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Blushing-Fearful Individuals' Judgmental Biases and Conditional Cognitions: An Internet Inquiry

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Abstract The present study examines two mechanisms that might explain why blushing-fearful individuals fear blushing: Judgmental biases for blushing in ordinary social situations that usually do not elicit a blush, and negative conditional cognitions about blushing irrespective of situation. A web-based self-report measure, linked to a German internet forum for people with fear of blushing, was completed by a group of high blushing-fearful participants ($n=155$) and a low fear group ($n=61$). Supporting the idea that cognitive biases are involved in fear of blushing, blushing-fearful participants showed inflated estimates of both the probability and the costs of blushing in these situations. In addition, blushing-fearful individuals were characterized by relatively negative conditional cognitions about blushing.

Keywords Fear of blushing · Judgmental biases ·
Conditional cognitions · Internet inquiry

Fear of blushing can be a highly invalidating complaint. People who fear their blushes do so in many social

situations and consequently avoid these situations or endure them with fear (Bögels 2006). Diagnostically, fear of blushing is a subcategory of social phobia (e.g., Chaker and Hoyer 2007). Correspondingly, fear of blushing is the main complaint of about one third of the people who seek clinical help for their social fears (Bögels and Scholing 1995; Essau et al. 1999), and more than half of the people who applied for surgical treatment because they feared their blushes could be diagnosed with social phobia (Gerlach and Ultes 2003). Yet, why some individuals live in fear of blushing is not well-understood. The present study was set up to test two mechanisms that could drive this fear.

One mechanism that might be involved in fear of blushing is the anticipation of a negative judgment by others when blushing in a particular context. Several studies showed that socially-fearful individuals tend to overestimate the costs of a negative social event (i.e., anticipate a negative judgment) and tend to overestimate the probability that such a negative event will actually occur (e.g., Foa et al. 1996). Several studies tried to replicate this finding for fear of blushing. In these studies high and low blushing-fearful participants were asked to imagine that they blushed in several types of situations and were asked to indicate how they expected to be judged. Yet, all these studies failed to find evidence for a biased expectation to be judged negatively *as a result of* displaying a blush (Dijk and de Jong 2009).

However, these studies used situations in which people usually blush; such as being the center of attention, after a faux pas, or when a taboo topic is brought up (Crozier 2004; Leary et al. 1992). Thus, situations in which blushing is quite normal and appropriate (cf. Shields et al. 1990). Yet, blushing-fearfuls often mention that they are typically bothered by blushing in very ordinary, everyday situations, in which people normally would not blush (e.g., see

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www.esfbchannel.com). Building on this, the present study tested whether blushing in ordinary, everyday situations does give rise to an enhanced expectation of a negative evaluation in high blushing-fearful individuals (i.e., costs). In addition, it was tested whether these individuals show heightened ratings for the probability to blush in these situations.

Apart from anticipating a negative judgment when blushing in ordinary social situations, blushing-fearful individuals may also have more general negative cognitions about the consequences of blushing, independent of a specific context (cf. Bögels and Reith 1999). Several types of conditional cognitions might be applicable. First, sensitivity to others' evaluations is a core element in most models of interpersonal fears (e.g., Rapee and Heimberg 1997; Clark and Wells 1995; Schlenker and Leary 1982). Second, negative cognitions about the self play a role in social anxiety as well (Stopa and Clark 1993). Therefore, the present study tested to what extent blushing-fearful individuals are characterized by negative cognitions about the self as well as by negative cognitions about other's evaluation when blushing. Third, Barlow (2002, p.254) noted that: "[...] individuals suffering from anxiety and related disorders evidence a marked sense of uncontrollability when faced with certain tasks and/or challenges that may be in some way threatening." Blushing is an autonomic response, which makes it hard to control (Drummond and Lance 1987). Therefore, cognitions about the loss of control could also be involved in fear of blushing. For example, people who fear blushing can have an enhanced belief that they will lose control over their body when they blush, or lose control over the impression they make on others when they blush.

To summarize, the present study was set up to test the following hypotheses: (i) blushing-fearful individuals have judgmental biases concerning both the costs and the probability of blushing in ordinary situations (in which people usually tend not to blush); (ii) besides expecting a negative judgment when blushing in a particular context, blushing-fearful individuals are characterized by relatively negative cognitions about the consequences of blushing.

