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ORIGINAL ARTICLE

Emotion Differentiation and Emotion Regulation in High and Low Socially Anxious Individuals: An Experience-Sampling Study

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Abstract The present study explored when and how emotional difficulties and poor quality of life arise in the everyday lives of socially anxious individuals. 264 freshmen-year college students completed an online survey for 11 consecutive days. Comparing individuals high (HSA) and low in social anxiety, results revealed that irrespective of daily positive emotion differentiation ability, HSAs engaged daily emotion suppression strategies, pointing to inflexible emotion regulation. Furthermore, HSAs with poor daily negative emotion differentiation used the least daily cognitive reappraisal. Finally, both expressive suppression and cognitive reappraisal showed group-specific effects on daily positive affect. Daily expressive suppression was more strongly associated with diminished daily positive affect in HSAs, and HSAs benefited less in terms of daily positive affect from daily use of cognitive reappraisal. Based on these findings, emotion differentiation ability and emotion regulation appear relevant clinical targets for individuals with social anxiety disorder.

Keywords Social phobia · Emotion differentiation · Emotion regulation · Positive affect · Quality of life

Introduction

Social anxiety disorder (SAD) is one of the most common anxiety disorders (Stein and Stein 2008) and is associated with profound negative outcomes, including difficulties in social relationships, e.g. loneliness (Lasgaard et al. 2011), diminished positive emotions, (e.g. Clark and Watson 1991; Brown and Barlow 2009; Kashdan 2007; Kashdan and Collins 2010), and overall poor quality of life (e.g. Brown et al. 1998; Kashdan 2004; Stein and Kean 2000). Recent research has focused on the role of emotion-related factors such as emotion knowledge and emotion regulation, and how they may contribute to these negative outcomes in SAD.

Emotion Regulation and Emotion Knowledge

Expressive suppression concerns the conscious inhibition of ongoing *emotion-expressive behavior* (Gross 1998, p. 226), whereas experiential avoidance refers to avoidance or suppression of *internal experiential events* (Hayes et al. 2004). Both strategies are emotion suppression strategies and are generally considered *maladaptive* when employed inflexibly across contexts (Hayes et al. 2006; Hofmann et al. 2012; Mennin et al. 2013). Individuals with SAD have been found to engage both (e.g. Dalrymple and Herbert 2007; Hayes et al. 2006; Turk et al. 2005; Werner et al. 2011). Cognitive reappraisal refers to the ability to think about a situation in an alternative way that alters its emotional impact (Gross 1998, 2002). It is generally considered an *adaptive* emotion regulation strategy (Gross 1998), and recent research has shown that socially anxious individuals both are, and believe they are, less effective at employing this strategy (Goldin et al. 2009a, b; Werner et al. 2011), while others have failed to find this association (Kashdan and Steger 2006).

How an individual regulates their emotions is determined by a variety of factors (John and Eng 2014;

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Hofmann et al. 2012). One may distinguish between more and less distal antecedents to emotion regulation. The most distal antecedents may include personality and stable cognitive factors, such as personality traits and IQ. These factors are thought to exert influence on less distal antecedents, including emotion knowledge (cf. John and Eng 2014). Emotion knowledge broadly refers to the ability to "identify one's own and others' experienced and expressed emotions, understand which emotions are appropriate in different contexts, and recognize the causes and consequence of emotions" (Eisenberg et al. 2007, p. 296). A recent meta-analysis has confirmed that socially anxious individuals have poor emotion knowledge (O'Toole et al. 2013), especially concerning their own experienced emotions. Although emotion knowledge is related to emotion regulation, emotion knowledge refers to the knowledge and assumptions about emotions that one *has*, that is an antecedent to emotion regulation, whereas emotion regulation refers to what one *does* with one's emotions. Following this definition, one aspect of emotion knowledge is the ability to differentiate between emotions, also referred to as emotion granularity. Emotion differentiation concerns the ability to differentiate between both positive and negative emotions, and there have been mixed findings regarding the association between positive and negative emotion differentiation (Feldman Barrett et al. 2001). It has been suggested that individuals with better emotion differentiation ability regulate their emotions more adaptively (Feldman Barrett et al. 2001; Wranik et al. 2007). Specifically, individuals with good negative emotion differentiation have been found to more frequently engage emotion regulation strategies. This association has not been found for the ability to differentiate between positive emotions (Feldman Barrett et al. 2001). The association between emotion differentiation and emotion regulation is, however, most likely bidirectional, and poor emotion knowledge may also be the result of dysfunctional emotion regulation strategies. For instance, emotion suppression may prevent the individual from attending to the information that emotions hold, thereby hindering the experience of and learning from emotions. This notion is supported by the finding that emotion regulation predicts a person's emotion knowledge over time (Schultz et al. 2001).

