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Implicit and Explicit Gender Role Expectations of Pain among College Students in China

WU Xiao-yong[1], HUANG Xi-ting[2]
([1]Aviation Safety and Security College, Civil Aviation Flight University of China, Guanghan 618307, China; [2]College of Psychology, Southwest University, Chongqing 400715, China)

【Abstract】 Objective: Gender role expectations of pain(GREP) are reflected by individuals' attitudes towards sex differences in pain perception. The aim of the present study was to examine the feature of the Chinese implicit and explicit gender role attitudes of pain. Methods: Explicit and implicit attitudes of 92 Chinese undergraduates to social expectations in pain were investigated using GREP questionnaire and the Extrinsic Affective Simon Task(EAST). Results: The results of GREP investigation were congruent with Robinson, Riley III and Myers(2001). Both male and female participants agreed explicitly that typical woman have a lower pain threshold, lower pain tolerance and higher willingness to report pain than typical man. In EAST test, there was a significant association between men and low frequency of pain reports in both male and female participants. Interestingly, the association between women and high frequency of pain reports was only found among male participants. No such effect was found among female participants. Conclusion: The results suggested that there was dissociation between explicit and implicit GREP toward women among female participants. The results of implicit attitude measurement may provide a more specific GREP towards men and women.

【Key words】 Gender role expectations of pain; Sensitivity to pain; Endurance of pain; Extrinsic affective simon task

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关于疼痛的外显和内隐性别角色期望研究

吴小勇[1]，黄希庭[2]
（1.中国民用航空飞行学院航空安全保卫学院，广汉 618307；2.西南大学心理学部，重庆 400715）

【摘要】 目的：考察中国人关于疼痛的外显和内隐性别角色期望特征。方法：92名健康大学生作为研究对象，其中女性48人，男性44人，分别通过关于疼痛的性别角色期望问卷和外部情绪性Simon任务测量其关于疼痛的外显和内隐性别角色期望。结果：在外显态度测量中，无论是女性还是男性被试均认为，相对于男性，女性的疼痛临界点更低、疼痛耐受力更低、表达疼痛倾向更高。在内隐态度测量中，男性与高疼痛耐受力或低疼痛敏感性的内隐联结在男性和女性被试的测量结果中均体现出来，但是，女性与低疼痛耐受力或高疼痛敏感性的内隐联结仅仅在男性被试的测量结果中体现出来，女性被试的测量结果中没有表现出相应的内隐联结。结论：研究证实了中国女性关于疼痛的外显和内隐女性性别角色期望存在分离的现象。

【关键词】 关于疼痛的性别角色期望；疼痛敏感性；疼痛耐受力；外部情绪性Simon任务

1 Introduction

Gender role expectations of pain(GREP) are reflected by individuals' attitudes towards sex differences in pain perception. Robinson, Riley III and Myers have found that people rate typical man less willing to report pain, less sensitive and more enduring of pain than typical woman[1]. There are two explanations for the attitudes about sex difference in pain perception. One suggests that social roles for men may encourage stoicism[2]. The other proposes that social roles for women may encourage pain awareness and expression[3]. Nevertheless, it's an important question, which has been unresolved yet, that either or both of above two viewpoints lead to individual's attitude about sex difference in pain perception.

GREP have been proposed to explain sex difference in clinical and experimental pain responses. Some studies revealed that compared to women's pain report, men's pain report was more influenced by GREP. For example, Pool, Schwegler and Theodore[4] investigated identification with gender expectations for pain tolerance in both men and women, and compared

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通讯作者：黄希庭，Email:xthuang@swu.edu.cn

experimental pain tolerance of participants who identified highly with gender norms with who identified lowly with gender norms. They found significant difference between high and low-identifying men in experimental pain tolerance. No such effect was found for women. Defrin, Shramm and Eli also found that correlations between GREP items and pain tolerance were stronger for men than women[3]. The results might indicate that men's performance was more affected by whose attitudes to GREP.

Why is explicit GREP unrelated to pain reports of women? Pool et al. provided two explanations for this phenomenon[4]. A floor effect may be responsible for it, because the pain stimulation increased in increments could not distinguish individuals who can not tolerate much pain. Alternatively, a greater proportion of women who identify with gender norms of pain might refuse to participate for painful stimulation involved in the experiment, and this might inflate pain tolerance scores for women group. However, these explanations have not been supported by any further research, and there are still other explanations for these results.