Method

Participants

A link to the questionnaire was placed on a German internet forum for people with fear of blushing (<http://www.erythrophobie.de/>, from September 9, 2005 until February 20, 2006). Because only a few people without fear of blushing would be reached via this link, students of the University of Dresden, friends (of friends) of these students,

and (German) acquaintances of the first and third author were also invited to complete the questionnaire. Both on the internet page as well as in the invitation mail, participants were informed that the study might help explain why people fear blushing, but were not provided with any information about the exact aims of the study. In line with the requirements of the ethical committee, participants were instructed that they were free to complete the questionnaire if they wanted and participants were allowed to refrain from answering questions. Table 1 presents a description of the 245 participants who completed the study¹ (see "Materials and Procedure; participants' characteristics").

Exclusion Criteria

Missing data Allowing participants to refrain from answering questions led to missing data. Five participants completed less than 50% of the items and three participants did not complete the whole blushing subscale of the Blushing, Trembling and Sweating Questionnaire (BQ; Bögels and Reith 1999), which is the primary measure for fear of blushing. These eight participants were excluded from all analyses. Furthermore, in each of the separate analyses, participants were excluded when more than 10% of the information for that specific analysis was missing (cf. Gerlach and Ultes 2003).² In the results section, the number of participants is explicitly noted for each analysis.

Two groups As can be seen in Fig. 1, the distribution of the mean BQ score is somewhat bimodal. Therefore, for all analyses two groups from the total sample were selected: a low-fear group ($n=61$) with a mean BQ score from zero to four and a high-fear group ($n=155$) with a mean score from six to ten (cf. Mulkens et al. 2001; de Jong and Peters 2005). The intermediate group ($n=21$) was excluded from all analyses.

Materials and Procedure

The questionnaire was designed with the program "Teleform" (<http://www.cardiff.com/products/teleform/>). The questionnaire consisted of three parts. Part one aimed to investigate blushing-fearful individuals' judgmental biases for blushing in ordinary situations, part two their more

¹ Since both sex and education differed between the groups the analyses were rerun including those variables as covariates. This did not change the significance of Response, Group or the interaction between these two variables (all p remained <0.001). Therefore, the analyses without these covariates are presented.

² Although these cases were deleted on theoretical grounds, analyses that included these participants did not change the significance of the results.

Table 1 Description of the sample

Variable (n)	(Test of) relation to BQ	Descriptives	
		<i>M</i> (<i>SD</i>)	Range
BQ (mean)	-	6.38 (2.76)	0.33–10
FQ (sum)	$r=0.75^{***}$	19.42 (10.26)	0–40
Age ($N=235$)	$r=-0.05$	28.2 (9.9)	14–82
Sex ¹	$t(232)=2.49^{**}$	$n_{\text{men}}=99$; BQ=6.91 (2.35) $n_{\text{woman}}=135$; BQ=6.02 (2.95)	
Highest Education ¹	$F(3,218)=6.41^{***}$	$n_{\text{Elementary school}}=17$; BQ=8.57 (0.74); $n_{\text{Middle school}}=44$; BQ=7.13 (2.54) $n_{\text{Grammar School}}=100$; BQ=6.26 (2.77) $n_{\text{University / University of Applied Sciences}}=61$; BQ=5.73 (2.74)	
% Years suffering	$>5 = 70.3\%$	$1-5=25.8\%$	$<1 = 2.6\%$

*** $p < 0.001$ ** $p < 0.05$

general conditional cognitions about blushing, and part three examined the participants' characteristics.