Emotion Regulation and Quality of Life

Maladaptive emotion regulation has generally been found to play an important role in contributing to quality of life. For instance, expressive suppression has been found to exacerbate negative emotional experiences (Gross 2002), diminish responsiveness to positive events (Gross and Levenson 1997), and to be associated with lower levels of social satisfaction (Srivastava et al. 2009) and general poor well-being (Gross and John 2003). Furthermore, experiential avoidance has been found to be associated with amplification of various types of anxiety-related pathology and poor quality of life (Kashdan et al. 2006). Specifically related to social anxiety, Kashdan and Collins (2010) in an experience-sampling study found that socially anxious individuals reported less positive affect in both social and non-social situations. Moreover, Kashdan and Steger (2006) investigated the link between emotion regulation in social anxiety and quality of life, and found that the number of experienced positive events was lowest on days where individuals high in trait social anxiety experienced high levels of social anxiety *and* used expressive emotion suppression. This was not true for cognitive reappraisal. However, at the trait level, being less effective at reappraising an event, and to alter its emotional impact from negative to positive, has been found to be associated with less positive experiences and poorer social functioning (Gross and John 2003). Furthermore, individuals high in trait social anxiety have been found to report fewer positive social events and less positive emotions on days subsequent to using emotion suppression during positive social events (Farmer and Kashdan 2012). Using experiential avoidance in student populations has also been shown to lead to more intense psychological stress and interfere with positive activities (Kashdan et al. 2006). In another experience-sampling study, Kashdan et al. (2006) found that a diagnosis of SAD was associated with less positive affect and more experiential avoidance.

The Present Study

Since emotion regulation strategies are considered context-dependent (Gross and Levenson 1997), one could argue that they are not properly assessed using only trait-questionnaires covering general tendencies. Furthermore, individuals with SAD often experience poor self-esteem (e.g. Tanner et al. 2006) and depressive symptoms (e.g. Brown et al. 2001); factors that may result in an underestimation of self-evaluated ability and an inflation of negative responses (Abbott and Rapee 2004; Hertel et al. 2008). We therefore aimed to supplement trait-assessments with daily records of the variables of interest in order to reduce possible biases that may come into play when evaluating emotional factors. As referenced above, there has been a recent surge in studies, investigating the association between social anxiety and emotion by means of experience-sampling methods (e.g. Farmer and Kashdan 2012; Kashdan and Collins 2010; Kashdan and Steger 2006; Kashdan et al. 2006). The present study is an extension of

this literature. We adopted an experience-sampling approach, with which we simultaneously investigated emotion differentiation and emotion regulation related to social anxiety in daily experiences of emotional events. Such experience-sampling methods are suited to capture more dynamic aspects of thoughts, feelings, and actions within the context of everyday activities (Connor Christensen et al. 2003, p. 53).

The main aim of the study was to explore the relationships between social anxiety, emotion differentiation and emotion regulation in the everyday lives of individuals high (HSA) and low (LSA) in social anxiety, and how maladaptive emotion regulation may contribute to poor quality of life. Specifically, we wanted to explore *when* socially anxious individuals engage maladaptive emotion regulation strategies and experience poor quality of life, and if these associations differed between individuals low and high in social anxiety.

Aim 1

Replicating past studies (e.g. Kashdan and Collins 2010; Kashdan et al. 2006), we wanted to explore if the emotional characteristics of SAD, as presented above, were to be found when measured both at the trait and state (daily) level. For both trait and daily measures, we hypothesized that high levels of social anxiety would be associated with less adaptive (cognitive reappraisal) and more maladaptive (emotion suppression strategies) emotion regulation, as well as with diminished positive affect and poorer satisfaction with social life.

Aim 2

Second, we wanted to address the question of *when* HSAs engages in maladaptive emotion regulation compared with LSAs. In doing this, we tested the predictive value of an interaction term, including trait social anxiety and daily positive and negative emotion differentiation. To the best of the authors' knowledge, no previous study using experience-sampling methods has specifically investigated *SAD specific* effects in the association between emotion differentiation and emotion regulation. Based on past literature, poor emotion differentiation is likely associated with maladaptive emotion regulation. However, we did not formulate any hypotheses regarding group specific effects on this association.

Aim 3

Finally, we wanted to explore *when* HSAs experience poor daily quality of life (positive affect and social satisfaction). Specifically we wanted to investigate possible *group specific* effects in the association between both adaptive and maladaptive daily emotion regulation and daily quality of life. An interaction term between trait social anxiety and daily emotion regulation was therefore tested as a predictor of daily quality of life. Based on the body of literature referenced above, we hypothesized that trait social anxiety and daily expressive suppression would interact in the prediction of daily positive affect. We further wanted to explore if this interaction term also predicted daily social satisfaction.

