The Friendship Questionnaire: An Investigation of Adults with Asperger Syndrome or High-Functioning Autism, and Normal Sex Differences

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Friendship is an important part of normal social functioning, yet there are precious few instruments for measuring individual differences in this domain. In this article, we report a new self-report questionnaire, the Friendship Questionnaire (FQ), for use with adults of normal intelligence. A high score on the FQ is achieved by the respondent reporting that they enjoy close, empathic, supportive, caring friendships that are important to them; that they like and are interested in people; and that they enjoy interacting with others for its own sake. The FQ has a maximum score of 135 and a minimum of zero. In Study 1, we carried out a study of n=76 (27 males and 49 females) adults from a general population, to test for previously reported sex differences in friendships. This confirmed that women scored significantly higher than men. In Study 2, we employed the FQ with n=68 adults (51 males, 17 females) with Asperger Syndrome or high-functioning autism to test the theory that autism is an extreme form of the male brain. The adults with Asperger Syndrome or high-functioning autism scored significantly lower on the FQ than both the male and female controls from Study 1. The FQ thus reveals both a sex difference in the style of friendship in the general population, and provides support for the extreme male brain theory of autism.

KEY WORDS: Empathy; high-functioning autism; Asperger Syndrome; social relationships; friendship; Theory of Mind.

There is a substantial literature on the social development of girls versus boys in terms of how they conduct their relationships, starting from early childhood, and becoming more divergent into the teens and adulthood (Geary, 1998; Kimura, 1999; Maccoby, 1999). Some key findings are that girls show more emotional sensitivity in helping a newcomer join a group, they show more sharing of toys and more communication, they use fewer direct commands and less aggression, and from the teens onward, they strive for greater emotional depth and intimacy than do males. In contrast, boys show more concern with their social

Most of the studies examining this have relied on observational methods, with almost no self-report instruments being developed. In this article, we report a study that aims to test whether these observational findings are also found in a self-report questionnaire. The main advantage of using a self-report questionnaire over observational studies is that it is much quicker for both the respondent and experimenter. This study also investigates whether the neuro-developmental condition of autism is an extreme of the male pattern, as has been suggested in a recent theory (Asperger, 1944; Baron-Cohen, 1999; Baron-Cohen, 2000; Baron-Cohen, 2002; Baron-Cohen & Hammer, 1997a; Baron-Cohen, Wheelwright, Griffin, Lawson, & Hill, 2002).

rank, competition, and an emphasis on doing things rather than on communication for its own sake (Caplan, Crawford, Hyde, & Richardson, 1997; Golombok & Fivush, 1994).

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Autism is diagnosed when an individual shows abnormalities in social and communication development, in the presence of marked repetitive behaviour and limited imagination (American Psychiatric Association, 1994). The term high-functioning autism (HFA) is given when an individual meets the criteria for autism in the presence of normal IQ. Asperger Syndrome (AS) is defined in terms of the individual meeting the same criteria for autism but with no history of cognitive or language delay (World Health Organization, 1994). Language delay itself is defined as not using single words by 2 years of age or phrase speech by 3 years of age.

In Study 2, we tested adults with HFA/AS on the FQ to explore the notion that autism is an extreme form of the male brain. The extreme male brain (EMB) theory of autism predicts that on any test of "empathizing," unaffected males will score lower than unaffected females, and performance by individuals with an autism spectrum condition will be even lower than unaffected males. Similarly, the EMB of autism predicts that on any test of "systemizing" (or the ability to understand nonintentional systems, such as machines, maths, physics, etc.), unaffected males will score higher than unaffected females, and performance by individuals with an autism spectrum condition will be intact or even higher than unaffected males. There is some preliminary support for this theory (Baron-Cohen & Hammer, 1997b; Baron-Cohen, Jolliffe, Mortimore, & Robertson, 1997; Baron-Cohen, O'Riordan, Jones, Stone, & Plaisted, 1999a; Baron-Cohen, Wheelwright, Scahill, Lawson, & Spong, 2001a; Lawson, Baron-Cohen, & Wheelwright, in press). This theory may have implications for the marked sex ratio in AS/HFA (8m:1f) (Wing, 1981).

Interestingly, the sex differences found in these sorts of tests in the unaffected population have not yet been found in adults with AS/HFA; that is, affected males and females perform as well as each other on tests of empathizing and systemizing. This may be partly the result of the relatively small number of affected females tested.

