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The Fear of Cockroaches Questionnaire (FCQ)

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The aim of this study was to validate the Fear of Cockroaches Questionnaire (FCQ) in general Italian population. The FCQ is an 18-item self-report questionnaire assessing fear of cockroaches. It was translated in Italian and modified as a cockroach adaption of the Fear of Spiders Questionnaire. Data obtained from 329 (mean age 24.21 ± 4.08 years) undergraduates revealed that the FCQ allowed discrimination between high fear and low fear subjects. Exploratory Factor Analysis revealed a mono-factorial structure. The FCQ has a good test-retest reliability (r=0.95) and a good internal consistency (α=0.95). The FCQ correlates with other measures related to fear of small animals, showing good concurrent validity. Finally, the FCQ score seems to be a measure of the fear free from disgust and anxiety caused by the cockroach exposition.

Key words: cockroach, fear, phobia, questionnaire

Studies on specific animal-phobias are typically focused on fear, despite the observation that anxiety often involves an aggregate of several emotions where fear could be the main feeling (Bartlett & Izard, 1972). Specific phobias are restricted to well-defined situations and they are not usually accompanied by the generalized anxiety, spontaneous panic, and depression that commonly trouble agoraphobic and social phobic patients (Marks, 1987).

The diagnostic features of the DSM IV TR (APA, 2000) for the specific phobia states that "the essential feature of a Specific Phobia is marked and persistent fear of clearly discernible, circumscribed objects or situations. Exposure to the phobic stimulus almost invariably provokes an immediate anxiety response".

These focal phobias can involve virtually any situation, but in clinical practice the most common ones are fears of specific kinds of animals or insects, blood or injury, dental or medical procedures, etc. Most kinds of specific phobias are more common in women, start at any age, and may endure for several decades (Marks, 1987). As an example, animal phobias tend to start in early childhood, and blood, dental, and thunderstorm phobias before adolescence (Liddell & Lyons, 1978; Öst, Salkovski, & Hellstrom, 1986).

Animal phobias are isolated fears of animal or insects such as birds, cats, dogs, frogs, spiders, moths, bees, and cockroaches. Such phobias involve fear and avoidance of animals in their own right rather than a fear of contamination by them (Marks, 1987). Nevertheless, in recent years, there has been an increasing interest in the topic of disgust and in the role it might play in anxiety disorders. Research has shown how disgust and phobias could be linked together, especially when referred to small animals such as spiders, cockroaches, maggots and rats. For that reason, and due to the frequency of simple animal phobias in the general population, for pragmatic causes (e.g., ease of participants recruitment) the simple animal phobia became a useful model for investigating diverse facets of anxiety and psychotherapy.

The most investigated simple animal phobias were the spider phobia (e.g., de Jong & Muris, 2002; O'Donohue & Szymanski, 1993; Öst, Salkovski & Hellstrom, 1991), the snake phobia (Klieger & Siejack, 1997), and the rat phobia. In part, these animals may evoke the same kind of threatening as large animals: a physical attack may motivate fear associated with predator defense (Öhman, 1986). Nevertheless, this is no longer true for the cockroaches. These animals may be threatening because they can be carriers of harmful diseases. This threat of contamination may moti-

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vate the disgust related to disease avoidance (Curtis & Biran, 2001; Matchett & Davey, 1991). For this reason, some questionnaires concerning disgust have items concerning cockroaches (e.g. Haidt, McCauley, & Rozin, 1994).

Thus, the study of the fear of cockroaches is interesting, and, it is important to have reliable and valid assessment tools. In order to develop a questionnaire with a good validity, reliability, internal consistency, and with a reasonable number of items, we adapted a small animal phobia questionnaire presenting all these properties. As proposed by Botella, Quero, Banos, Garcia-Palacios, Breton-Lopez, Alcaniz & Fabregat (2008), we selected the Fear of Spiders Questionnaire (FSQ) (Szymanski & O'Donohue, 1995) for the adaptation. It is an 18-item on a 7-point Likert scale questionnaire. It assesses participants' avoidance and fear of harm from spiders with a very good internal consistency, reliability, validity.