Methods

Participants

Participants were recruited from a sample of 1,181 volunteer first-year college students. 531 (45 %) agreed to participate. Based on their social anxiety score on the Liebowitz Social Anxiety Scale (LSAS; Liebowitz 1987), the lower and upper quartiles on the LSAS were invited for participation in the study. The lower quartile was made up of 131 individuals with a maximum LSAS score of 21, and the upper quartile consisted of 130 individuals with a minimum LSAS score of 47 (it was not possible to contact 4 individuals). The 261 individuals making up the upper and lower quartiles were asked to fill out daily records for 11 consecutive days.

Measures

Trait Measures

All trait measures were obtained from the survey that all participants previously had completed, and alpha-values were calculated based on scores from participants included in the present study ($N = 261$).

Trait social anxiety was assessed by the self-report version of the Liebowitz Social Anxiety Scale (LSAS; Liebowitz 1987). The LSAS consists of 24 items concerning fear and avoidance of specific social situations, all rated on a 4-point Likert-scale. Fear is rated from "none" to "severe", and avoidance is rated from "never" to "usually". ($\alpha = .97$ for the full scale).

Three trait emotion regulation strategies were assessed. *Cognitive reappraisal* (6 items) and *expressive suppression* (4 items) were assessed by the Emotion Regulation Questionnaire (ERQ; Gross and John 2003), with items being rated on a 7-point Likert-scale from "strongly disagree" to "strongly agree" ($\alpha = .86$ and $\alpha = .74$, respectively). *Experiential avoidance* was assessed by 7 items, factorially derived (Bond and Bunce 2003) from the Acceptance and Action Questionnaire (AAQ; Hayes et al. 2004) ($\alpha = .73$).

All items are rated on a 7-point Likert-scale from "never" to "always".

Trait emotion clarity was assessed by the emotion clarity subscale of the Trait Meta-Mood Scale (TMMS; Salovey et al. 1995). The 11 items are rated on a 5-point Likert-scale from "strongly disagree" to "strongly agree" ($\alpha = .87$).

Trait positive affect was assessed by the 10 positive emotion items from the 20-item trait version of the Positive and Negative Affect Schedule (PANAS; Watson et al. 1988). The presence of the emotions during the past week was rated on a 5-point Likert-scale from "very slightly or not at all" to "extremely" ($\alpha = .87$).

Trait social satisfaction was measured by a single item, created for this study: *How satisfied are you with your social life?* rated on a 7-point Likert-scale from "not at all" to "very much".

Daily Measures

All state measure items in the daily records were linguistically modified to cover daily (emotional) events, that is, participants were explicitly asked to base their answers on that particular day's events. When a shorter version of the trait scale was used as the daily measure, scales and categories were identical to the trait version. The internal consistency values given below were calculated from the first daily observation ($N = 164$).

Daily social anxiety was assessed by seven items, rated on a 5-point Likert-scale from "strongly disagree" to "strongly agree" ($\alpha = .90$). The scale was developed and validated by Kashdan and Steger (2006). The items were derived and modified from other scales measuring social anxiety, and a principal-component analysis supported a one-factor solution.

Daily emotion differentiation was assessed by a method adapted from the Rochester Interaction Record (Reis and Wheeler 1991). The method is based on the participants' ratings of the presence of both positive (*happiness, enthusiasm, amusement, curiosity, and pride*) and negative emotions (*shame, nervousness, anger, sadness, guilt*) in the most emotionally intense situation of the day (cf. Feldman Barrett et al. 2001; Kashdan and Steger 2006). All emotions were rated on 5-point rating scales. Cf. Feldman Barrett et al. (2001), daily emotion differentiation was determined from the average correlation between the individual ratings of emotions across days. Fisher r-to-z transformations were performed on all individual correlations that were then averaged for both positive and negative emotions. This resulted in two indexes of emotion differentiation; one for positive and one for negative emotions. Large, average correlations between emotions are considered to reflect poor clarity of emotion, as it is unlikely that the same emotions always co-occur *across* situations. The two indexes were not significantly correlated, $r = .2, p = .162$.

Daily positive affect was measured by the five positive emotions listed above ($\alpha = .75$).

The three strategies of daily emotion regulation were each assessed by 4 items from the trait emotion regulation questionnaires (method cf. Kashdan and Steger 2006). *Daily expressive suppression* was measured by the four items from the expressive suppression subscale ($\alpha = .80$). Four items were chosen for *daily cognitive reappraisal* ($\alpha = .70$) and *daily experiential avoidance* ($\alpha = .79$) based on the items' factor loadings in prior studies (strategy cf. Kashdan and Steger 2006). Factor loadings for the reappraisal subscale had been determined by Kashdan and Steger (2006), whereas the factor loadings for experiential avoidance was determined based on the validation paper by Bond and Bunce (2003).

Daily satisfaction with social life was measured with the item "How satisfied have you been today with your social life? and rated on a 7-point Likert-scale from "not at all" to "very much".