This study provides another test of the EMB theory of autism. An individual scores highly on the FQ if they report enjoying close, empathic supportive friendships; liking and being interested in people; enjoying interaction with others for its own sake; and finding friendships important. It was predicted that unaffected females would score highest, unaffected males would score slightly but significantly lower than females, and adults with AS/HFA would score significantly lower than unaffected males on the FQ.

THE FQ

The FQ was designed to be short, easy to use, and easy to score. It is shown in the Appendix. The FQ comprises 35 questions, on 27 of which it is possible to score. Questions were taken from the sex differences literature above. Although this may sound circular, the aim of this study was to investigate whether a quantitative self-report questionnaire would produce the same results as previous observational studies.

The maximum score for each item on the FQ is 5 points, with fewer points also available for some items. The Appendix shows the precise scoring scheme for each item. Approximately half the items were worded to produce a "disagree" response and half to produce an "agree" response for the high FQ response. This was to avoid a response bias either way. Following this, items were randomized with respect to the expected response from a high-scorer. The FQ has a forced choice format, can be self-administered, and is straightforward to score as it does not depend on any interpretation.

AIMS

In the studies reported below, we had two aims: To test for the sex differences in friendship reported in earlier observational reports (Study 1), which would be reflected in females scoring higher than males, and to test whether adults with HFA or AS score in an extreme male way (Study 2); that is, whether they have even lower FQ scores, given the predictions from the EMB theory of autism.

In Study 1, we tested whether there is a sex difference in the general population on the FQ.

STUDY 1

Subjects

Group 1 comprised 27 males with a mean age of 38.1 years (SD = 13.1; range, 18.0–58.7 years). Group 2 comprised 49 females with a mean age of 41.9 years (SD = 13.4; range, 18.0–66.4 years). Both groups were recruited from volunteers in Cambridge, United Kingdom, who had acted as controls in previous studies. The samples were similarly mixed in terms of background, with no differences in the socioeconomic status of Groups 1 and 2. The range of occupations included manual, clerical, professional, student, and unemployed. Information about their ethnicity was

not obtained but is assumed to be representative of the population in Cambridge.

Method

Subjects were sent the FQ by post and were instructed to complete it on their own and as quickly as possible, to avoid thinking about responses too long.

Results

The mean FQ score for males was 70.3 (SD = 15.7), and the mean FQ score for females was 90.0 (SD = 16.1). A t-test demonstrated that, as predicted, males scored significantly lower than females on the FQ (t = -5.2, df = 74, p < .0001). Table I shows the percentage of subjects scoring at or above selected FQ scores. Note that 33% of females score 100 or higher on the FQ (a high FQ score), whereas no male scores as high as this. Similarly, 85.7% of females compared with 48.1% of males score at or above the medium FQ score of 70 or higher. These differences were both demonstrated to be significant at the p = .001 level, using χ^2 tests ($\chi^2 = 11.2$ and 12.3, respectively; df = 1). An item analysis showed that males had a higher mean score than females on only four items, numbers 14, 29, 31, and 33. Finally, Cronbach's α was calculated as 0.75, indicating high internal consistency.

Discussion of Study 1

As predicted, Study 1 showed that women score significantly higher on the FQ than men. This replicates a series of earlier observational studies reporting sex differences on measure of friendship (Davis, 1994; Maccoby, 1999). Thus, women are more likely to enjoy

Table I. Percentage of Subjects in Study 1 Scoring at or above Selected FQ Scores

FQ Score	Males $(n = 27)$	Females (n = 49)
30+	100	100
40+	96.3	100
50+	92.6	98.0
60+	74.1	93.9
70+	48.1	85.7
80+	29.6	75.5
90+	18.5	67.3
100+	0	32.7
110+	0	4.1
120+	0	0

close, empathic supportive friendships; to like and be interested in people; to enjoy interaction with others for its own sake; and to consider friendships important. Whether this reflects women's greater willingness compared with men to report the behaviors that gain a high FQ score cannot be determined from this study. In Study 2, we tested the EMB theory of autism prediction that people with HFA or AS would score significantly lower than normal males.

STUDY 2

Subjects

Two groups of subjects (all of whom had given informed consent) were tested.

