The effect of hypervigilance on negative memory recall in socially anxious people

Clinical Psychology Master's Thesis

Faculty of Social & Behavioural Sciences

Utrecht University

March 21st, 2017

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Word count: 5000

Abstract

The aim of this thesis was to explore the existence and effects of hypervigilance on negative memory recall of a social situation. It was hypothesised that a higher level of social anxiety would predict a higher level of hypervigilance. A higher level of hypervigilance would predict a higher amount of negative memories recollected, as well as a higher accuracy of negative memory recollection versus positive or neutral memory recollection. In order to do this, 33 participants took place in a 3-part experiment. The participants had to perform a social stress task in the form of having a speech in front of a 4 man audience. Their memory recollection was measured at two time-points via a questionnaire about the audience's behaviours and surroundings.

As the measurement of the level of hypervigilance had an unreadable output, the level of social anxiety was used to predict the negative memory recollection and the accuracy thereof. Results show that a higher level of social anxiety predicts a significant lower level of negative memory recollection, opposite that which was expected. It also shows that a higher level of social anxiety predicts a significant lower accuracy of negative memory recollection compared versus positive or neutral memories, also opposite than what was expected. Future research should focus on the attentional shift away from all social stimuli in social situations instead of hypervigilance, as this seems to have a greater effect on memory recollection of daily life.

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Introduction

Social interaction and its importance

Social interaction happens almost every day for nearly everyone. It takes different forms, from talking to friends to replying to an e-mail. Social interaction guides us in our place in society, and is even perceived as a fundamental need for humans (Maslow, 1943; Kenrick, Griskevicius, Neuberg, & Schaller, 2010). Quality of social contact is an important aspect of quality of life (Pinquart, & Sörensen, 2000). Approval and disapproval from others strongly influence the self-esteem of an individual (Leary et al., 2003). Self-esteem consequently predicts quality of social support (Marshall, Parker, Ciarrochi, & Heaven, 2014), which has an important influence on the development of coping mechanisms and possibly reducing stress. However, social interactions and social support do not only provide positive influences on an individual's well-being. Negative social outcomes are more strongly related to well-being than positive social outcomes (Rook, 1984). Negative, or problematic, social interaction is related to increased depression, and anxiety, and general lowered well-being (Revenson, Schiaffino, Majerovits, & Gibofky, 1991; DiNicola, Julian, Gregorich, Blanc, & Katz, 2013). If attention in social interactions would only be focused on negative feedback, the social interaction would more quickly be interpreted as negative or problematic.

Facial expression is one of the most powerful, natural, and immediate means for human beings to communicate their emotions and intentions (Shan, Gong, & McOwan, 2009). This makes imprecision or failure to correctly interpret this information in facial expressions a possible cause for negative or problematic social interaction. There is certainly variability in the information that individuals extract from a facial expression, and between the intended expression and the information interpreted by the perceiver (Hess, Blairy, & Kleck, 1997; Niedenthal, Halberstadt, Margolin, & Innes-Ker, 2000; Wagner, MacDonald, & Manstead, 1986). This variability however, can cause serious problems in how social situations are interpreted as a whole, making them seemingly more dangerous than necessary. This misinterpretation can eventually lead to pathological anxiety.

Social anxiety disorder – prevalence and problems

Social anxiety disorder (SAD) is characterized by an extreme fear of being negatively evaluated by other people (American Psychiatric Association, 2013). The lifetime prevalence for this disorder in the Netherlands is 9.3% (7.7% for men and 10.9% for women) and the 12-month prevalence is 3.8% (3.2% for men and 4.4% for women; de Graaf, ten Have, van Gool & van Dorsselaer, 2012). Individuals with diagnosed SAD also have an elevated risk for comorbid disorders, such as a panic disorder or depression, with comorbidity rates as high as 71.2% for anxiety disorders and 65.3% for mood disorders (Fehm, Beesdo, Jacobi, & Fiedler, 2008). It is also associated with a

reduced quality of life in various domains, which also shows in the number of disability days individuals with SAD report (35 vs. 12 days in the control group; Fehm, Beesdo, Jacobi, & Fiedler, 2008). Unfortunately, when left untreated, SAD is generally chronic and unremitting (Bruce, & Saeed, 2014).

Social anxiety disorder – the model

As the prevalence and severity of SAD became apparent, research has increasingly focused on explanatory models of the disorder in an effort to improve treatment. The most widely cited and applied of these models have been those emphasising the role of cognitive processes in the maintenance of SAD, specifically those of Clark and Wells (1995), and Rapee and Heimberg (1997). Several potentially fruitful models that build on this foundational work have also recently been proposed (see Hofmann, 2007). Each of these models aim to explain the cognitive processes that maintain SAD, and break this down into several factors. These factors and their underlying relation are clearly depicted in figure 1, which shows the model of Clark and Wells (1995).