METHODS

Development of the questionnaire

The questionnaire is an adaptation of the Fear of Spiders Questionnaire (FSQ) (Szymanski & O'Donohue, 1995). Three psychologists translated the questionnaire to obtain three different Italian versions. A native English speaker provided the back-translations. The results were compared in order to obtain a definitive version. A comparison between the original English language version and the back-translation made it possible to eliminate inconsistencies or significant differences in meaning. The style of test was adjusted to make the list of questions easier to read, and the word cockroach substituted the word spider. The questionnaire was tested on small groups of people drawn from general population to check ease of comprehension and readability. Adjustments were made and final touches added. The Fear of Cockroaches Questionnaire (FCQ) is an 18-item measure that assesses participants' avoidance of and fear of harm from cockroaches.

Participants

The number of participants was 329, 171 recruited from psychology classes at the University of Padua, and 158 from other classes at the University of Padua and at the University of Verona. There were 113 (34.3%) males and 216 (65.6%) females. The age range was 18 to 30; mean (*SD*) age was 24.21 (4.08) years; mean (*SD*) age for men was 24.29 (5.79) years and mean (*SD*) age for women was 24.17 (2.81) years.

Procedure

The FCQ was administered as part of a battery of tests, described below. Before undergoing the tests, each participant completed a form reporting personal information about age and sex.

Questionnaires Fear Inventory (IP) (Sanavio, 1987). It is the nine-item animal subscale of the Italian version of the Fear Survey Schedule (FSS, Wolpe & Lang, 1964) where the item "crawling insects" was replaced with "cockroaches", using the same approach proposed by Teachman (2007). This measure assesses fear of specific animals on a five-point Likert scale ranging from "not at all" to "very much". Other items from the animal subscale were included to decrease salience of the "cockroaches" item.

Disgust Scale Revised (DS) (Olatunji, Haidt, McKay, & David., 2008; Haidt, McCauley & Rozin 1994; Olatunji et al., 2009) is an index of sensitivity to disgust-eliciting stimuli. The DS consists of three subscales: a 12-item core disgust scale, an 8-item animal-reminder scale, and a 5-item contamination disgust scale (Olatunji, Sawchuk, de Jong, & Lohr, 2007; Olatunji et al., 2007). These scales include 13 true/false items and 12 items on a 3-point scale (0, .5, and 1) with respect to the extent to which participants find the experience ''Not disgusting at all, Slightly disgusting, or Very disgusting". Two of the true/false items are reverse-scored. For each respondent, two scores were calculated: a mean of the 13 true/false items and a mean of the 12 items on a 3-point scale. A total score for overall disgust sensitivity may be calculated by computing the mean of these two scores (scores thus range from 0 to 1). The DS has proven adequate internal consistency and convergent and discriminant validity (Olatunji, Sawchuk et al., 2007; Olantuji, Williams et al., 2007).

State Trait Anxiety Inventory X (STAI-X) (Spielberger, Gorush, & Lushene, 1981; Vidotto & Bertolotti, 1991). It is an anxiety scale consisting of twenty four-point Likert-scale items, where the respondent is asked to rate his/her current level of general anxiety. The score of the scale has shown to increase in distressing situations, while it decreases through relaxing (Spielberger et al., 1981).

Statistical analysis

Analysis was carried out using PASW Statistics 17, Release Version 17.0 (SPSS, Inc., 2009, Chicago, IL, www.spss.com) for Windows and R software version 2.5.1 for Windows (R Development Core Team, 2010). Internal consistency was evaluated using Cronbach's alpha. Pearson's r coefficient was used to check test-retest reliability and concurrent validity. Exploratory factor analysis was carried out to analyze the factor structure of the FCQ.

RESULTS

Internal consistency & test-retest reliability. Internal consistency, estimated by Cronbach's alpha, was very high in the FCQ scale (α= .95). To evaluate the test-retest reli-