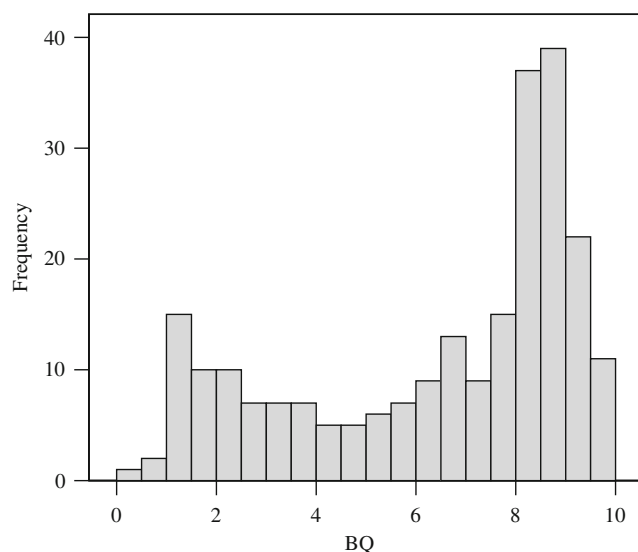
Judgmental biases

In the first part of the study the participants read four vignettes that described an ordinary social situation. At the end of the vignette the participants were asked to imagine they blushed in this situation, after which several questions were asked to indicate how they expected to be judged by others. Then they were asked to imagine that they did not blush and to answer the questions concerning others' judgments again. The order of "imagine you blushed in this situation" and "imagine you did not blush in this situation" was counterbalanced and changed for every succeeding vignette. In addition, participants were asked to rate the probability that they would blush in such a situation (cf. Dijk and de Jong 2009). To control for the

effects of a specific situation, there were three different versions for this first part of the study. After entering the website of the study, participants were randomly assigned to one of these three versions. For each version there were four different vignettes. Thus, in total there were 12 different vignettes describing ordinary situations (a full set of the vignettes can be obtained from the first author).

There were eight questions concerning others' judgments (costs of blushing); four for imagining blushing and four for imagining not blushing. The questions were presented on a horizontal scale from 0 to 10, visualized with 11 dots.³ Participants were asked to indicate how *competent* (0 = very competent, 10 = not competent at all), how *self-assured* (0 = very self-assured, 10 = not self-assured at all), how *normal* (0 = very normal, 10 = not normal at all), and how *likeable* (0 = very likeable, 10 = not likeable at all) they thought others would judge them. When the participants had answered these questions, they were asked to indicate the *probability* that they would blush if they were to encounter such a situation in reality (0=0%, 10=100%).

Conditional cognitions This part of the study contained questions aimed at examining participants' conditional cognitions about blushing (i.e. "If I blush then ..."). There were three subscales. The *others' evaluations scale* contained nine cognitions about others' evaluations when blushing (cf. Bögels and Reith 1999). The *self-evaluation scale* contained five cognitions about the self when blushing. The *control scale* contained three cognitions

**Fig. 1** Distribution of fear of blushing in the sample (BQ)

³ A horizontal measure was used to follow previous work in which Visual Analogue Scales (VAS) were used to examine judgmental bias (e.g., de Jong and Peters 2005; de Jong et al. 2006). However, for technical reasons, scales from 0 to 10 were used rather than Visual Analogue Scales (cf. Couper et al. 2006). For all these eleven-point scales (including the BQ), this means that the scores can be multiplied by 10 to compare them with the original scales.

about loss of control when blushing. All questions could be answered on a scale from 0 (applies totally to me) to 10 (does not apply to me at all). The questions are displayed in Table 2.

Participants' characteristics The final part of the study contained questions designed to describe the sample. Question one was on a four-point scale and asked participants how long they had suffered from fear of blushing (0 = do not suffer, 1 = very brief/a few weeks, 2 = already for some time/a few months, 3 = relatively long/1–5 years, 4 = very long/more than 5 years). To examine participants' fear of blushing, questions seven through 12 consisted of the blushing part of the Blushing Trembling and Sweating Questionnaire (BQ; Bögels and Reith 1999). To examine participants' social anxiety, questions 13 through 17 were questions from the social phobia subscale of the Fear Questionnaire (FQ; Marks and Mathews 1979). Finally, participants filled out some demographics: question 18 asked participants to fill in their gender, question 19 their age, and question 20 their level of education.

Data Reduction

Cronbach's alpha was examined and mean scores were calculated for *competent*, *self-assured*, *normal* and *likeable* regarding the four vignettes. That is, the mean scores were calculated for imagining blushing (*competent* $\alpha=0.86$, *self-assured* $\alpha=0.92$, *normal* $\alpha=0.92$ and *likeable* $\alpha=0.91$) and for imagining not blushing (*competent* $\alpha=0.89$, *self-assured*

$\alpha=0.87$, *normal* $\alpha=0.85$ and *likeable* $\alpha=0.89$). Furthermore, for the conditional cognitions about blushing the mean scores were calculated for the nine items measuring *others' evaluations* ($\alpha=.83$), five items measuring *self-evaluation* ($\alpha=.90$) and three items measuring *control* ($\alpha=.75$).

Results

Analyses of Judgmental Biases of Costs and Probability

After correction for more than 10% missing data, 58 low-fearfuls and 137 high-fearfuls were included in the analyses.

