressive symptoms might be detected in a sample with more strongly depressed participants. Future rumination studies that would specify MDD section criteria (as in, Kircanski et al., 2015; Ruscio et al., 2015) should investigate whether the protective factor of social company becomes evident for strongly depressed individuals.

Trait and State Rumination Related to Depressive Symptoms

Higher scores of depressive symptoms were associated with higher scores of TR. However, this association could not be found with SR. One possible cause for this could be again the participants' level of depressive symptoms. Although the participants in this study showed rather high levels of depressive symptoms compared to the European norm (Hapke et al., 2019), only 10 percent showed very high levels of depressive symptomatology, that would be categorise as a MDD diagnosis (Kroenke et al., 2001). Previous ESM studies that found a relationship between SR and depression have included only MDD patients (Kircanski et al., 2015; Ruscio et al., 2015). Therefore, it is possible that the relationship between SR and depression is only present for individuals who are already experience heavy symptoms but not for those who fall within the subclinical spectrum.

The reason for this may lie in the two different thinking modes of *concrete* and *abstract rumination* (Treynor et al., 2003). Concrete rumination is characterized by productively processing specific details about negative stimuli and their relation to one's feeling, leading to clear and precise thoughts (Stöber & Borkovec, 2002). *Abstract rumination*, involves a generalized focus on finding the overarching reason for one's emotions, often leading to self-critical and negative conclusions (Treynor et al., 2003). Concrete rumination has been associated to better mental health (White & Wild, 2016),

whereas abstract rumination is associated with higher levels of depression (Watkins et al., 2008). Hence, it is possible that subjects with higher depressive symptoms as well as those with lower depressive symptoms have engaged in SR, but the mode in which they ruminated was different, one being adaptive, the other being maladaptive. In this case, it is no longer as surprising that depressive symptoms and SR were not associated between subjects, given that healthy individuals commonly engage in concrete rumination. Upcoming studies would be needed which differentiate between these different modes of rumination to investigate this association in more depth.

Strengths and Limitations

One strength of this study was investigating the association between social company and rumination with ESM. To our knowledge, no previous research investigated these associations over time in relation to depressive symptoms. Investigating these associations with ESM allowed to capture SR and social company in daily life 10 times per day, and assess time-consistent within-subject effects. At the same time, this study design represents the first limitation. 10 measurements per day, even if they take only two minutes to complete, can increase participants' burden as they interfere with daily life activities (Myin-Germeys & Kuppens, 2022). A solution to this might be to measure social company with passive monitoring (Myin-Germeys & Kuppens, 2022). Through the microphone, Bluetooth or GPS of the smartphone, it can be identified if participants are in company, their active engagement, and even the content of conversations (Bachmann, 2015; Morshed et al., 2019).

The participants' burden has probably also contributed to the second limitation, which is the large attrition rate. In total, 80 participants had to be excluded because they either did not fill in the baseline questionnaire or did not manage to fill in more than 30 percent of the daily measurements. This led to the relatively small sample size (N= 31). It is possible that attrition was systematic. For example, it is plausible that primarily those participants who displayed high levels of depressive symptoms and rumination withdrew because for them the

burden of the study design was too high. The skewedness of depressive symptoms in the current sample points towards this notion. Still, the original research question of this study concerned subclinical levels of depression. Upcoming studies that focus on MDD patients should examine whether these findings translate to higher levels of depressive symptoms to find out whether social company can serve as a protective factor for MDD patients.

Lastly, SR was only measured using one item. Even though this item likely captured the main aspect of rumination as it asked about problem related thoughts, recent conceptualisations proposed that SR encompasses multiple facets, such as emotion regulation, brooding, and negative thoughts (Marchetti et al., 2018). These authors created a new 8-item questionnaire, which showed excellent psychometric properties in terms of reliability and measurement invariance in three independent samples (Marchetti et al., 2018). It is therefore possible that our item only concerned a single dimension of SR and that a more complete assessment of SR would have yielded different results. At the same time, longer questionnaires rapidly increase participants' burden, especially in ESM (Degroote et al., 2020). Prior research shows that short-forms of questionnaires can achieve sufficient psychometric properties without being too burdensome (Degroote et al., 2020). Therefore, future ESM studies could profit from the employment of a short-form of Marchetti and colleagues' (2018) instrument as a solution to combine valid assessment with little burden for participants.

Conclusion

The current study has confirmed previous findings regarding the relationship between rumination and depression. Firstly, higher TR was associated with higher levels of depression. Secondly, SR was associated with NA, a known mediator for the relationship between rumination and depression. However, no evidence of the role of social company as a protective factor against SR on NA for subjects of varying depression levels was found. At the same time, few participants of the sample experienced high levels of depressive

symptoms, and so it remains unclear whether social company might hold potential as a protective factor for patients with a full MDD diagnosis.

     To conclude, this study has added to the understanding of risk factors for depressive symptoms by replicating some of the previously shown associations. We collected first evidence showing that social company might not serve as a buffer against increased state rumination and negative affect for individuals with subclinical depressive symptoms.

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