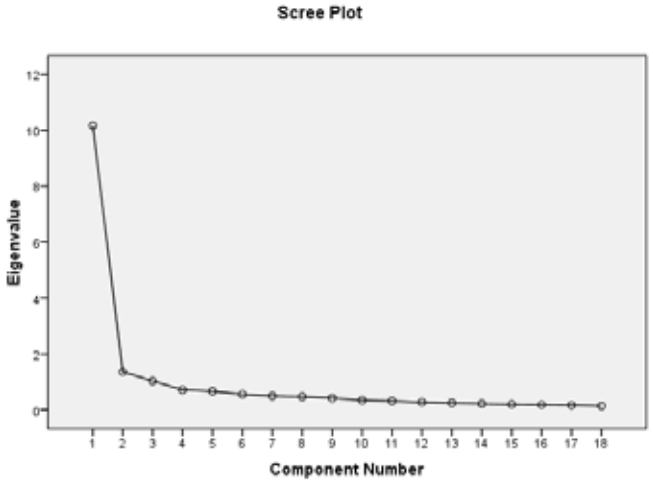

Figure 1. Scree plot of the EFA performed on 18 items of the FCQ scale

ability of the FCQ questionnaire, the test was administered to 36 subjects randomly sampled from the original group of $N = 329$ subjects after 6 months. Test-reliability of the total FCQ score was $r = .95$ ($p < .01$).

Exploratory factor analysis. Principal Components Analysis with varimax rotation was applied. Scree-plot test (Cattell, 1966) was considered to choose a mono-factorial solution (see Figure 1).

The Kaiser-Meyer-Olkin Measure of Sampling Adequacy was 0.942, a "sound" value (Kaiser, 1974) indicating that the factor structure was an appropriate model for these data. Bartlett's Test of Sphericity was 4,630.41 ($p<.001$): an adequate value to support the model and to reject the hypothesis that the correlation matrix is an identity matrix. The anti-image correlation matrix - showing the extent items share common variance, had values between ±0.50. The partial correlations should be small if items share common factors. The squared multiple correlations between one variable and all the others indicating the strength of linear association, i.e. the communalities, were appropriately moderate-high at between 0.49 and 0.83 (see Table 1).

Concurrent validity. The correlation between FCQ and i) the animal factor of IP, ii) the item cockroaches of IP, iii) the DS, and iv) the STAI-X was calculated in order to evaluate concurrent validity. Results indicate good concurrent validity of the FCQ: a positive correlation was found between FCQ and i) the animal factor of IP ($r = .53$, $p < .01$), ii) the item cockroaches of IP ($r = .65$, $p < .01$). Results indicate that the fear of cockroaches measured with FCQ is related to the fear of specific animals, and to the fear of cockroaches measured by a single five-pointed item. There are weak correlations with the DS ($r = .38$, $p < .01$) and its subscales (core $r = .35$, $p < .01$; contamination $r = .24$, $p < .01$; animal $r = .27$, $p < .01$), and the STAI-X ($r = .26$, $p < .01$).

These results indicate a weak association between disgust and fear of cockroaches, and anxiety and fear of cockroaches. Table 2 shows correlations between the scales and subscales administered and the FCQ.

Gender differences. Statistical analysis was carried out for testing gender differences. We calculated means and standard deviations split by gender for each scale. T-tests were performed to verify whether gender differences exist for the questionnaires used in the study. Table 3 displays means, standard deviations (*SD*), and coefficients of variation (calculated through the following formula: $CV=sd/|\bar{X}|$) for each questionnaire, subscale and gender. In the last column of Table 3 are reported the results of the t-tests for independent samples performed.

Table 1
Item communalities; extraction method: principal component analysis

	Extraction
FCQ 1	.749
FCQ 2	.486
FCQ 3	.555
FCQ 4	.617
FCQ 5	.761
FCQ 6	.739
FCQ 7	.694
FCQ 8	.658
FCQ 9	.712
FCQ 10	.743
FCQ 11	.697
FCQ 12	.681
FCQ 13	.834
FCQ 14	.800
FCQ 15	.696
FCQ 16	.678
FCQ 17	.729
FCQ 18	.729

Table 2
Correlations between FCQ and IP cockroaches, IP total, Disgust Scale, Disgust Scale core, Disgust Scale contamination, Disgust Scale animal and STAI-X (Pearson two-tailed)

	Correlations
IP cockroaches	.650
IP total	.531
DS	.382
DS core	.355
DS contamination	.238
DS animal	.270
STAI - X	.260

Note. All the correlations are significant at the .01 level

Table 3
For each questionnaire are presented the mean and standard deviation for men and women respectively, and in the last column are reported *t*-test and *p* values.