Group 1 comprised n = 68 (51 males, 17 females) adults and adolescents with AS/HFA. All subjects in this group had been diagnosed by psychiatrists using established criteria for autism or AS (American Psychiatric Association, 1994). They were recruited via several sources, including the National Autistic Society (UK), specialist clinics carrying out diagnostic assessments, and advertisements in newsletters/Web pages for adults with AS/HFA. Their mean age was 34.3 years (SD = 15.7; range, 14.0-63.9 years). They had all attended mainstream schooling and were reported to have an IQ in the normal range. Their occupations reflected their mixed socioeconomic status. Because we could not confirm age of onset of language with any precision (because of the considerable passage of time), these individuals are grouped together, rather than attempting to separate them into AS versus HFA.

To confirm the diagnosis of adults in Group 1 as high functioning, 15 subjects in each group were randomly selected and invited into the lab for intellectual assessment using four subtests of the WAIS-R (Wechsler, 1939). The four subtests of the WAIS-R were Vocabulary, Similarities, Block Design, and Picture Completion. On this basis, all of these subtests had a prorated IQ of at least 85; that is, in the normal range (Group 1, x = 106.5, SD = 8.0; Group 2, x = 105.8, SD = 6.3), and these scores did not differ from each other statistically (t test, t > .05).

Group 2 comprised the same adults described in Study 1; that is, 27 males and 49 females. Although the sex ratio of this group is different from that of Group 1, this is taken into consideration in the statistical calculations. The mean age of Group 2 was 40.5 years (SD = 13.6; range, 18.0–66.4 years). Their socioeconomic status profile was similar to that of Group 1. As in Study 1, their occupations ranged from unemployed,

manual, clerical, professional, and student. As in Study 1, information about ethnicity was not requested, but there is no reason to suspect this would have differed between the groups.

Method

The method for administering the FQ was identical to that used in Study 1. Subjects were sent the FQ by post and asked to complete it on their own. No subjects reported any difficulty with the questionnaire.

Results

The response rate from Group 1 was 61% and 40% from Group 2. Mean FQ scores by group and sex are shown in Table II. A univariate analysis of variance with

Table II. Mean FQ Scores by Group and Sex for Study 2

	Males	Females
AS/HFA group		
Mean	53.2	59.8
SD	18.3	25.1
n	51	17
Controls adults		
Mean	70.3	90.0
SD	15.7	16.1
n	27	49

the between-subject factors of Group and Sex demonstrated that, as predicted, the AS/HFA group scored significantly lower than the controls [F(1,139)=51.6, p<.0001]. The main effect of Sex was also significant [F(1,139)=16.8, p<.0001], indicating that, again as predicted, women scored higher than males. The Group by Sex interaction almost reached significance [F(1,139)=3.5, p=.06). Inspection of the means indicated that this was the result of there being no difference between the males and females in the AS/HFA group. A *t*-test proved this to be the case (t=-1.2, df=66, p=0.25). Figure 1 displays the distribution of FQ scores for the AS/HFA group and the male and female controls.

Table III shows the percentage of subjects scoring at or above selected FQ scores. Note that 21.1% of control subjects, compared with just 1.5% adults with AS/HFA, achieve the high FQ score of 100 or greater. Of the control subjects, 72.4% scored at the medium FQ score of 70 or higher, compared with 23.5% of adults with AS/HFA. These differences were both significant at the p < .001 level, using χ^2 tests ($\chi^2 = 13.0$ and 34.2, respectively, for control and AS/HFA; df = 1).

An item analysis showed that the AS/HFA adults did not achieve a higher mean score on any of the items in the FQ compared with the control group. Cronbach's α was calculated for both groups to be 0.84, indicating high internal consistency.

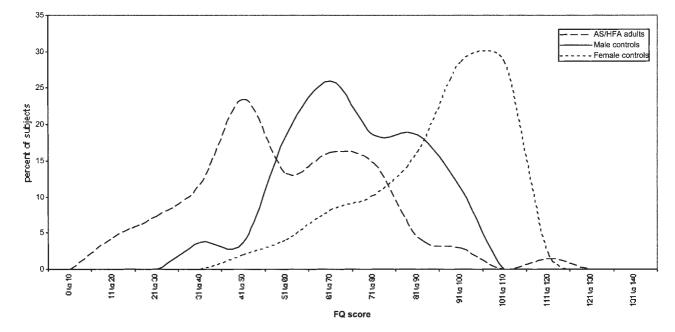


Fig. 1. Distribution of scores on the FQ of males and females in the control group, and individuals with Asperger Syndrome (AS) or high-functioning autism (HFA).