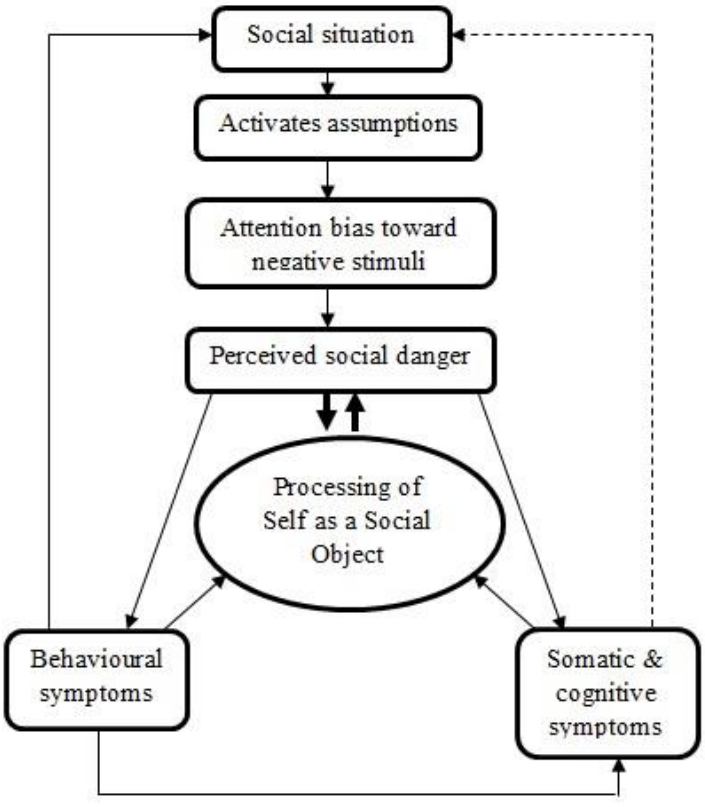


Figure 1. Cognitive model of social anxiety, adapted from Clark & Wells (1995).

Within this framework, the social situation refers to the situation in which the socially anxious person might find themselves, and which activates their assumptions about a high social standard. This might also happen in a situation where this there is no performance evaluation present. The social situation activates certain assumptions within socially anxious people, such as the assumption of not being able to convey a desired impression, and belief that others may hold high standards for their performance. The consequences of performance are also often overestimated (Hofmann, 2007). This might cause socially anxious people to perceive these social situations as dangerous, causing an anxious reaction. When confronted with a social threat, the person tends to shift their attention inward and engage in a process of detailed monitoring and observation of themselves (Hirch, Clark, Mathews, & Williams, 2003). This, however, often means that they overestimate how visible their symptoms of anxiety are, and how negatively they will be judged by those in their environment (Heimberg, Brozovich, & Rapee, 2010; Woody, 1996).

As a reaction to this anxiety, socially anxious people often engage in safety-behaviours in order to avoid or remove feared social situations or stimuli (McManus, Sacadura, & Clark, 2008). These safety behaviours can range from avoiding eye contact to not attending a social situation at all. This avoidance reduces the immediate anxiety socially anxious people feel, even in the smallest ways, and so do not disconfirm the evidence of the perceived social danger. Thus, these safety behaviours establish a positive feedback loop, as anxiety in social situations remains unchanged despite repeated, and often successful, social encounters (Wells, Clark, Salkovskis, Ludgate, Hackmann, & Gelder, 1996).

Hypervigilance as a cognitive maintaining factor for SAD

To perceive a social situation as dangerous, socially anxious people need only the slightest of negative social cues during this situation. This leads to another cognitive maintaining factor for SAD; the negative attentional bias, or hypervigilance. Research has shown that people with SAD have a tendency to miss important positive cues during a social encounter, and have a heightened awareness of negative cues in comparison to non-anxious controls (Hirsch, & Mathews, 1997; Hirch, & Mathews, 2000). Generally, experimental evidence supports the proposal that attention is directed to stimuli that are relevant to the concerns of the specific anxiety disorder, which in this case would be social stimuli (for a review, see Harvey, Watkins, Mansell, & Shafran, 2004). In fact, electrophysiological studies have demonstrated that adults with SAD demonstrate abnormal attentional processes consisting of early hypervigilance followed by attentional avoidance (i.e., reduced visual processing) of social threat stimuli (Mueller et al., 2009). This supports the vigilance-avoidance hypothesis of Mogg, Bradley, De Bono, and Painter (1997) and Mogg and Bradley (1998). Within social situations, hypervigilance-avoidance may result in the initial enhanced processing of threatening

stimuli, yet the reduced opportunity to habituate to, or reappraise the stimulus as non-threatening (Bögels, & Mansell, 2004). This would mean that socially anxious people would be initially hyperaware of negative social cues, while missing more positive or neutral ones, after which the social situation is perceived as dangerous and their attention focuses more inwardly. As a result, the socially anxious person would miss the opportunity to see the negatively appraised social cue as anything different, and they would miss other correcting positive social cues. If this happens, the memory recall of a socially anxious person would be biased toward negative social cues, essentially programming the memory of the entire situation as a negative one, when stored.

However, studies have provided mixed results about the existence and effect of hypervigilance on the maintenance of SAD. As this negative attentional bias can influence the interpretation of the social situation as a whole (especially considering the fact that attention will be followed by avoidance of social stimuli), it is imperative to know more of the exact effect it has on the immediate interpretation, but also the recollection of social interactions. Therefore this thesis will focus on the effects of hypervigilance in a social situation in order to provide more insight in the consequences of this maintaining factor.

Current study

Thus, in the current study, the first question that will be answered is if people with a higher score on social anxiety, or social phobia, display hypervigilance. This will be tested by the following hypothesis:

1. Participants with a higher score on the Social Phobia Scale (SPS) will have a higher score on hypervigilance, as measured by the face dot probe task.

Next, the effect of hypervigilance on memory recall will be investigated. Specifically, we propose the following hypotheses:

2. Participants with a higher score on hypervigilance, as measured by the face dot probe task, will remember more negative stimuli than neutral or positive stimuli after the social stress task (speech task), and after 24 hours.
3. Participants with a higher score on hypervigilance, as measured by the face dot probe task, will remember negative stimuli after the social stress task (speech task) more accurately than people with a lower score.

Method

Ethical approval was received from the Faculty of Social and Behavioural Sciences Human Research Ethics Committee before conducting the experiment.

Participants

Participants were approached via social media websites, the personal network of the researchers, the Utrecht University research participation website, and flyers (Appendix A) and handouts posted around Utrecht University. The information made available on all forms of recruitment was the same. Bachelor Psychology students were eligible for course credit, all other participants were entered in a raffle to win a 30 euro voucher for bol.com. Informed consent was obtained from all participants.