Judgmental Bias for Costs of Blushing

The four variables (*competent*, *self-assured*, *normal*, *likeable*) were subjected to a two within (*imagined response* = blush vs. no blush) by two between (*group* = high-fear vs. low-fear) repeated measures MANOVA. The means of the variables are displayed in Fig. 2. The analyses showed that participants generally anticipated a less positive judgment after imagining that they blushed than after imagining that they did not blush ($F(4,190)=236.08, p<0.001, \eta_p^2=0.83$). Also, there was a main effect for group ($F(4,190)=10.62, p<0.001, \eta_p^2=0.18$), evidencing that high-fearful participants generally anticipated a less positive judgment than low-fearful participants did. Of interest for the present study, the imagined response by group interaction was significant ($F(4,190)=28.24, p<0.001, \eta_p^2=0.37$); suggesting that high blushing-fearful participants show an enhanced expectation of being judged negatively when they would blush in ordinary situations.

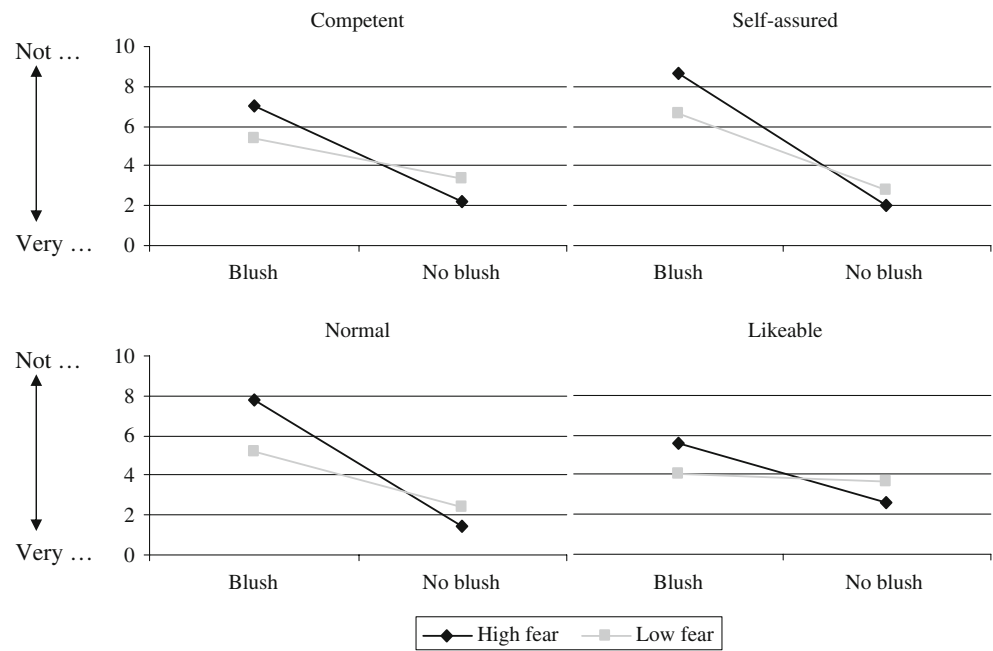
To examine whether this pattern occurs with all dependent variables the analysis was followed up with four univariate repeated-measures analyses (for *competent*, *self-assured*, *normal* and *likeable*). These analyses showed that the main effect of imagined response is significant at the $p=0.001$ level for all variables. Thus, for all variables participants expected a less positive judgment when they were asked to imagine that they blushed than when they were asked to imagine that they did not blush. The main effect of group (high-fear vs. low-fear) was only significant for *self-assured* and *normal*, both at the $p=0.001$ level. Thus high-fearful participants expected to be judged as less self-assured and less normal than low-fearful participants. The interaction between the imagined response and group was significant for all variables at the $p=0.001$ level. Therefore, there were subsequent t-tests for all variables to examine whether the groups differed for both imagined responses; and to examine for all variables whether the imagined responses differed for both groups.

Table 2 The cognition questionnaire

Conditional cognitions about others' evaluations: When I blush, others will think I am ...	Conditional cognitions about the self: When I blush, I will think I am ...
1) Socially skillful ^a	10) Socially unskillful
2) Competent ^a	11) Incompetent
3) Weak	12) Weak
4) Insecure	13) Insecure
5) Shy	14) Shy
6) Strange	15) Strange
7) Normal ^a	Cognitions about control:
8) Sincere ^a	When I blush ...
9) Likeable ^a	16) People will find out things about me that I want to keep private.
	17) I lose control over how I come across to others
	18) I lose control over my own body

^a Items were contra-indicative and were recoded in the analyses.