Table III. Percentage of Subjects in Study 2 Scoring at or above Selected FO Scores

FQ Score	AS/HFA adults $(n = 68)$	Control adults $(n = 76)$
10+	100	100
20+	97.1	100
30+	88.2	100
40+	77.9	98.7
50+	54.4	96.1
60+	39.7	86.8
70+	23.5	72.4
80+	8.8	59.2
90+	4.4	50.0
100+	1.5	21.1
110+	1.5	2.6
120+	0	0

Most of the adults with AS/HFA had previously taken part in two other questionnaire studies, one using the Autism Spectrum Quotient (AQ) (Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001b) and the other using the Empathy Quotient (EQ) (Baron-Cohen & Wheelwright, in press). The AQ measures the number of autistic traits an adult of normal intelligence has. The higher the AQ score, the more traits the individual has. The EQ measures empathy, with the more empathic individual achieving a higher score. Adults with AS/HFA score significantly higher on the AQ and significantly lower on the EQ than do control adults. The FQ score was inversely correlated with the AQ and positively correlated with the EQ. Both correlations were significant at the p < .001 level (AQ: r = -0.55, EQ: r = 0.59).

Discussion of Study 2

The results of Study 2 show that as a group, individuals with HFA/AS scored significantly lower on the FQ than controls drawn from a general population. This indicates that although many adults with AS/HFA do have friendships, compared with people in the normal population, their relationships are less close, less empathic, less supportive, and less important to the individual. In addition, adults with AS/HFA like and are interested in people to a lesser extent than control adults, and they are less likely to enjoy interaction with others for its own sake. The more autistic traits an affected adult has, as measured by the AQ, the lower their FQ score. The FQ also correlates with the EQ so that affected adults who report greater levels of empathy also report having friendships that are more

similar to the normal population (i.e., a higher FQ score). These correlations provide some external validation of the FQ.

DISCUSSION

In this article, we have described a new self-assessment instrument, the FQ. A high FQ score is achieved by respondents who report enjoying close, empathic supportive friendships; who like and are interested in people; who enjoy interaction with others for its own sake; and for whom friendships are important. In the general population, women scored significantly higher than men (Study 1), the results replicating the findings from previous observational studies concerning the differences in friendships experienced by men and women (Maccoby, 1999). And in line with the EMB theory of autism (Baron-Cohen & Hammer, 1997a), adults with AS/HFA scored significantly lower on the FQ than unaffected males (Study 2).

The FQ has good construct validity as the questionnaire has a high alpha coefficient, and because the FQ is correlated in precisely the direction one would expect with the AQ (Baron-Cohen *et al.*, 2001b) and the EQ (Baron-Cohen & Wheelwright, in press). That is, inversely and positively, respectively. It will be important to determine whether the significant correlations found between the FQ and the AQ and EQ in the adults with AS/HFA are also found in the general population.

Future work could test the validity of the FQ by comparing results from the FQ with observational studies of the same subjects. Further studies with the FQ could also include psychiatric samples other than people with autism, as it is likely that friendships and relationships are affected by a range of psychiatric conditions. However, we might expect that patterns of scores on the FQ in different groups would be different. For example, in adults with chronic depression, one might still find that the respondent would rate confiding as important to them, even if their condition has led them to withdraw from their former social network to the point that they no longer have one or two best friends.

What are the potential uses of the FQ? One application might be to measure individual differences on this dimension for research purposes (such as in quantifying a behavioral phenotype in genetic or endocrinal research). A second application might be to measure change in the individual's style of relating to others preand posttreatment, if an individual is seeking treatment

for difficulties in social relatedness. A third purpose might be to distinguish special populations, as has been the focus of the above study. For example, one might predict that women with congenital adrenal hyperplasia who show a developmental history of tomboyism (Hines & Kaufman, 1994) might have an FQ score that is closer to the male pattern. Finally, the FQ might be a useful adjunct to more specific measures (e.g., of loneliness) that have been studied in autism (Bauminger, 2000).

It is important to stress that the FQ has been designed to be neutral in terms of the value placed on the "male" and "female" style of friendships. That is, the wording is carefully chosen to indicate that individuals might value or prefer different things in relationships (e.g., confiding vs. shared activities), and that one preference is not better or worse than another—just different. As such, a particular score on the FQ is not indicative of any need for intervention, per se.