In the first set of questionnaires participants were formally screened for their age (between 18 and 74), anxiety, depression, and suicidality, and were immediately excluded if there was an indication of a positive score on any of these exclusion criteria.

Apparatus and Materials

Social anxiety. The level of social anxiety was measured by the Social Phobia Scale (SPS; Mattick & Clarke, 1998; Safren, Turk, & Heimberg, 1998). The cut-off score for social phobia is 24 (Heimberg, Mueller, Holt, Hope, & Liebowitz, 1993). The Dutch version has a high reliability of α = 0.93 (de Beurs, Tielen, & Wollmann, 2014). The current study has a high reliability of α = .93 and α = .79, English and Dutch respectively.

Depression. The level of depression was measured by the Patient Health Questionnaire (PHQ-9; Kroenke, Spitzer, & Williams, 2001). The English version has a high reliability of α = .89 (Kroenke, Spitzer, & Williams, 2001), and the Dutch version has shown a reliability of α = .77 in previous unpublished theses (van de Kerkhof, Lurvink, & Lindeboom, 2016; Nooten, 2016). The current study has a high reliability of α = .84 and α = .82, English and Dutch respectively. The PHQ-9 also screens for suicidal thoughts via the last item.

Anxiety. The level of general anxiety was measured by the Generalized Anxiety Disorder Scale (GAD-7; Spitzer, Kroenke, Williams, & Löwe, 2006). The English version has a high reliability of α = .92 (Spitzer et al., 2006), and the Dutch version has a high reliability of α = .86 (Donker, van Straten, Marks, & Cuijpers, 2011). The current study has a high reliability of α = .82 and α = .87, English and Dutch respectively.

Memory recollection. Memory recall and focus of attention were measured by the memory questionnaire which had been previously developed for the video used in this research. The Dutch

version has shown a reliability of α = .60 in previous, unpublished theses (van de Kerkhof, Lurvink, & Lindeboom, 2016; Nooten, 2016). This questionnaire has been translated for this study by a researcher fluent in Dutch as well as in English. The current study has a high reliability of α = .75 and α = .84, for English and Dutch versions respectively. The questionnaire and scoring can be found in Appendix B.

Video audience. A pre-recorded video of four students was used as an audience, based on a standardised audience from Goodacre and Zandro (2010) and created as part of pilot work conducted in the supervisor's lab (van de Kerkhof, Lurvink, & Lindeboom, 2016; Nooten, 2016). The video contained a short sequence of 'responses' of the audience to increase the impression of the live video feed.

Field-perspective pictures. Standardized field-perspective pictures of the audience were used, as seen from the point of view from the camera the participant would be wearing. These were used in order to prevent problems with the transfer of the photos from the camera to the computer, and prevent blurred pictures due to the movement of the participant. A sample can be seen in Appendix C.

Hypervigilance. The face dot-probe computer task presents a series of picture pairs of negative and neutral social cues. It has been primarily used to assess the relation between anxiety and attention orienting in adults (Mogg, Philippot, & Bradley, 2004). The pictures used in this experiment were one of a man and one a woman, both once looking angry and once looking neutral.

The task consisted of one block of practice stimuli of 16 picture pairs, followed by six experimental blocks. The six test blocks each contained 24 picture pairs and were separated by a short break, after which the participants themselves could press space to continue the task. Each presentation consisted of three sequential phases: (1) a 500 millisecond fixation cross that would appear in the centre of the screen, (2) a 500 millisecond simultaneous presentation of two picture stimuli that were centred and located with equal space above and below the fixation cross, and (3) an asterisk replacing one of the pictures. The participants were asked to press either 'i' or 'm' if they saw the asterisk above or below the fixation cross respectively.

Procedure

General overview

This study consisted of three phases: a first set of questionnaires including the screening for exclusion criteria, a lab procedure including a computer task and a three-minute speech task, and a last set of questionnaires sent 24 hours after participation in the lab procedure. All questionnaires were presented via the website 'Qualtrics.com'.

First set of questionnaires (Figure 2)

Participants were asked to respond to the recruitment via e-mail, or to follow a link or QR-code directly to the first set of questionnaires. In this set of questionnaires participants were screened for the exclusion criteria. These were: scoring ≥20 on the PHQ-9, ≥15 on the GAD-7, and ≥0 on the suicidality item of the PHQ-9. Eligible participants were contacted by the researchers via e-mail to make an appointment for the in-lab procedure of the experiment.