	Male		Female		
	Mean	*SD*	Mean	*SD*	*t*
FCQ	13.35	20.94	26.67	23.56	$t_{(251.911)} = -4.46$**
IP cockroaches	1.54	1.22	2.06	1.27	$t_{(327)} = -3.57$**
IP total	11.15	6.06	16.35	6.88	$t_{(327)} = -6.77$**
DS	0.31	0.15	0.45	0.15	$t_{(327)} = -8.23$**
DS core	4.24	2.39	6.20	2.19	$t_{(327)} = -7.45$**
DS contamination	1.51	0.91	1.72	0.99	$t_{(327)} = -1.87$*
DS animal	3.61	1.82	3.61	1.50	$t_{(193.147)} = -6.44$**
STAI-X	19.07	9.86	22.83	9.35	$t_{(327)} = -3.40$**

Note. **p<.001; *p=.063.

CONCLUSION

Results of this study show that the FCQ is a valid and reliable questionnaire for the measurement of fear of cockroaches in normal population. Our data indicate that the FCQ discriminates between high and low fear-of-cockroaches individuals, as the high correlation with the IP reveals. The FCQ shows a quite strong correlation with both the item cockroaches of the IP and the total score of animal factor of IP. There are weak correlations with the DS and its subscales, and the STAI-X. This reveals that the FCQ is focused on the fear, and neither on the disgust that cockroaches cause, nor on general anxiety. The reason of this can be that the items of FCQ deeply explore the behaviors and the thoughts connected to the fear of cockroaches, whereas the animal factor of the IP measures "the fear and anxiety caused by this situation" (as the Italian version reports) of a specific animal on a 5-point Likert scale. This could mean that the measure of the IP is not free from the influence of disgust and anxiety, as shown by the correlation between IP and DS, and between IP and the subscales of DS.

The FCQ presents a very good internal consistency and test-retest reliability at six months, as the original questionnaire FSQ reports. The Exploratory Factor Analysis of the FCQ showed a mono-factorial structure. Differently the FSQ presents a two factors structure: a "fear of harm" factor and an "avoidance/search of help" factor; this difference could be due to the fact that the FSQ focused on spiders, insects that can actually harm individuals. In the FCQ, since cockroaches cannot harm individual a "fear of harm" factor could be a no sense.

In the FCQ gender differences are statistically significant. This happens in the most part of questionnaires concerning anxiety or fear. In our sample the average of the males is smaller than females'.

Also in the other questionnaires included in the battery gender differences are statistically significant, except for the contamination subscale of Disgust Scale. This could be due either to a random effect of the sample's characteristics or to the translation into Italian, or both.

In the most part of the questionnaires of the battery we observed a high value of standard deviation. This suggests a further line of research to investigate potential differences not only between males and females, but also between clinical and non-clinical individuals, etc. In fact, the high value is due to the presence of few "high fear-of-cockroaches" participants in our sample. FCQ scores range between 0 and 108, but in a normal population of students, randomly chosen, only few subjects present a high score (i.e., there are only 14.89% if participants who scored more than 50), and their presence actually increases the standard deviations. Another possible interpretation of the high values observed for the sd could be the high sensitivity of the instrument that seems to be able to detect and highlight even small levels of fear. All these issues have to be further investigated.

Further analysis will have to focus on: (i) reliability and validity studies on a more general sample, since this study was performed only on students, with a small age range; (ii) samples of participants with anxiety disorders; (iii) specific small animal phobias samples (cockroaches).

Moreover, studying its responsiveness could be important to assess treatment efficacy.

In conclusion, the analysis of the FCQ in a normal population provides evidence of reliability, factor and concurrent validity. Nevertheless, this tool is useful in assessment of anxiety disorders, because the fear of small harmless animals like cockroaches seems to play a role in anxiety disorders.

REFERENCES

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders: DSM-IV-TR*. Washington, DC: American Psychiatric Association.

Bartlett, E. S., & Izard, C. E. (1972). *A dimensional and discrete emotions investigation of the subjective experience of emotion*. In C. E. Izard (Ed.), Patterns of emotion: A new analysis of anxiety and depression (pp. 129–173). New York: Academic Press.