The daily measures were collected through an online survey for 11 consecutive days. Each day, the participants received an e-mail with a link to the survey. The daily links were open from 6 p.m. until 12.00 p.m. the following day. Participants were advised to fill out the questionnaire at the end of the day. In case of non-reply, a reminder e-mail and a text message were sent out both in the evening and the following morning.

Analytic Strategy

Between-group differences regarding trait measures were evaluated with independent samples t-tests from the sample of participants with at least one daily record. All other hypotheses were tested on participants with at least three daily records using multilevel linear modeling in the linear mixed models module of SPSS version 21. Multilevel linear models assume no independence of errors; an assumption that was violated in the present study as the same individuals had several records.

The data were hierarchically arranged in two levels. Level-1 variables (within-person) referred to the individual's daily records, whereas level-2 variables (between-person) reflected trait measures. Multilevel linear models were based on individuals with at least three daily records (as recommended in Singer and Willett 2003), holding 911 observations nested within the 114 individuals. The covariance structure AR(1) was chosen for the repeated-measures, as recommended for this type of data (Field 2009; Heck et al. 2010; Singer and Willett 2003; Snijders and Bosker 2012), and the intercept and slope were treated as fixed effects.

The validity of the daily measures was investigated in linear mixed models, where an association between the daily measures and the trait measures of a medium effect size (cf. Cohen 1988), was considered an indication of acceptable validity. The effect size was based on t-to-r transformations. See below.

Most variables changed significantly over time (see "Results" section), which may indicate that the daily variables were sensitive to repeated measuring. Therefore, for those variables, we chose to centre level-1 variables around the individual's own regression slope (described as *detrending*, cf. Curran and Bauer 2011), and computed the residuals from the regression line for each individual for each of the daily measures. Variables that did not change over time were centered around the person's mean. We chose to centre level-1 variables around the individual's mean/slope because we were interested in daily *variations* compared to that specific person's mean/slope. Continuous level-2 variables were grand mean-cantered.

The continuous LSAS variable was included in the interaction analyses, although referred to as dichotomous (HSAs vs. LSAs). This variable was chosen in order not to compromise power.

For the ease of comparing results, a correlation effect size (r) (t-to-r-transformations, cf. Kashdan and Steger 2006) was calculated for all results. A value of .1, .3, and .5 was considered a small, medium, and large effect size, respectively (Cohen 1988).

Results

Participant Descriptives and Demographics

A total of 164 participants filled out the daily questionnaires at least once, with 75 and 89 considered LSA and HSA, respectively. Multilevel linear models were based on the 114 individuals that had recorded at least three observations, 52 with LSA and 62 with HSA, respectively. Specifically, the number of completed records was: 3: $N = 11$, 4: $N = 6$, 5: $N = 9$, 6: $N = 10$, 7: $N = 9$, 8: $N = 9$, 9; $N = 13$, 10: $N = 20$, 11: $N = 27$. Demographic descriptives are reported in Table 1. At baseline, the LSA and HSA groups significantly differed with respect to gender, with more women in the HSA group, and there was a borderline significant tendency for the LSA group to be older ($p = .051$).

Table 1 Baseline demographic and clinical characteristics: means (standard deviations) and differences

	LSA (N = 75) *M* (SD)	HSA (N = 89) *M* (SD)	Effect size *r*
Gender (% women)	38	61	.25*
Age	23.4 (7.0)	21.6 (4.5)	−.15†
Social anxiety	13.3 (5.4)	60.8 (10.9)	.94***
Emotion differentiation	39.4 (4.5)	33.6 (4.6)	−.54***
Cognitive reappraisal	30.4 (6.0)	28.2 (5.8)	−.18*
Expressive suppression	13.0 (5.0)	16.7 (5.0)	.35***
Experiential avoidance	21.6 (6.0)	28.0 (5.4)	.49***
Positive affect	37.7 (6.1)	33.3 (7.3)	−.31*
Satisfaction with social life	5.5 (1.1)	3.9 (1.4)	−.53***

LSA low social anxiety, *HSA* high social anxiety

† $p < .1$; * $p < .05$; *** $p < .001$

Validity of Daily Measures

To test the validity of the daily measures, separate models investigating the association between trait and daily measures were tested. All trait measures (social anxiety: $r = .6$, cognitive reappraisal: $r = .3$, expressive suppression: $r = .6$, experiential avoidance: $r = .7$, positive affect: $r = .3$, satisfaction with social life: $r = .5$) significantly predicted all the corresponding daily measures, except for trait emotion clarity that predicted neither the positive, $r < .1$, nor the negative differentiation, $r = .1$, index.