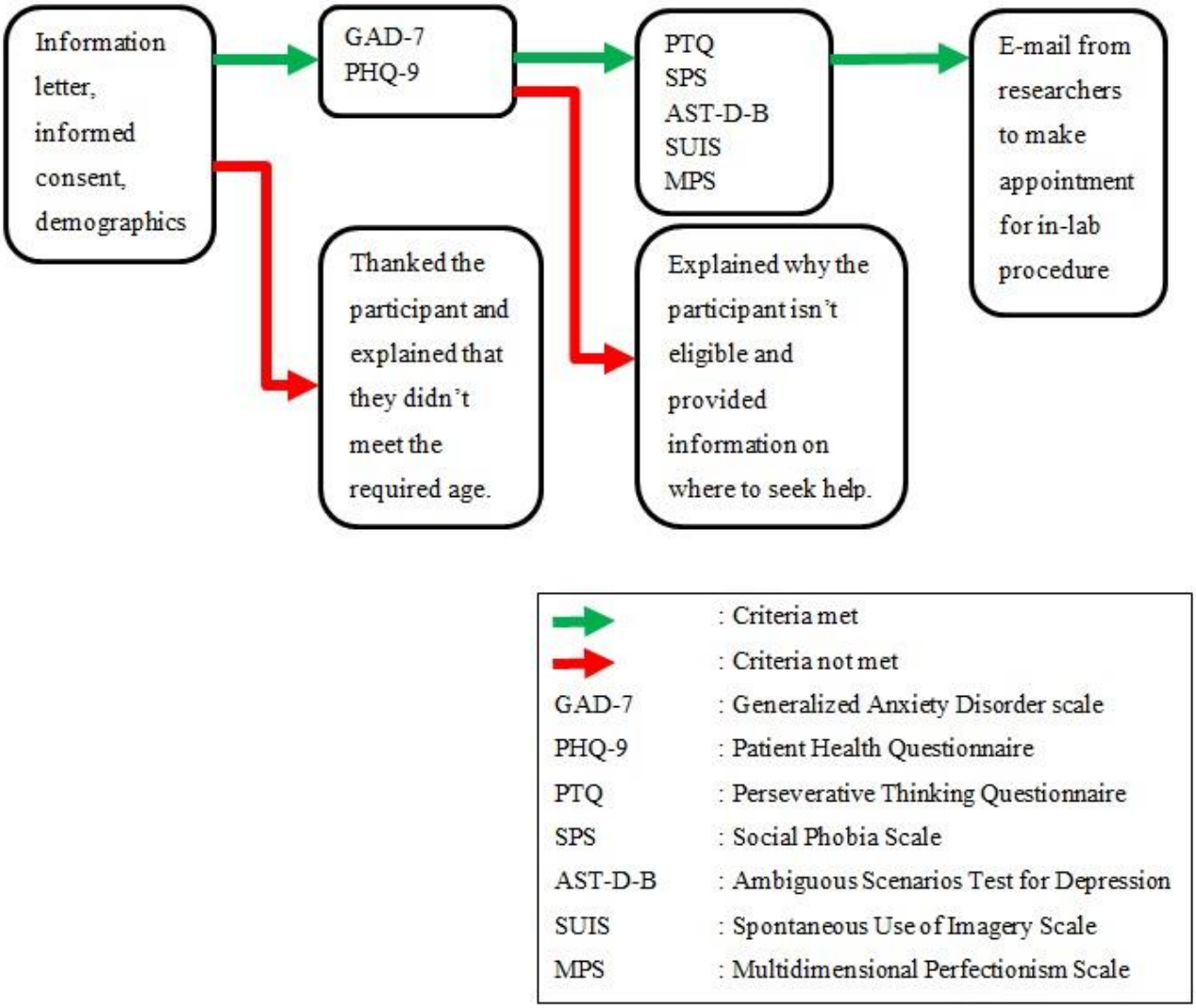


Figure 2 Flowchart showing the first set of questionnaires.

Lab procedure (Figure 3)

The second part of the research took place in a laboratory on the Utrecht University campus. This was a private room with two desks, with on each a computer, and a divider screen between the desks. The participants were informed about all the stages of the lab procedure, including that the researchers present were investigating social information processing during a social interaction, and

would only focus on the interaction between the participant and the audience via wearable cameras. The participants were then asked to wear the FitBit so the researchers could monitor the participants' heartrate throughout the procedure, and to wear the camera as to monitor the social interaction.

The participants would then fill in a questionnaire via a mobile phone that was provided, and then asked to do a short computer-task. When completed, the participants were asked to prepare the speech task. They were provided with a piece of paper containing the instructions and some examples of what they could talk about (seen in Appendix D). There was a timer for three minutes visibly present on a smartphone for the participants to track the time left to prepare. After the participants were done, they were instructed to stand in front of the second computer. They were shown the audience and instructed that the audience was asked not to engage with them in any way. This was to account for the lack of response that the participants might expect. The researcher then pretended to interact with the audience to ensure believability. For the speech there was a timer for three minutes visibly present on a smartphone for the participant to track the time. The researchers sat behind the screen as to not influence the participants in their speech with their reactions. After three minutes the participants were asked to stop.

The camera would be connected to the computer the speech was given on, and the participant was asked to fill out another questionnaire at the other desk. After this, the procedure depended on the condition the participants were placed in.

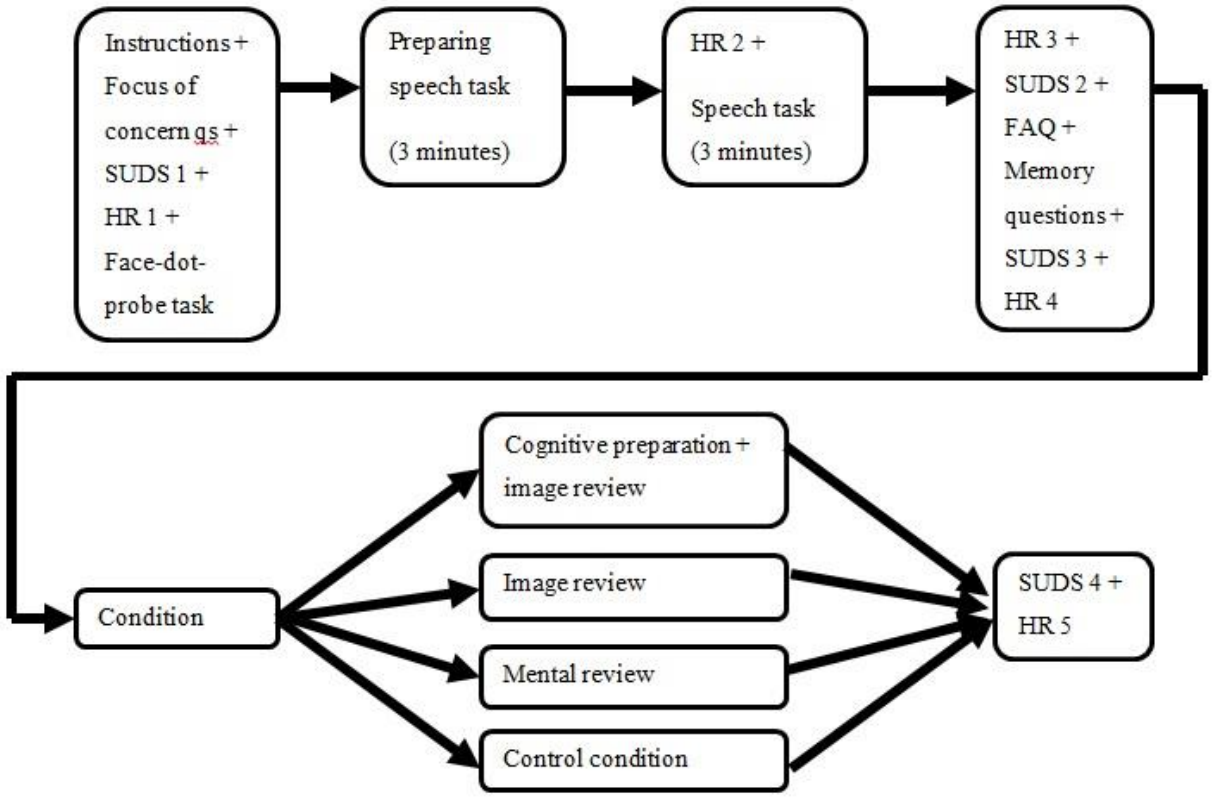
Condition 1. Cognitive preparation and image review condition. This condition contained cognitive preparation based on Harvey, Clark, Ehlers, and Rapee (2000). After this the participants were asked to review the standardized images.