In understanding how attitude may influence actual behavior, it is necessary to consider the processes that determine behavior in general. Over the course of the past few years, an impressive amount of research evidence has shown that individuals process information about their environment in not only an explicit but also an implicit mode[5-7]. Previous studies suggested that implicit attitude is automatically and directly activated, but explicit attitude may only activate with conscious deliberation[8,9]. As such, an automatically and directly activated attitude may be quite distinct from a more deliberative attitude.

Most previous studies about sex difference in pain responses focused on the effect of explicit GREP[10-12], and no research concerned effect of implicit GREP. Although all participants agree that men were more stoical than women in pain responsivity, it does not implicate that women are generally sensitive and effeminate. It's inevitable for them to compare pain responding between men and women in explicit GREP investigation. Explicit test usually can't reflect straightforward attitudes of GREP for men and women separately. Implicit attitude measurements could allow one to assess direct associations between men/women and attributes about pain responding. Low mediating role of explicit GREP on the pain reports of women in previous studies may reflect weak implicit association between women and expectations of pain in women's mind.

The aim of the present study was to examine whether the implicit and explicit gender role attitudes of pain about women in Chinese women are discordant or not. We predicted that male participants' implicit GREP on both gender were congruent with their explicit attitudes, and female participants' implicit GREP on men were congruent with their explicit attitudes, however, the implicit GREP on women were incongruent with the explicit attitudes.

2 Material and methods

2.1 Subjects

The sample included data from 92 college students (44 men and 48 women), all in good health. The age of the participants ranged from 19 to 24(M_{men}=21.54, SD=3.21; M_{women}=21.79, SD=4.06; t=0.55, P=0.588). All participants took part in this study as paid volunteers. Informed consent was obtained from all participants before the study.

2.2 Material

2.2.1 GREP questionnaire All participants filled out the Chinese translation of GREP questionnaire, which measures sex-related attitudes regarding three clusters: pain sensitivity, pain endurance, and willingness to report pain. Each cluster includes four items(12 items in all) regarding how men and women perceive themselves and the opposite sex, shown as following: ① whether participants perceive themselves to be more sensitive to/endurable to/willing to report pain than the typical woman, ② whether participants perceive themselves to be more sensitive to/endurable to/willing to report pain than the typical man, ③ whether participants perceive the typical man to be more sensitive to/endurable to/willing to report pain than the typical woman, ④ whether participants perceive the typical woman to be more sensitive to/endurable to/willing to report pain than the typical man. Answers were drawn by the respondent on a 100 mm line with endpoints denoted as 0 (much less) and 100 (much more) on the scale.

The questionnaire was translated into Chinese by a native Chinese speaker and then was retranslated back into English. For validity purposes the original version was then compared with the retranslated version.

2.2.2　Extrinsic Affective Simon Task(EAST)　To assess implicit gender role attitudes of pain, we used a verbal Extrinsic Affective Simon Task(EAST), which was originally designed by De Houwer[13]. Although the original Implicit Association Test(IAT) effect corresponds to the difference in performance on two different tasks, an EAST effect can be calculated by comparing trials within the same task(i.e., trials on which the response and the target stimulus are associated with the same valence compared to trials on which they are associated with a different valence). Therefore, EAST effects are less likely to be influenced by non-associative variables that determine how participants recode tasks. The EAST also has some other potential advantages compared to the original IAT. Most importantly, unlike the IAT, it could allow one to assess single association and multiple associations. This allows for a more straightforward assessment of implicit attitudes toward men and women. Note that, a recent series of studies by De Houwer and De Bruycker showed that the IAT may perform better than the EAST in inter-individual differences in attitudes[14]. Reinecke et al. argued that while EAST might not be applicable to individual diagnostics, it is sufficiently reliable and valid to be used in the assessment of group differences[15].