Time-Varying Variables and Detrending

Time (days) served as a predictor of the daily measures in a set of mixed models. Social anxiety, $t(409.0) = -2.1$, $p = .039$, $r = .1$, cognitive reappraisal, $t(472.1) = -2.6$, $p = .011$, $r = .1$, expressive suppression, $t(450.9) = -2.1$, $p = .035$, $r = .1$, experiential avoidance, $t(484.1) = -2.5$, $p = .0012$, $r = .1$, and positive affect, $t(398.6) = -2.6$, $p = .009$, $r = .1$, significantly decreased over time. However, satisfaction with social life did not, $t(383.2) = .7$, $p = .485$, $r < .1$.

Between-Group Differences on Trait Measures

Independent samples t tests revealed that the two groups differed on all trait variables in the expected direction. That is, the HSA group showed poorer emotion clarity, used less cognitive reappraisal, used more expressive suppression and more experiential avoidance, experienced less positive affect and was less satisfied with their social life. See Table 1.

Between-Group Differences on Daily Measures

Between-group differences were also explored for the daily measures. The group variable, HSA versus LSA, served as

Table 2 Results from interaction analyses

	Daily expressive suppression	Daily cognitive reappraisal	Daily experiential avoidance
TSA × DPED	**$t(155.9) = -2.3$, $p = .019$, $r = .2$**	$t(150.4) = -.3$, $p = .758$, $r < .1$	$t(159.4) = -1.8$, $p = .079$, $r = .1$
TSA × DNED	$t(104.0) = .8$, $p = .399$, $r = .1$	**$t(111.8) = 2.5$, $p = .014$, $r = .2$**	$t(101.2) = .5$, $p = .603$, $r < .1$
	Daily positive affect		Daily social satisfaction
TSA × DES	**$t(629.9) = -2.4$, $p = .019$, $r = .1$**		$t(630.8) = .2$, $p = .839$, $r < .1$
TSA × DCR	**$t(621.2) = 2.0$, $p = .046$, $r = .1$**		$t(624.1) = .1$, $p = .902$, $r < .1$
TSA × DEA	$t(651.7) = -.2$, $p = .847$, $r < .1$		$t(653.0) = .7$, $p = .504$, $r < .1$

Results in boldface are significant at $p < .05$. *DCR* daily cognitive reappraisalm, *DEA* daily experiential avoidance, *DES* daily expressive suppression, *NED* negative emotion differentiation, *PED* positive emotion differentiation, *TSA* trait social anxiety

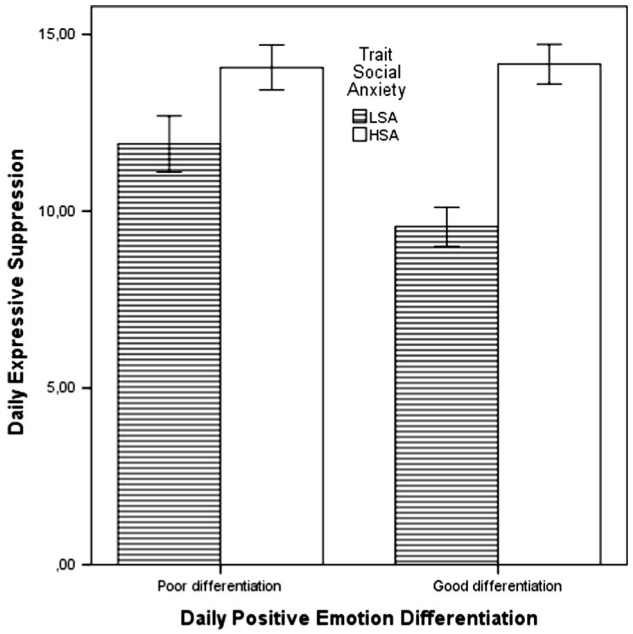

Fig. 1 Depicting the association between daily positive emotion differentiation and daily expressive suppression for individuals high and low in social anxiety. *Error bars* represent standard errors. *HSA* high social anxiety, *LSA* low social anxiety

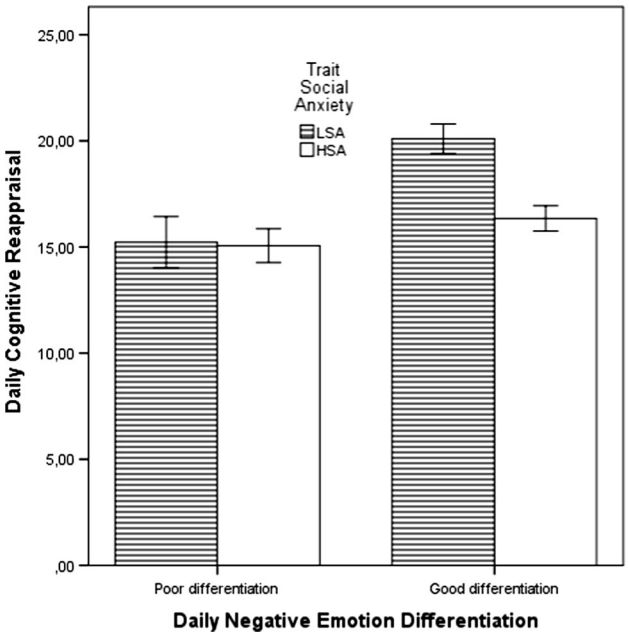

Fig. 2 Depicting the association between daily negative emotion differentiation and daily cognitive reappraisal for individuals high and low in social anxiety. *Error bars* represent standard errors. *HSA* high social anxiety, *LSA* low social anxiety