Fig. 2 Means of the variables that measured high and low-fearfuls' judgmental biases regarding costs of blushing



These t-tests showed that for all four variables, for both imagining to blush and imagining not to blush, the difference between high and low-fearful participants was significant at the $p=0.001$ level. Also, for all variables except likeable, the difference between imagining to blush or not to blush was significant at the $p=0.001$ level for the high-fearful as well as the low-fearful group. For the anticipated judgment of likeable, there was no significant difference between imagining to blush and imagining not to blush in the low-fearful group ($t_{\text{low-fear}}(57)=1.87, p=0.07$). Only in the high-fearful group did participants anticipate that blushing would lead to a judgment of being less likeable ($t_{\text{high-fear}}(136)=13.78, p<0.001$).

Judgmental Bias for the Probability to Blush

There was a main effect of group for the probability to blush ($t(157.14)=17.11, p <0.001$). Whereas low-fearful participants indicated that it was unlikely that they would blush in these situations ($M=1.4, SD=1.5$), high-fearful participants indicated that a blush would be quite probable in these situations ($M=6.2, SD=2.2$).

Conditional Cognitions

All 61 low-fearfuls and all 155 high-fearfuls were included in the analyses. To examine whether high-fearfuls differed from low-fearfuls in their conditional cognitions about blushing, the three cognition variables were analyzed in a two group MANOVA. Results showed that there was a significant difference between high and low-fearfuls in cognitions about blushing ($F(3,212)=62.93, p <0.001$,

$\eta_p^2=0.47$). Subsequent analyses per variable (self, other, control) showed that this difference was evident for all variables ($F_{\text{others}}(1,214)=143.83, p<0.001, \eta_p^2=.40$; $F_{\text{self}}(1,214)=121.92, p<0.001, \eta_p^2=.36$; $F_{\text{control}}(1,214)=69.2, p<0.001, \eta_p^2=.24$) Means and standard deviations are displayed in Table 3.

The Relationship between Judgmental Biases for Costs and Cognitions

To examine the relationship between judgmental biases and cognitions about blushing, mean differences between imagining to blush and imagining not to blush were calculated for the four judgmental variables (competent, self-assured, normal and likeable). Subsequently, mean scores were calculated for these mean difference scores to come to one “judgmental bias” score (Cronbach’s α for these four difference scores is 0.88). Furthermore, we calculated a mean “cognition” score (Cronbach’s α for Self, Other and Control is 0.79). The correlation between cognition and judgmental bias is $-.59$ ($p <0.001$); note that a more positive judgmental bias score indicates a negative anticipated judgment whereas a more positive cognition score

Table 3 Means (and Standard Deviations) the cognition scores of high and low-fearful participants

Cognitions	Low-fearful (n=61)	High-fearful (n=155)
Self	4.1 (2.5)	1.1 (1.4)
Other	3.9 (1.3)	1.7 (1.2)
Control	3.6 (1.1)	1.1 (1.6)

indicates less negative cognitions about blushing. A regression analysis, in which both variables were entered predicting the mean BQ-score, showed that both variables are independently associated with fear of blushing ($\beta_{\text{cognition}} = -.87$, $p < 0.001$; $\beta_{\text{judgmental bias}} = .35$, $p < 0.001$).

Discussion

The main findings can be summarized as follows: (i) Compared to people who do not fear blushing, blushing-fearful individuals have judgmental biases for both the probability and costs of blushing in ordinary social situations. (ii) Blushing-fearful individuals are characterized by relatively negative conditional cognitions about blushing, irrespective of a given situation.

The results showed that both high and low-fearful participants expected a negative judgment when they would blush in ordinary situations; yet that blushing-fearful individuals showed an exaggeration of this anticipated negative judgment. In addition, high-fearful individuals showed enhanced ratings of the probability that they would blush if they would encounter such a situation in real life. This last finding is in correspondence with a previous study that tested situations in which people usually do blush, such as when being the center of attention (Dijk and de Jong 2009). In this previous study high-fearful participants showed higher ratings for the probability to blush, but high and low-fearful participants anticipated an equally negative judgment because of blushing. The present study however, found that high-fearful individuals showed higher ratings of the probability and of the costs of blushing. Thus, in correspondence with studies that looked for judgmental biases in social phobics (e.g., Foa et al. 1996; Voncken et al. 2003), also blushing-fearful individuals seem to hold judgmental biases for costs, but only for those situations in which blushing is not common.