During the present EAST, participants were asked to sort target and attribute words as fast as possible by using correspondent response keys on the keyboard. Target words included 5 male pronouns(man, lad, sir, boy, men) and 5 female pronouns(woman, lady, madam, girl, women) (see Appendix). All target words were consisted of two Chinese characters and were either presented in green or blue color. Extrinsic response words included 5 adjectives which were associated with high frequency of pain report(HFPR) (effeminate, tender, sensitive, low pain-tolerance threshold, high willingness to report pain), and 5 adjectives which were associated with low frequency of pain report(LFPR) (tough, insensitive, stoical, high pain-tolerance threshold, low willingness to report pain), chosen from internet and the previous GREP researches[1, 3]. All extrinsic response words were consisted of three Chinese characters. Target words were presented on the colored trials, whereas extrinsic response words were presented on the white trials. All targets and extrinsic response words were presented on the black background. Each Chinese character was 30 mm high and 30 mm wide. Presentations were controlled by an E-Prime 1.1 program, which operated in graphics mode. Participants were seated in front of the computer at a distance of approximately 40 cm from the 19 inch screen. They could respond by pressing the key "Q" or the key "P" on the keyboard.

2.3　Procedure

Participants completed the experiment individually. After filling out an informed consent form, they were given written instructions on the computer screen. These instructions informed participants that words would be presented in the middle of the computer screen. Their task was to classify these words by pressing the key "P" or the key "Q" depending on the meaning or the color of the presented word. They were told that if the word was white (i.e., not colored), the meaning of the word was important. All participants were instructed to press the key "P" for white HFPR words and to press the key "Q" for white LFPR words. If the word was colored, they were instructed to press the key "P" or "Q" depending on the color of the word. Half of the participants were instructed to press the key "P" in response to words in a bluish color and the key "Q" in response to words in a greenish color. The other participants received the reversed color response assignments. Next, participants were informed that a red cross would appear underneath the word if they made an incorrect response. Both the cross and the word would remain on the screen until the participant gave the correct response. Participants were asked to respond as quickly and accurately as possible. Finally, they were told that there would be two practice blocks of 20 trials followed by four test blocks of 30 trials and that all the experiment would take about 15 minutes.

The experiment started with a practice block during which each of the 10 white words was presented twice in a random order. During the second practice block, each of the 10 target words was presented, once in blue and once in green. Next, there were four test blocks of 30 trials during which each of the 10 target words was presented once in each color and each of the 10 extrinsic response words was presented once in white. Instructions about the upcoming task were given before each practice and test block. These instructions informed the participants about which key to press in response to which type of stimulus. After reading those instructions, participants started the presentations by pressing the spacebar key. In all practice and test blocks, stimulus were presented in a random order with the restriction that the same word could not be presented on two or more consecutive trials and that the required response could not be the same on four or more consecutive trials. Each practice and test trial consisted of the following sequence of events: A white fixation cross for 500 ms; the word until a correct response was given (if the participant made an incorrect response, a red cross appeared underneath the word until the participant pressed the correct key). The inter-trial interval was 1500 ms.

After EAST, participants were asked to complete the GREP questionnaire. Finally, participants received 10 Yuan as compensation for their participation in the study.

2.4 Data analysis

SPSS software was used to analyze the data. Three separate sets of analyses were conducted. First, an exploratory principal component factor analysis with orthogonal rotation was performed on the GREP responses in order to assess structural equivalence of the Chinese translation. Then, a repeated measures analysis of variance(ANOVA) was used to calculate sex difference in GREP values. The values of the GREP questionnaire were calculated for each question and for each dimension (pain sensitivity, pain endurance, and willingness to report of pain). Finally, the repeated measure ANOVA were used to compare separately means of reaction times and percentage of errors in EAST between congruent trials(male pronouns VS LFPR; female pronouns VS HFPR) and incongruent trials(male pronouns VS HFPR; female pronouns VS LFPR).

3 Results

3.1 Factor analysis

Table 1 presents the factor loading for the items contained in each factor as resulted from the factor analysis performed on the GREP responses. The five factors presented(with eigenvalues greater than1) accounted for 81.339% of the total variance. In the present study, item 9 and 10 belong to the factor of self-report of endurance. However, item 9 and 10 belong to factor of self-report to sensitivity in the original study [1]. This difference may be caused by the small sample size in present study. Only 92 subjects were included in present study. Generally speaking, the results of the factor analysis here resemble to that reported by the original study[1]. Both studies showed five same factors in factor analysis which suggests that the translation used in the present study did not change the internal construct and therefore is validated.