predictor of the raw daily scores, not the detrended variables, in the mixed models. The groups differed in the expected direction, with HSAs scoring higher on daily social anxiety, $t(111.9) = 8.3$, $p < .001$, $r = .6$, daily expressive suppression, $t(113.7) = 5.3$, $p < .001$, $r = .4$, daily experiential avoidance, $t(112.1) = 5.5$, $p < .001$, $r = .5$, daily social satisfaction, $t(110.5) = -5.5$, $p < .001$, $r = .5$, and daily positive affect, $t(112.3) = -3.4$, $p < .001$, $r = .3$. However, the two groups did not differ on daily cognitive reappraisal, $t(116.9) = -.1, p = .652, r < .1$. Because the index representing daily emotion differentiation was calculated as an average, group differences regarding these variables were tested with independent *t* tests. No differences were found for the index of positive, $t(110) = .9$, $p = .372$, $r = .1$, or negative emotion differentiation, $t(89) = -.2$, $p = .835$, $r < .1$.

Emotion Differentiation and Emotion Regulation

Results from all interaction-analyses are presented in Table 2. Regarding positive emotion differentiation, the interaction between trait social anxiety and daily positive emotion differentiation ability interacted in the prediction of daily expressive suppression. While emotion differentiation ability was not associated with expressive suppression in the HSAs, LSAs were more likely to use expressive suppression when they scored lower on positive emotion differentiation. The same interaction term predicted daily

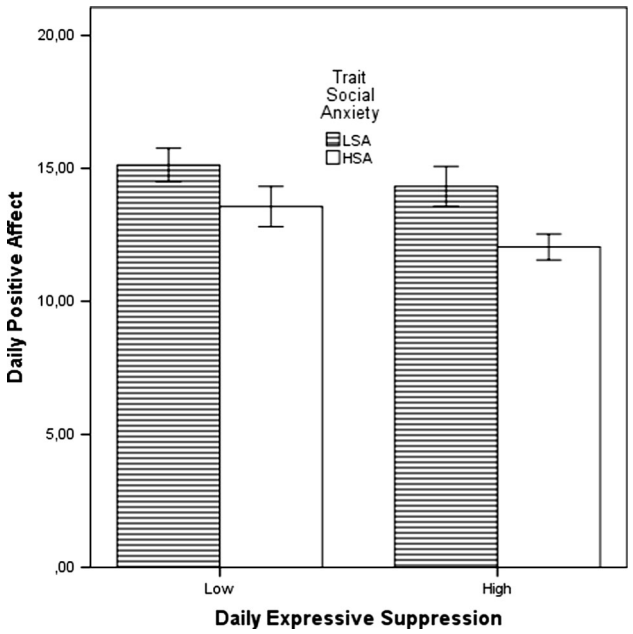

Fig. 3 Depicting the association between daily expressive suppression and daily positive affect for individuals high and low in social anxiety. *Error bars* represent standard errors. *HSA* high social anxiety, *LSA* low social anxiety

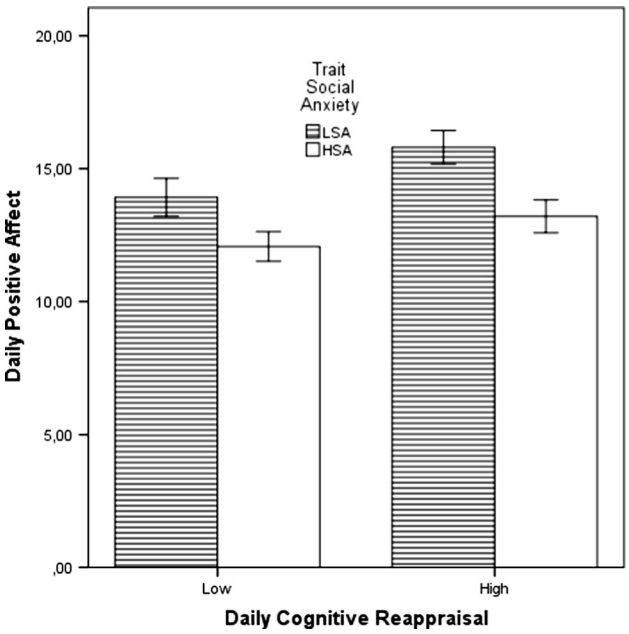

Fig. 4 Depicting the association between daily cognitive reappraisal and daily positive affect for individuals high and low in social anxiety. *Error bars* represent standard errors. *HSA* high social anxiety, *LSA* low social anxiety

experiential avoidance at the trend level. The interaction term did not predict cognitive reappraisal (Figs. 1, 2).