Condition 2. Image review condition. This condition contained only the task of reviewing the standardized images.

Condition 3. Mental review condition. This condition contained a task to mentally review the speech they had done from their perspective, and to verbally recall any of the behaviour from the audience.

Condition 4. Control condition. This condition only contained the speech task. The participants were given a minute to rest with the option of doodling on a piece of paper with a pen.

Afterwards the participants were asked to fill out the last questionnaire. Then they were thanked for participating and told that they would receive an e-mail with a link to the last set of questionnaires in 24 hours. It was emphasized that it was important to fill this out on the same day they receive the link.



SUDS X	: Subjective Units of Distress Scale (X indicating different time points)
HR X	: Heartrate (X indicating different time points)
FAQ	: Focus of Attention Questionnaire

Figure 3 Flowchart showing lab procedure.

Follow-up

Approximately 24 hours after the lab procedure of the research the participants were sent a link to the last set of questionnaires. In this they were asked a few questions about the perspective in which they remembered their speech task, and if intrusive thoughts about it had occurred. Then the participants answered the memory questions, and afterwards received the debriefing. This was also the point at which they could leave their student number to receive the course credit, and their e-mail address to participate in the raffle for the bol.com voucher.

Analysis

SPSS (Version 24, SPSS, Inc. Chicago, IL, USA) was used to analyse the data. Because of the design of this research, a linear regression analysis will be conducted to test hypothesis 1, and a multiple linear regression analysis will be conducted to test hypothesis 2 and 3.

Results

Limits original method

When the data was opened for analyzation, it was discovered that the data from the face dot-probe task, measuring hypervigilance, did not differentiate between the previously stated conditions (neutral-neutral vs. neutral-threat). Neither did the output indicate which of the pictures was replaced by the asterisk. Because the necessary conditions could not be analyzed, a different approach was taken. Instead of having the score on the SPS predict a higher hypervigilance, which in turn would predict a higher negative memory recollection, it was predicted that the score on the SPS would predict a higher negative memory recollection. This would also imply the existence and effect of hypervigilance. Thus, the following hypotheses were tested:

1. Participants with a high score on the SPS will have a higher score on negative memory recollection immediately after the social stress task.
2. Participants with a high score on the SPS will have a higher score on negative memory recollection at the follow-up.
3. Participants with a high score on the SPS will have a higher score on accuracy of negative memory recollection immediately after the social stress task.
4. Participants with a high score on the SPS will have a higher score on accuracy of negative memory recollection at the follow-up.

Descriptive Statistics

A total of 56 people participated in the study, 31 English speaking and 25 Dutch. A total of 8 participants were excluded, and 14 dropped out or had incomplete data. This brings the total to 33 complete datasets (18 English and 15 Dutch; 11 male and 22 female). The participants were randomly allocated to the conditions: 10 in the control condition, 4 in mental review, 10 in image review, and 9 in image review with cognitive preparation. One outliers was found by means of the boxplots in SPSS; case 1 (on total score of SPS). This had a score of 37 on the SPS, being 4 points higher than the other maximum. As the amount of participants was low, their scores could be misrepresentative of the population, thus the data was included in the final dataset.

The descriptive statistics concerning age, total scores for GAD-7, PHQ-9, SPS, positive and negative memory questions, and the ratio of negative versus positive and neutral memory questions at both in-lab and follow-up can be found in table 1.

Table 1

Descriptive statistics for age, sex, total scores on the GAD7, PHQ9, SPS, negative and positive memory questions at T1 and T2, and accuracy for negative and positive memories.

	Range	Minimum	Maximum	*M*	*SD*
Age (in years)	15.00	18.00	33.00	23.79	3.12
Total GAD7	15.00	.00	15.00	4.91	3.82
Total PHQ9	21.00	.00	21.00	5.27	5.32
Total SPS	36.00	1.00	37.00	12.70	9.42
Total Negative Memories (T1)	3.00	.00	3.00	1.39	.79
Total Negative Memories (T2)	3.00	.00	3.00	1.85	.87
Ratio Negative vs. Positive and Neutral (T1)	3.33	.00	3.33	1.04	.80
Ratio Negative vs. Positive and Neutral (T2)	2.50	.00	2.50	1.04	.53

Participants were grouped together as ‘low SPS score’ and ‘high SPS score’, with a score of 24 being the cut-off as a threshold for clinically meaningful social anxiety symptoms (Heimberg et al., 1993). Descriptive statistics concerning these groups can be found in table 2.