Table 1　Factor analysis of the GREP[a]

Item No.	Factors				
	Ⅰ Sensitivity to pain	Ⅱ Willingness to report	Ⅲ Self-report of endurance	Ⅳ Stereotypic endurance	Ⅴ Self-report to sensitivity
1					0.862
2					0.599
3	−0.926				
4	0.936				
5			0.800		
6			0.738		
7				−0.935	
8				0.918	
9			−0.718		
10			−0.454		
11		0.871			
12		−0.935			

[a]Factors Ⅰ-Ⅴ accounted for 81.339% of the total variance

3.2 GREP questionnaire

Tables 2 presents the values of the GREP questionnaire for participants by sex, showing the three GREP dimensions: pain sensitivity, pain endurance, and willingness to report pain, divided into four items in each dimension. In the present study, the following differences were found.

3.2.1　Sensitivity to pain　A repeated measure ANOVA found significant main effects for sensitivity to pain [$F_{(1,90)}$=24.44, P<0.001], and interaction of sensitivity of pain×sex[$F_{(1, 90)}$=3.62, P<0.05]. A simple effects analysis on this interaction revealed that both men and women thought that the typical man was less sensitive to pain than the typical woman[$F_{(1,90)men}$=4.10, P<0.01; $F_{(1,90)women}$=16.88, P<0.001]. In addition, women rated themselves more sensitive to pain than men[$F_{(1,90)}$=14.33, P<0.001].

Tables 2　GREP questionnaire values by sex (N=92)[b]

Dimensions	Items	Women(n=48)		Men(n=44)	
		M	SD	M	SD
Pain sensitivity	1. Self to typical woman	46.809	17.767	39.773	30.651
	2. Self to typical man	71.277	23.876	50.568	17.461
	3. Typical man to typical woman	30.851	31.369	38.068	28.268
	4. Typical woman to typical man	69.149	30.993	63.068	28.268
Pain endurance	5. Self to typical woman	65.426	17.719	82.386	17.537
	6. Self to typical man	27.660	21.003	56.818	16.498
	7. Typical man to typical woman	84.043	18.375	80.114	14.844
	8. Typical woman to typical man	15.426	15.245	21.591	17.546
Willingness to report of pain	9. Self to typical woman	67.021	28.124	43.182	17.357
	10. Self to typical man	43.085	24.284	26.136	25.832
	11. Typical man to typical woman	17.553	24.954	25.000	20.174
	12. Typical woman to typical man	79.255	24.627	79.546	20.369

[b] M=mean; SD=standard deviation; N=the number of all subjects; n=the number of male/female subjects.

3.2.2　Endurance of pain　A repeated measure ANOVA found significant main effects for endurance of pain [$F_{(1, 90)}$=233.34, P<0.001], and interaction of endurance of pain×sex[$F_{(1, 90)}$=13.71, P<0.001]. A simple effects analysis on this interaction revealed that both men and women reported that the typical man has higher endurance of pain than the typical woman[$F_{(1, 90)men}$=87.97, P<0.001; $F_{(1, 90)women}$=87.89, P<0.001]. In addition, women rated themselves less enduring of pain than men[$F_{(1,90)}$ = 57.26, P<0.001].

3.2.3　Willingness to report pain　A repeated measure ANOVA found significant main effects for willingness to report pain[$F_{(1,90)}$=93.37, P=0.000], and interaction of willingness to report×sex[$F_{(1, 90)}$=7.72, P<0.001]. A simple effects analysis on this interaction revealed that both men and women reported that the typical man has higher willingness to report pain than the typical woman[$F_{(1, 90)men}$=29.04, P<0.001; $F_{(1, 90)women}$=33.65, P<0.001]. Women rated themselves more willing to report pain than men[$F_{(1,90)}$ =26.78, P<0.001].