Botella, C., Quero, S., Banos, R. M., Garcia-Palacios, A., Breton-Lopez, J., Alcaniz, M., & Fabregat, S. (2008). Telepsychology and self-help: The treatment of phobias using the Internet. *Cyberpsychology & Behavior, 6*(11), 659-663.

Cattel, R. B. (1966). *Handbook of multivariate experimental psychology*. Chicago: Rand McNally.

Curtis, V., & Biran, A. (2001). Dirt, Disgust, and Disease: Is Hygiene in Our Genes?, *Perspectives in Biology and Medicine, 44*(1), 17-31.

de Jong, P. J., & Muris, P. (2002). Spider phobia: interaction of disgust and perceived likelihood of involuntary physical contact. *Journal of Anxiety Disorders, 16*, 51–65.

Haidt, J., McCauley, C., & Rozin, P. (1994). Individual differences in sensitivity to disgust: a scale sampling seven domains of disgust elicitors. *Personality and Individual Differences, 16*, 701 – 713.

Kaiser, H. F. (1974). *Little Jiffy, Mark IV*. *Journal of Educational and Psychological Measurement, 34*(1), 111-117.

Klieger D. M., & Siejak K. K. (1997). Disgust as the source of false positive effects in the measurement of ophidiophobia, *Journal of Psychology, 131*(4), 371-382.

Liddell, A., & Lyons, M. (1978). Thunderstorm phobias. *Behavioral Research Therapy, 16,* 306-308.

Marks, I. M. (1987). *Fears, phobias, and rituals*. New York: Oxford University Press.

Matchett, G., & Davey, G. C. L. (1991). A test of a disease-avoidance model of animal phobias. *Behaviour Research and Therapy, 29*, 91-94.

O'Donohue, W. T., & Szymanski, J. (1993). Mechanisms of change in cognitive therapy for a simple phobia: logical analysis and empirical hypothesis testing. *Journal of Rational-Emotive and Cognitive Behavior Therapy, 11*, 207-222.

Olatunji, B. O., Moretz, W. M., McKay, D., Bjorklund, F., de Jong, P. J., Haidt, J., Hursti, T. J., Imada, S., Koller, S., Mancini, F., Page, A. C., & Schienle A. (2009). Confirming the three-factor structure of the Disgust Scale - Revised in eight countries. *Journal of cross-cultural psychology, 2*(40), 234 – 255.

Olatunji, B. O., Haidt, J., McKay, D., & David, B. (2008). Core, animal reminder, and contamination disgust: Three kinds of disgust with distinct personality, behavioral, physiological, and clinical correlates. *Journal of Research in Personality, 42*, 1243–1259.

Olatunji, B. O., Sawchuk, C. N., de Jong, P. J., & Lohr, J. M. (2007). Disgust sensitivity in anxiety disorder symptoms: Factor structure and psychometric properties of the Disgust Emotion Scale. *Journal of Psychopathology and Behavioral Assessment, 29*, 115–124.

Olatunji, B. O., Williams, N. L., Tolin, D. F., Sawchuk, C. N., Abramowitz, J. S., Lohr, J. M., et al. (2007). The Disgust Scale: Item analysis, factor structure, and suggestions for refinement. *Psychological Assessment, 19*, 281–297.

Öhman, A. (1986). Face the beast and fear the face: Animal and social fears as prototypes for evolutionary analyses of emotion. *Psychophysiology, 23*, 123-145.

Öst, L. G., Salkovski, P. M., & Hellstrom, K. (1991). One-session therapist-directed exposure vs. self-exposure in the treatment of spider phobia. *Behavior Therapy, 22*, 407-422.

R Development Core Team (2010). *R: A language and enviroment for statistical computing*. Vienna: R Foundation for Statistical Computing.

Sanavio, E. (1987). La valutazione delle paure: presentazione della forma adulti dell'inventario delle paure [The evaluation of fear: Presentation of the "adult" form of the Fear Inventory]. *Bollettino di Psicologia Applicata, 175*, 3 – 20.

Spielberger C. D., Gorush R. L., & Lushene R. E. (1981*). STAI State Trait Anxiety Inventory* [Questionario di autovalutazione per l'ansia di stato e di tratto. Manuale di Istruzioni]. Paolo Pancheri Firenze: OS.