Table 2

Descriptive statistics for low and high SPS scores

	N	Range	Minimum	Maximum	*M*	*SD*
Low SPS	28	22	1	23	9.64	6.09
High SPS	5	13	24	37	29.80	5.26

Analysis

After checking the assumptions, the normality was met for the dependent variable of social phobia and memory recollection. The assumption of homoscedasticity was also met, by Levene’s tests. These results can be found in table 3.

Table 3

Test of homogeneity of variance

	Levene Statistic	df1	df2	Sig.
Total Negative Memories (T1)	1.94	1	31	.17
Total Negative Memories (T2)	1.02	1	31	.32
Ratio Negative vs. Positive and Neutral (T1)	.12	1	31	.73
Ratio Negative vs. Positive and Neutral (T2)	.60	1	31	.45

** significance of $p < .05$*

The first two hypotheses explored the effect of the conditions of a high or low score on social anxiety on the negative memory recollection at two different time-points, which was measured by the total score on negative memories on those respective time-points. An independent samples t-test was used to test these hypotheses. The analysis revealed no significant effect for negative memory recollection at time-point 1 (t[31] = -1.22, p = .23), but it did at time-point 2 (t[31] = -.2.56, $p < .05$). The effect sizes was r = .21 for time-point 1, and r = .42 for time-point 2. However, when the direction of the effect was analyzed, it was in the opposite direction than hypothesized, as can be seen in figure 4. It was checked if the review conditions influenced the negative or positive memory recollection at time-point 2, which they did not (t[31] = -1.55, p = .13; t[31] = -1.16, p = .25; negative and positive respectively).

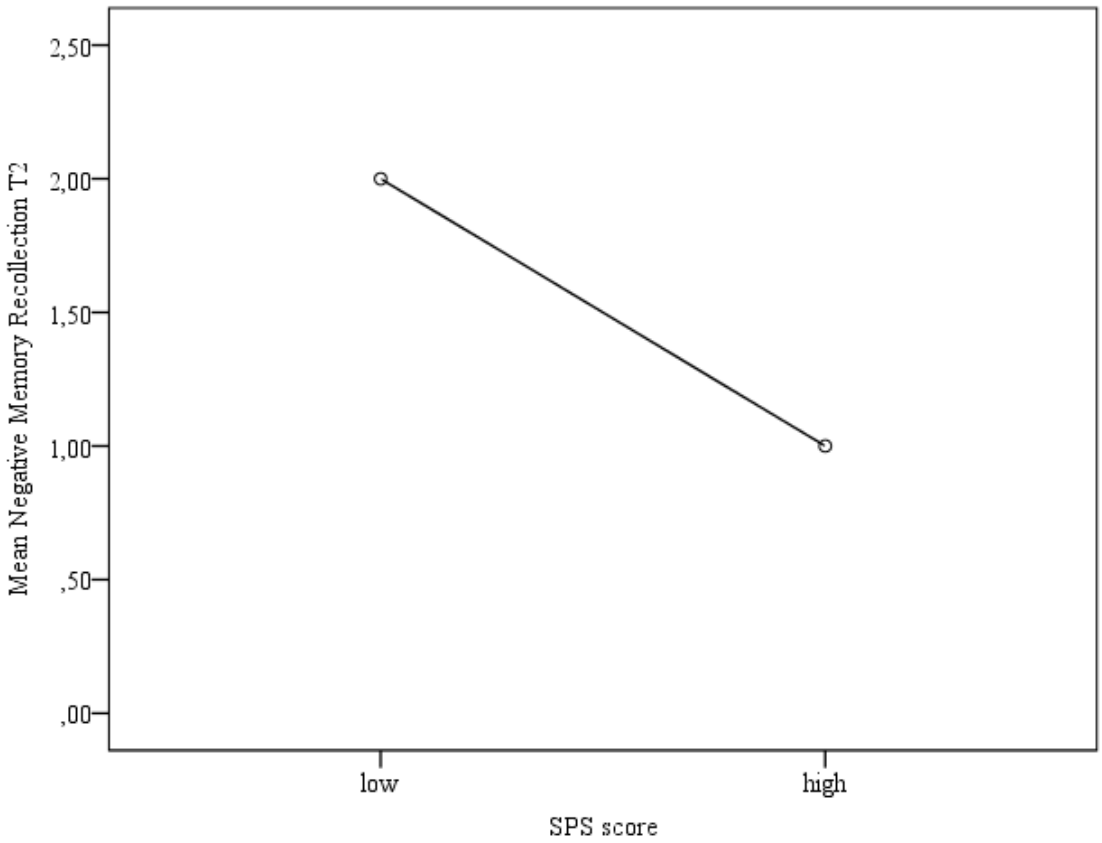


Figure 4 Effect of SPS score on negative memory recollection in follow-up.

The third and fourth hypotheses explore the effect of the conditions of a high or low score on social anxiety on the accuracy of negative memory recollection at two different time-points, which was measured by the ratio of the scores of negative memory recollection versus positive and neutral memory recollection combined. Two datasets were excluded based on division by zero when calculating this score. An independent samples t-test was used to test these hypotheses. The analysis revealed no significant effect for negative memory recollection at time-point 1 (t[29] = -.36, p = .72), but it did at time-point 2 (t[29] = -2.05, p = .05). The effect sizes were r = .07 for time-point 1, and r = .36 for time-point 2. It was checked if the review conditions influenced the memory recollection at time-point 2, which they did not (t[29] = .08, p = .94). However, when the direction of the effect was analyzed, it was in the opposite direction than hypothesized, as can be seen in figure 5.