3.3　EAST results

Analysis of the results of the test trials only taken into account the time and accuracy of the first response on those trials and discarding reaction times on trials with an incorrect response. Reaction times below 300 ms or above 3000 ms were recoded as 300 ms and 3000 ms respectively, and latencies were log-transformed. We then calculated the mean log-transformed reaction time and the percentage of errors separately for trials on which a male word was presented and an extrinsically LFPR response was required(i.e., the response that was assigned to LFPR white words), trials with a male word and an extrinsically HFPR response(i.e., the response that was assigned to HFPR white words), trials with a female word and an extrinsically LFPR response, and trials with a female word and an extrinsically HFPR response. The resulting mean log-transformed reaction times and percentage of errors(see Table 3) were analyzed using a 2(sex: men or women)×2 (target words: male pronouns or female pronouns)×2(extrinsic response words: LFPR or HFPR) ANOVA with repeated measures on both variables.

EAST score was calculated separately for male and female words by deducting the mean log-transformed reaction time and percentage of errors on trials with an extrinsically LFPR response from the mean log-transformed reaction time and percentage of errors on trials with an extrinsically HFPR response. The analysis of the log-transformed reaction times revealed a main effect of sex[$F_{(1, 90)}$ =25.5, P<0.001], resulting from slower responses for male participants than female participants in the experiment. The main effect of attribute words was significant in the analysis of the reaction times[$F_{(1, 90)}$=40.07, P<0.001]. Participants tended to be faster when the extrinsic response words that were associated with LFPR were required. The interactions between target words and extrinsic response words were significant for the reaction time data[$F_{(1, 90)}$= 29.96, P<0.001], and for the error data[$F_{(1, 90)}$=17.04, P<0.001]. More importantly, the crucial interaction among sex, target words and extrinsic response words were significant for the reaction time data[$F_{(1, 90)}$=8.39, P<0.01], and for the error data[$F_{(1, 90)}$=7.94, P<0.01]. The ANOVAs did not reveal any other significant effects(Fs<1).

A simple effects analysis on the interaction among sex, target words and extrinsic response words revealed that, on trials with colored male words, men' s HFPR responses were given more slowly[$F_{(1,90)}$=55.81, P<0.001], and less accurately[$F_{(1,90)}$=12.04, P<0.005] than LFPR responses. And on trials with colored female words, there were no significant effects in attribute words responses with both reaction time[$F_{(1,90)}$=3.50, P<0.05] and percentage of errors[$F_{(1,90)}$=3.86, P<0.05] for men. Similar to men's performances, on trials with colored male words, women's HFPR responses were given more slowly[$F_{(1,90)}$=17.65, P<0.001], and less accurately[$F_{(1,90)}$=4.79, P<0.05] than LFPR responses. However, on trials with colored female words, there were no significant effects in extrinsic response words responses with both reaction time[$F_{(1,90)}$=0.39, P=0.53] and percentage of errors [$F_{(1,90)}$=1.81, P=0.29] for women.

Table 3 Mean untransformed reaction times(in Milliseconds) and percentage of errors during the EAST as a function of target and Extrinsic Response Valence[b]

Target words	Extrinsic Response Valence			
	Women (n=48)		Men (n=44)	
	LFPR	HFPR	LFPR	HFPR
Men pronouns				
Reaction Time	654.89(251.73)	687.33(266.35)	671.35(208.94)	749.38(279.06)
Percentage of Errors	2.08(3.22)	3.58(6.37)	1.86(3.26)	4.37(5.82)
Women pronouns				
Reaction Time	659.09(242.42)	667.57(241.04)	720.84(248.79)	684.95(242.05)
Percentage of Errors	3.75(7.23)	2.92(6.16)	3.16(5.73)	1.95(3.71)

[b]LFPR= low frequency of pain report; HFPR= high frequency of pain report; n=the number of male/female subjects

4 Discussion

Results of explicit GREP responses in present study indicated that both Chinese men and women rated typical man less willing to report pain, less sensitive and more enduring of pain than typical woman. This is in line with the results of the original study [1]. In addition, we also found that Chinese men thought themselves less sensitive to pain, less willing to report pain, and more enduring of pain than Chinese women, and Chinese women rated themselves more sensitive to pain, more willing to report pain, and less enduring of pain than Chinese men. Compared with Robinson et al. [1] in which only women were found to rate themselves more willing to report pain than men, the present study show that Chinese participants are more self-stereotypical to explicit GREP. Researches on people's spontaneous self-descriptions have revealed consistent group differences: East Asians generally mention more interdependent or group-related self-statements, whereas European North Americans generally mention more independent self-statements[16,17]. Gender identity, as a group-related self concept, may be more accessible for Chinese than for American in explicit GREP investigation. Therefore, the different results might be caused by the collectivism of Chinese culture, which may increase the level of gender role involvement.