Concerning negative emotion differentiation, the interaction between trait social anxiety and daily negative emotion differentiation ability predicted daily use of cognitive reappraisal. Individuals with good negative emotion differentiation generally used more cognitive reappraisal. HSAs were more likely to use daily cognitive reappraisal if they reported good negative emotion differentiation ability, but this difference was larger for LSAs.

Emotion Regulation and Quality of Life

Three two-way interaction terms, one for each of the emotion regulation strategies (trait social anxiety × daily emotion regulation), were tested as predictors of daily positive affect. The interaction term between trait social anxiety and daily use of expressive suppression predicted daily positive affect. HSAs in general experienced less daily positive affect, this was especially true on days where they also engaged in relatively more expressive suppression. The difference in positive affect for LSAs appeared less dependent on the use of expressive suppression. The interaction term between trait social anxiety and daily use of cognitive reappraisal also predicted daily positive affect. In general, LSAs scored higher on positive affect, and cognitive reappraisal was positively associated with daily positive affect. However, a larger difference in positive affect depending on the relative usage of cognitive reappraisal was found in LSAs.

The same three two-way interaction terms were tested as predictors of daily social satisfaction, none of which turned out significant (Figs. 3, 4).

Discussion

Between-Group Differences on Trait and State Measures

Our results showed that the HSAs scored in the expected direction compared with the LSAs on all trait questionnaires; they reported poorer emotion clarity, less positive affect, less cognitive reappraisal, less satisfaction with social life, more expressive suppression, and more experiential avoidance. Similar differences were found between the two groups on the daily measures, except for two; emotion differentiation and cognitive reappraisal.

Since socially anxious individuals are likely to underestimate their competences (Abbott and Rapee 2004; Hertel et al. 2008), it may not be appropriate to ask the individual directly about their emotion differentiation ability. This may be even further complicated considering that the TMMS inquires about general emotion clarity ability across contexts. As an alternative, we measured emotion differentiation as an average correlation between emotion ratings (cf. Feldman Barrett et al. 2001) and found

no between-group differences. Regarding the validity of these indexes, we did not find emotion clarity and emotion differentiation to be associated ($r \leq 1$), although they are theoretically overlapping constructs. However, this finding is in accordance with a recent study showing that trait emotion clarity and state emotion differentiation were not strongly associated (Boden et al. 2013).

Concerning trait cognitive reappraisal and its association with trait social anxiety, mixed results have been found (e.g. Goldin Manber-Ball et al. 2009b; Kashdan and Steger 2006). These mixed results may reflect the potential inaccuracy of trait questionnaires as they ask about general cross-contextual tendencies, which could be argued an inappropriate approach when inquiring about a context-dependent phenomenon such as emotion regulation. We have suggested using repeated daily measures instead of trait-questionnaires as being a more valid approach, and by following this approach, socially anxious individuals did not report less *daily* cognitive reappraisal.

Interaction Effects

Further regarding cognitive reappraisal, as indicated by a statistically significant two-way interaction term of a small to medium magnitude, negative emotion differentiation ability may play a role in explaining the mixed results regarding cognitive reappraisal. Trait social anxiety and negative emotion differentiation interacted in the prediction of daily cognitive reappraisal. HSAs with relatively poor negative emotion differentiation were less likely to use cognitive reappraisal than HSAs with good negative emotion differentiation, although this difference was largest for LSAs. Thus, where the between-group analyses showed no differences between HSAs and LSAs in their overall daily use of cognitive reappraisal, there was a between-group difference when taking negative emotion differentiation ability into account. The same interaction term did not predict the other emotion regulation strategies, indicating similar associations between negative emotion differentiation and both external and internal suppression in the two groups.

Daily positive emotion differentiation interacted with trait social anxiety in the prediction of expressive suppression. Results revealed that positive emotion differentiation ability was not associated with expressive suppression in HSAs. However, in the LSA group, individuals engaged in less expressive suppression when they reported better positive emotion differentiation ability. Thus, the ability to differentiate between positive emotions did not predict less emotion suppression in HSAs. One reason may be that HSAs or individuals with SAD have been described as being inflexible in their emotion regulation (Kashdan and Collins 2010), in that they persistently engage in emotion suppression (e.g. Dalrymple and Herbert 2007; Turk et al. 2005; Werner et al. 2011), possibly doing this irrespective of a relative greater awareness of positive emotions.