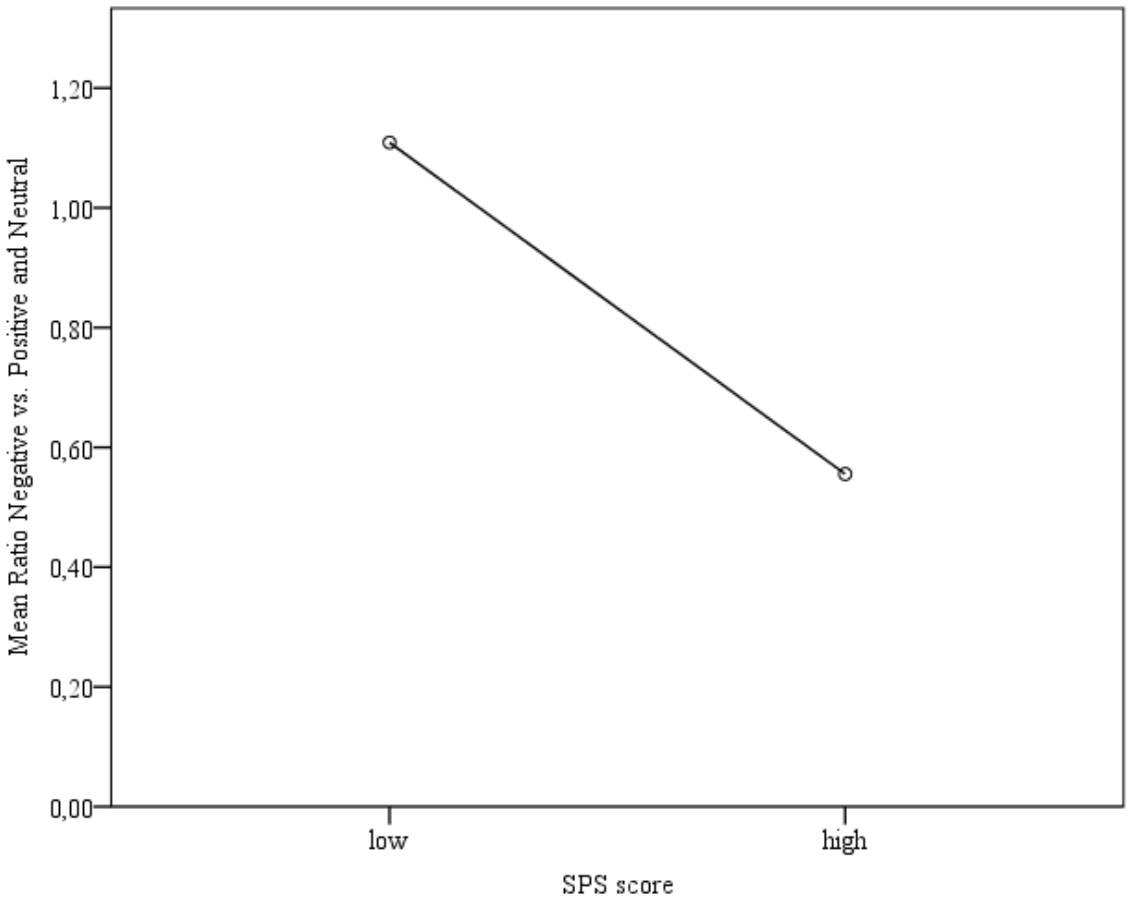


Figure 5 Effect of the SPSS score on the accuracy of negative memory recollection at follow-up.

Discussion

This thesis explored the effects of social anxiety on negative memory recollection after a social stress task in the form of a speech. It was expected that a higher score on social anxiety would predict more negative memory recollection. In addition, it was also expected that a higher score on social anxiety would predict a higher accuracy on negative memory recollection in contrast to positive and neutral memory recollection combined. This was expected because socially anxious people tend to be more attentive to negative social cues and less to positive ones (Hirsch, & Mathews, 1997; Hirch, & Mathews, 2000). This would then influence their memory recollection immediately after the social stress task, as well as 24 hours later. Contrary to the expectations, no support was found for these hypotheses.

Hypothesis 1 and 2

There was no support found for the first hypothesis; that a higher score on social anxiety predicted a higher level of negative memory recollection immediately after the social stress task. This

result is not congruent with earlier findings of hypervigilance (Hirsch, & Mathews, 1997; Hirch, & Mathews, 2000; Mueller et al., 2009). A possible reason for this effect could be found in the hypervigilance-avoidance hypothesis of Mogg, Bradley, De Bono, and Painter (1997) and Mogg, & Bradley (1998). This states that socially anxious adults first display hypervigilance towards negative social stimuli, followed by attentional avoidance of these stimuli. If attention to the negative stimuli was avoided, then that would influence their memory recollection. This would also explain why no support was found that a higher score on social anxiety predicted a higher level of negative memory recollection 24 hours after the social stress task. The results actually indicated that there was a significant effect in the negative memory recollection after 24 hours, but it was in the opposite direction than expected (see figure 4), with even a medium effect size. This means that participants with a high score on social anxiety actually remembered less negative social cues than participants with a low score on social anxiety. If non-socially anxious participants did not avoid negative cues, it is logical they would recollect more negative memories than socially anxious participants.

Hypothesis 3 and 4

No support was found on the effect that a higher score on social anxiety predicted a higher accuracy on negative memory recollection immediately after the social stress task. This was also contrary to expectations, as hypervigilance was hypothesized to provide a higher accuracy on negative memory recollection. However, these findings are in line with the reasoning why no support was found for the first hypothesis. A significant effect was found on the accuracy of negative memory recollection after 24 hours, with a medium effect size. However, again the effect was not in the expected direction (see figure 5). These findings are in line with the reasoning why no support was found for the first two hypotheses, as it would also be in line with the hypervigilance-avoidance hypothesis Mogg, Bradley, De Bono, and Painter (1997) and Mogg, & Bradley (1998).