The implicit GREP test found that all participants reacted faster and more accurately during trials of male words VS LFPR than that during trials of male words VS HFPR. However, there were no significant differences between trials of female pronouns VS HFPR and trials of female pronouns VS LFPR for female participants. These results might prove the association between men and LFPR, but no association between women and HFPR in Chinese women gender schemata. This indicated that there are gender schemata about pain for men, but not women. Results of explicit GREP responses in present study indicated that both Chinese men and women rated typical women more willing to report pain, more sensitive and less enduring of pain than typical men. It showed the discordance between implicit and explicit gender role attitudes of pain about women for female participants. As we mentioned in Introduction, the discordance between implicit and explicit gender role attitudes of pain about women may be caused by the limitation of explicit measurement tool. It's inevitable for participants to compare men with women about pain responding in explicit GREP investigation. Explicit test just showed the attitudes about sex difference and usually couldn't reflect straightforward attitudes of GREP for men and women separately.

Many studies have verified that gender role expectation about pain, as a key factor, mediate sex differences in pain responsivity. The facts that male subjects perform more stoically than female subjects in experiments have made many researchers attribute this to the mediation of social expectations for men. However, it might also lead some researchers subjectively to infer that women are generally expected to be sensitive and effeminate in pain responsivity. Present study indicates that women gender role schemas about pain may only apply to male participants, not to female participants. If the pain researchers interpret false about sex difference in pain response, it may lead prejudice to women.

Although the results of a majority of studies showed that men have a higher pain threshold and pain tolerance, lower willingness to report pain than women in experimental and clinical research[18-20], there always exist different views about this topic. Bendelow explored women and men's experience of and beliefs about causes of pain in-depth qualitative study and found that both gender groups believed that women were more able to cope with pain[21]. He also found that pain was seen as "normal" for women because of painful experiences associated with the reproductive process, particularly childbirth. Berkley and Holdcroft argued that women are more vulnerable to pain than men but they have a larger repertoire of ways to deal with it [22]. Bendelow's view was supported by some studies. For example, McCaffery and Ferrell found nurses believed that women tolerate more pain, are less sensitive to pain and feel less distress when in pain than men[23]. And a prospective study by Applegate et al. found that higher femininity scores taken at college entry predicted a higher number of chronic pain conditions 30 years later in men, but not women[24]. These studies indicate that women might show stoical attributes in some painful conditions and people might not associate women with low pain threshold, low pain tolerance and high willingness to report pain all the time. The dissociation between explicit and implicit GREP toward women among female students in present study supported this argument. Thus, how to improve the performance of women in pain responsivity by mediation of women's social roles might be an interesting and significant direction of future research.

There is a clear limitation in this study. Although many studies[25-28] have found impact of implicit attitude on people's behavior, it is still unknown whether implicit attitude about GREP is a valid mediator to people's pain responsivity or not. Present study found there are gender role schemas about pain to men, not to women. Given the effects of this finding shown in gender-stereotyped pain behavior or correlations with laboratory pain responding, it is likely to provide strong evidence for our explanation for the low mediating role of explicit GREP on pain report in women and contribute to our understanding of sex differences in pain responding. Future research should pay more attention to the effects of implicit gender role attitude for pain responding.

In conclusion, we have differentiated explicit and implicit GREP and found the discordance between implicit and explicit gender role attitudes of pain about women among female participants, that is, female participants thought explicitly women in general have a lower pain threshold, lower pain tolerance and higher willingness to report pain, but there is only a significant implicit association between men and low frequency of pain reports and no significant association between women and high frequency of pain reports in EAST. The results of implicit attitude measurement may provide a more specific GREP to men and women.

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