Two measures of life quality, positive affect and social satisfaction, were investigated under the hypothesis that maladaptive emotion regulation would predict poor quality of life in HSAs. Two significant interactions were revealed. Both interactions were of a small magnitude ($r = .1$) and should be interpreted with caution. First, HSAs, compared with LSAs, who used relatively more daily expressive suppression reported the lowest positive affect. Thus, expressive suppression showed a more toxic effect on positive affect for HSAs than LSAs. This result replicates a finding by Kashdan and Steger (2006) who also found that daily expressive suppression was associated with less daily positive affect in HSAs. One characteristic of inflexible emotion regulation, as has been evidenced in SAD, includes the use of expressive suppression *across* a variety of situations regardless of whether it is contextually appropriate (e.g. Kashdan and Rottenberg 2010). One could therefore hypothesize that HSAs would suppress emotional expressions even in social situations where some expression and exchange of emotions could be considered appropriate and facilitative of positive affect and interpersonal bonding (cf. Srivastava et al. 2009). This may be specific to external and not internal suppression of emotion, since the interaction term with daily experiential avoidance was not significant. Secondly, LSAs, compared with HSAs, using relatively more cognitive reappraisal reported the highest level of daily positive affect, indicating that HSAs do not experience the same benefits from using cognitive reappraisal. HSAs are likely more emotionally reactive (Hofmann 2007), which could leave HSAs with a shorter window of time for effectively applying cognitive reappraisal, an antecedent emotion regulation strategy, before the emotion fully unfolds (Gross and Thompson 2007; Sheppes et al. 2011). As such, one may speculate that the HSAs used cognitive reappraisal in a more response-focused manner, and thus did not experience the positive outcomes, such as positive affect, typically associated with this emotion regulation strategy.

None of the interaction terms predicted daily social satisfaction, which indicates that although HSAs in general experienced less daily social satisfaction than LSAs, the association between daily use of the investigated emotion regulation strategies and daily social satisfaction did not differ between the two groups.

Clinical Implications

Although a student population was used, the HSAs had a minimum LSAS score of 47, averaging at 60.8 (10.0). With a score of 60 being suggested as a cut-off for clinical levels

of social anxiety (Mennin et al. 2002; Rytwinski et al. 2009), the level of social anxiety in the HSA group may therefore be considered clinically relevant. This study has shown that negative emotion differentiation may be an important target in facilitating more adaptive emotion regulation such as cognitive reappraisal. Recent therapeutic initiatives do indeed focus on emotion differentiation ability by increasing awareness of subjective feelings, bodily reactions, and response-tendencies related to different emotions (see Mennin et al. 2013). The present findings also align with recent emotion dysregulation models of anxiety disorders stressing that maladaptive emotion regulation can lead to decreased positive affect (Hofmann et al. 2012; Mennin et al. 2013). Thus, expressive suppression may be another important target since positive affect was lowest on days where HSAs engaged in more expressive suppression, and the costs associated with inflexible use of this strategy should be further explored. Finally, based on emotion regulation models (Gross and Thompson 2007; Mennin et al. 2002), well-being benefits, such as positive affect typically associated with cognitive reappraisal, may be related to when and how this strategy is used.

Limitations

Limitations of the study include the use of a student population, although the HSA group did report clinical levels of social anxiety. The direction of causality between the variables cannot be established as all measures were obtained at the same time points. Furthermore, there was an effect of time on most daily variables. The participants' scores generally decreased over the course of the study, indicating that the variables were sensitive to repeated measuring. However, this was accounted for by the method of detrending. The discussed interaction terms, although significant, were of a small magnitude (rs = .1–.2). The state emotion regulation scales have previously been used, except for the state experiential avoidance items. Although we followed previously used procedures, the four items have not been formally validated. Finally, there was a between-group difference on gender, and a relatively large number of participants (57 %) did not obtain at least three daily records and therefore had to be excluded from the multi-level analyses.

Conclusions

In conclusion, the present study may contribute to our understanding of *when* social anxiety leads to difficulties with emotion regulation and poor quality of life. Positive and negative emotion differentiation ability had a different influence on emotion regulation in the two groups. Irrespective of positive emotion differentiation ability, HSAs engaged expressive suppression, pointing to inflexible emotion regulation. Furthermore, although the ability to differentiate between negative emotions made the largest difference for LSAs, HSAs with poor negative emotion differentiation used less cognitive reappraisal. Both expressive suppression and cognitive reappraisal showed group-specific effects on positive effect. Daily expressive suppression was more strongly associated with less daily positive affect in the HSAs, and HSAs benefitted less in terms of daily positive affect from using daily use of cognitive reappraisal. The detected associations need to be replicated in a formal clinical sample of individuals with SAD, however, the present study points to several aspects of the emotional life of HSAs that may also be relevant in a clinical setting.

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Conflict of Interest Mia Skytte O'Toole, Morten Berg Jensen, Hanne Nørr Fentz, Robert Zachariae and Esben Hougaard declare that they have no conflict of interest.

Informed Consent All participants provided written consent prior to participation, and the local ethics committee, De Videnskabsetiske Komitéer for Region Midtjylland in Denmark, approved the study.

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