Limitations

One of the major limitations of the study was that the sample size was too small. The recruitment goal of 126 for a valid power (63 participants in each group of social anxiety scores) was not met, as only 33 complete datasets were available at the end of the study. Therefore, the results may not be representative because of the power being too low. This is especially the case for the group of high socially anxious participants, as that group was very small with only 5 complete datasets. Thus, the group of socially anxious participants could be severely misrepresented.

Another limitation is that the social stress task did not always have the desired effect of being stressful, as many participants expressed their disbelief in the authenticity of the audience. This might have affected the reaction of the participants in the perceived level of threat coming from the situation, especially for the socially anxious participants. The disbelief seemed to stem from the complete lack

of reaction from the audience to the speech at seemingly critical points (such as the participant not having anything to say) and the lack of reaction to the end of the speech.

Future research

Because indication for hypervigilance has already been found in a socially anxious sample before (Hirsch, & Mathews, 1997; Hirch, & Mathews, 2000; Mueller et al., 2009), there is reason to suspect that an effect in this area can be found if the sample size is large enough. This would mean that the limitations of this study had a significant effect on the results, enough that no support for the hypotheses supporting hypervigilance had been found. However, as has been shown in this study, the effect of hypervigilance in daily situations seems to be less important than the shift of attention inward to remember the negative or even positive cues of a social situation. Thus, a suggestion for future research would be to focus on the shift of attention inward in clinical samples as well as the general population. An intervention could be formed based on this attentional shift to allow socially anxious adults to disconfirm the evidence of the perceived social danger.

Conclusions

In conclusion, contrary to what was expected this study did not find any support for the existence or effect of hypervigilance in socially anxious adults. However, it did provide support for the process attentional shift inwards in these adults. Having daily situations in mind, it is suggested for future research to focus on this attentional shift instead of the hypervigilance, as it seems to have a bigger effect on memory recollection.

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Appendix A

Know your audience!

Would you like the chance to win a bol.com voucher worth **€30,-**? And would you like to earn **1.25 PPU**? Then you're the participant we're looking for!

What: Our research on social information processing consists of an online questionnaire of 20 minutes, a social experiment of 30-40 minutes in the lab and a questionnaire of 15 minutes after 24 hours.

Who: Anyone over 18 years!

Where: Martinus J. Langeveld Building, The Uithof in Utrecht, room E0.50.

How: Send an email to faceforwarduu@gmail.com, we will then email you a link with the questionnaire to start!

Appendix B

To measure memory recall, the following statements were presented, and answered by choosing "Yes", "No", or "I don't know". The Dutch translation is shown next to it in italics.

1. One audience member wore a yellow sweater. *Iemand uit het publiek had een gele trui aan.*
2. An audience member smiled at the beginning of your speech. *Iemand in het publiek glimlachte aan het begin van uw speech.*
3. Someone from the audience yawned. *Iemand uit het publiek geeuwde.*
4. The color of the floor was dark blue. *De kleur van de vloer was donkerblauw.*
5. Someone in the audience was turning on his or her seat. *Iemand in het publiek zat op zijn of haar stoel te draaien.*
6. Someone from the audience took a piece of gum. *Iemand uit het publiek pakte een kauwgompje.*
7. There was a painting on the wall. *Er hing een schilderij aan de muur.*
8. The audience consisted of three women and one man. *Het publiek bestond uit 3 vrouwen en 1 man.*
9. Someone in the audience coughed. *Iemand uit het publiek kuchte.*
10. An audience member whispered something to another audience member. *Iemand uit het publiek fluisterde wat tegen een ander lid van het publiek.*
11. One audience member wore a pink scarf. *Iemand uit het publiek droeg een roze sjaal.*
12. An audience member nodded during your speech. *Iemand in het publiek knikte tijdens uw speech.*
13. The man in front was wearing a tie. *De man vooraan droeg een stropdas.*
14. One audience member wore glasses. *Iemand uit het publiek droeg een bril.*
15. Someone from the audience frowned. *Iemand uit het publiek fronste.*
16. The woman in the front on the wore her hair tied up. *De vrouw links vooraan droeg haar haar vast.*
17. Someone from the audience took a swig from a bottle of water during your speech. *Iemand uit het publiek nam een slok uit een flesje water tijdens uw speech.*
18. Someone from the audience looked at her watch during your speech. *Iemand uit het publiek keek tijdens uw speech op haar horloge.*

Statement 1, 4, 7, 8, 11, 13, 14 and 16 are on factual information about the environment and clothing of the audience members. Statement 2, 3, 5, 6, 9, 10, 12, 15, 17 and 18 are about behaviour displayed by the audience (or not), and when "yes" was selected, participants were asked why they think that behaviour was displayed. Statement 1, 2, 3, 8, 11, 15, 16 and 18 are true, statement 4, 5, 6, 7, 10, 13, 14 and 17 are false. Each correct answer was given one point. Each incorrect answer, or "I don't know", was given 0 points.

Appendix C

Figure 6 Field-perspective picture of a positive cue (smiling)

Figure 7 Field-perspective picture of an ambiguous cue (adjusting hair).

Figure 8 Field-perspective picture of a negative cue (yawning).

Appendix D

Speech Task

You'll now have **3 minutes** to prepare a speech about the relationship between employer and employee and what it should look like, in your opinion. The speech should take 3 minutes and you'll be giving it in front of a group of psychology students via a live video feed. You can use this piece of paper to write down some notes, however, you can't bring it to your speech.

In order to give you some ideas what to talk about, we prepared the following keywords (you can use them in your speech but you don't have to):

Equality, trust, involvement, payment, leave of absence