Moreover, the present results showed that, compared to non-fearfuls, blushing-fearful individuals had a positive bias for not blushing in these everyday (blush-irrelevant) situations. When asked to imagine that they did not blush in these situations, blushing-fearful individuals expected to be judged more positively than did non-fearful individuals. Unfortunately, blushing-fearful individuals do expect to blush in these situations. This last finding suggests that at least part of the judgmental bias might be an over-positive expectation regarding the performance of other (non-blushing) people.

Negative cognitions about blushing were not restricted to specific situations, but were also present in the more general cognitions that the blushing-fearful participants held about blushing, irrespective of a particular situation. Blushing-fearfuls were more negative in all three types of

cognitions, but the cognitions about others' evaluations appeared to have the largest effect size. This might be due to the relationship between fear of blushing and social anxiety. Since most of the high blushing-fearful participants were also socially anxious, the acceptance of other people might be important to them (cf. Leary et al. 2001). Interestingly, fear of blushing also related to negative cognitions about the self when blushing. For example, the high-fearful group indicated that they judged themselves weak or strange when they blushed. For social phobia, it has already been shown that socially phobic individuals have relatively negative cognitions about the self (Stopa and Clark 1993), but no studies known to the authors have tested this idea for fear of blushing. Furthermore, in accordance with the uncontrollability of the blush (Drummond and Lance 1987), the results indicated that people who fear blushing have more negative cognitions about the lack of control when they blush.

As one would expect, since both are related to fear of blushing, the judgmental biases are related to the more general negative cognitions about blushing. Yet, more important for the present study, both are independently associated with fear of blushing. This hints to the possibility that judgmental biases about the consequences of blushing in a particular situation and more general negative cognitions about blushing are separate mechanisms, that both may contribute to individuals' fear of blushing. More research is necessary to untangle the exact (causal) relationship between both mechanisms. It might be that negative cognitions about the consequences of blushing cause blushing-fearfuls to anticipate a negative judgment by others when blushing in ordinary situations. However, previous studies showed that blushing-fearfuls do not always expect to be judged negatively as a result of their blush, and sometimes even expect a more positive judgment (de Jong and Peters 2005; de Jong et al. 2006); and it might also be that blushing-fearfuls developed negative beliefs about blushing because of negative experiences with blushing in ordinary situations.

The present study has several limitations. First, the direct invitation of acquaintances and students as a control group vs. the link on a forum for the anxious participants led to differences in sex and education between both groups. However, additional analyses including sex and education as covariates showed that including these variables did not change the results. Second, the present study relied upon hypothetical situations and hypothetical responses for testing the judgmental biases. Such an approach relies upon participants' ability to accurately report about how they would react, and one may well question whether individuals are indeed (always) able to do so (e.g., Parkinson & Manstead, 1993). One could nevertheless argue that what is of major concern here is whether people do explicitly anticipate negative effects from their blushing. It seems that

the influence of such explicit considerations regarding the anticipated interpersonal effects of displaying a blush can be reasonably successfully investigated with a vignette methodology (cf. Dijk and de Jong 2009).

The current findings are not only of theoretical interest, but may also have clinical implications. First, the present data indicate that it would seem efficient to challenge the expectancy of being judged unfavorably when displaying a blush in ordinary situations (i.e., the bias concerning overestimation of costs). Meanwhile, to the extent that the inflated expectancy of displaying a blush is not due to a differential physiological make-up (e.g., Mulkens et al. 1999), the present data indicate that it may be profitable to address this type of judgmental bias through therapy.

To conclude, the present study aimed to come up with some insights into the factors involved in people's fearful preoccupation with their blushing. Two different types of mechanism were examined: Judgmental biases (for costs and probability) and conditional cognitions about blushing. The results showed that blushing-fearful individuals hold judgmental biases for blushing in ordinary situations. They expect to blush relatively easily in ordinary situations and they anticipate a negative judgment from others. Furthermore, they are characterized by relatively negative conditional cognitions about blushing that are independent of particular context. Together, the empirical evidence provides several important insights into why people fear blushing, which may also be useful in therapy.

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