Szymanski J., & O'Donohue W. (1995). Fear of spiders questionnaire. *Journal of Abnormal Psychology, 26*, 31 - 34.

Teachman B. A. (2007). Evaluating implicit spider fear associations using the go/no-go association task. *Journal of Behavior Therapy and Experimental Psychiatry, 38,* 156 – 167.

Vidotto G., & Bertolotti G. (1991). Una valutazione base dell'ansia di stato. La versione ridotta dello STAI-X1. *Bollettino di psicologia applicata, 198*, 33 – 40.

Wolpe J., & Lang P. J. (1964). A fear survey schedule for use in behavior therapy. *Behavior Research and Therapy, 2*, 27 – 30.

APPENDIX

Fear of Cockroaches Questionnaire (FCQ)
Questionario sulla Paura agli Scarafaggi

Istruzioni: Le voci di questo inventario si riferiscono a atteggiamenti, sentimenti e comportamenti relativi a diverse situazioni. Leggi una voce alla volta e valuta se le affermazioni ti descrivono oppure meno. Scegli la risposta nel simbolo corrispondente che vanno da 0 a 6 tenendo presente che:

⓪ = *Completamente in disaccordo*

⑥ = *Completamente d'accordo*

Indica con una crocetta la risposta che corrisponde al tuo modo di sentire di questo ultimo periodo di tempo, il più recentemente possibile. Basati su ciò che immagini e cerca di rispondere a tutte le domande.

Se qualcosa non ti è chiaro, chiedi pure spiegazioni e chiarimenti. Alla fine ricontrolla di aver risposto a tutte le domande.

1. Se trovassi uno scarafaggio, chiederei aiuto perché qualcuno lo rimuova.	⓪ ① ② ③ ④ ⑤ ⑥
2. A volte mi guardo attorno per vedere se ci sono scarafaggi.	⓪ ① ② ③ ④ ⑤ ⑥
3. Se vedessi uno scarafaggio adesso, penserei che potrebbe nuocermi.	⓪ ① ② ③ ④ ⑤ ⑥
4. Adesso penso molto agli scarafaggi.	⓪ ① ② ③ ④ ⑤ ⑥
5. Potrei essere un po' spaventato ad entrare adesso in una stanza dove prima ho visto uno scarafaggio.	⓪ ① ② ③ ④ ⑤ ⑥
6. Farei qualsiasi cosa per provare ad allontanarmi da uno scarafaggio.	⓪ ① ② ③ ④ ⑤ ⑥
7. A volte penso riguardo al venir punto o morso da uno scarafaggio.	⓪ ① ② ③ ④ ⑤ ⑥
8. Se incontrassi uno scarafaggio adesso, non potrei occuparmene efficacemente.	⓪ ① ② ③ ④ ⑤ ⑥

9. Se incontrassi uno scarafaggio adesso, ci vorrebbe molto tempo prima di riuscire a togliermelo dalla testa.	⓪ ① ② ③ ④ ⑤ ⑥
10. Se incontrassi uno scarafaggio adesso, lascerei la stanza.	⓪ ① ② ③ ④ ⑤ ⑥
11. Se vedessi uno scarafaggio adesso, penserei che potrebbe provare a saltarmi addosso.	⓪ ① ② ③ ④ ⑤ ⑥
12. Se vedessi uno scarafaggio adesso, chiederei a qualcuno di ucciderlo.	⓪ ① ② ③ ④ ⑤ ⑥
13. Se incontrassi uno scarafaggio adesso, me lo immaginerei mentre tenta di catturarmi.	⓪ ① ② ③ ④ ⑤ ⑥
14. Se vedessi uno scarafaggio adesso ne avrei paura.	⓪ ① ② ③ ④ ⑤ ⑥
15. Se vedessi uno scarafaggio adesso andrei in panico.	⓪ ① ② ③ ④ ⑤ ⑥
16. Gli scarafaggi sono una delle mie peggiori paure.	⓪ ① ② ③ ④ ⑤ ⑥
17. Mi sentirei molto nervoso se vedessi uno scarafaggio ora.	⓪ ① ② ③ ④ ⑤ ⑥
18. Se vedessi uno scarafaggio adesso probabilmente comincerei a sudare e il mio cuore batterebbe velocemente.	⓪ ① ② ③ ④ ⑤ ⑥