There is considerable interest in understanding the social and biological causes of sociality, including style of relatedness. It is uncontroversial that both cultural and neurobiological factors are causal (Geary, 1998; Maccoby, 1999). The evidence here for lower FQ scores in the group with AS/HFA is presumed to reflect differences in the brain (Baron-Cohen *et al.*, 1999b) that are ultimately of genetic origin (Bailey, Bolton, & Rutter, 1998).

In conclusion, the sex differences in close relationships revealed by the FQ in the general population may help us understand conditions like autism or AS not as qualitatively different from anything else we are familiar with but, instead, simply as an extreme of the normal quantitative variation we see in any sample.

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APPENDIX

The Friendship Questionnaire (FQ)

This questionnaire has 35 questions. Please answer every question.

For each of the following questions, tick the box next to the statement which most applies to you.

	•
1. a	I have one or two particular best friends. [5]
ł	I have several friends who I would call best friends.
C	
2. a	The most important thing about a friendship is having somebody to confide in. 5
ł	The most important thing about a friend- ship is having somebody to have fun with.
_	0
3. a	If I had to pick, I would rather have a friend
	who enjoys doing the same things as me
	than a friend who feels the same way about life as I do.
ł	o If I had to pick, I would rather have a friend
	who feels the same way about life as I do,
	than a friend who enjoys doing the same
	things as me. 5
4. a	I like to be close to people. 5
ł	I like to keep my distance from people. ①
5. a	When I talk with friends on the phone, it is
	usually to make arrangements rather than to chat.
ł	When I talk with friends on the phone, it
	is usually to chat rather than to make arrangements. [5]
6 .	_
	I I tend to think of an activity I want to do and then find somebody to do it with.
t	I tend to arrange to meet somebody and then think of something to do. 5
7 .	_
1. 8	I prefer meeting a friend for a specific activity, e.g., going to the cinema, playing
	golf.
ł	I prefer meeting a friend for a chat, e.g., at
	a pub, at a café. 5
8. a	If I moved to a new area, I would put more
	effort into staying in touch with old friends
	than making new friends.
t	o If I moved to a new area, I would put more
	effort into making new friends than staying in touch with old friends.
9. a	My friends value me more as someone who
	is a support to them than as someone to have fun with.
ł	My friends value me more as someone

to have fun with than as someone who is a

0

support to them.

10. a If a friend had a problem, I would be better at discussing their feelings about the problem than coming up with practical solutions. [5]	17. How easy would you find it to discuss your feelings with a stranger? Very easy Quite easy Quite very easy Quite difficult Very difficult
b If a friend had a problem, I would be better at coming up with practical solutions than discussing their feelings about the problem. 11. a If a friend was having personal problems,	18. In terms of <i>personality</i> , how similar to your friends do you tend to be? Very similar 5 Quite similar 3 Not very similar 1 Very dissimilar 0
I would wait for them to contact me as I wouldn't want to interfere. b If a friend was having personal problems, I would contact them to discuss the problem.	19. In terms of <i>interests</i> , how similar to your friends do you tend to be? Very similar Quite similar Not very similar Very dissimilar
12. a When I have a personal problem, I feel that it is better to work it out on my own. b When I have a personal problem, I feel that it is better to share it with a friend. c When I have a personal problem, I feel that it is better to try and forget about it.	20. How important is it to you what your friends think of you? Of no importance Of little importance Fairly important Very important Of upmost importance 5
 13. a If I have to say something critical to a friend, I think it's best to broach the subject gently. b If I have to say something critical to a friend, I think it's best to just come right out and say it. 14. If I fell out with a good friend and I thought 	21. How important is it to you what strangers think of you? Of no importance Of little importance Fairly important Very important Of upmost importance
that I hadn't done anything wrong, I would a do whatever it takes to repair the relationship. 5 be willing to make the first move, as long as they reciprocated.	22. How easy do you find it to admit to your friends when you're wrong? Very easy Not very easy Very difficult O 22. How easy do you find it to admit to your friends when you're wrong? Very easy Quite easy Very difficult O
c be willing to sort out the problem, if they made the first move. d not feel able to be their <i>close</i> friend anymore. 15. My ideal working space would be	23. How easy to do you find it to tell a friend about your weaknesses and failures? Very easy Not very easy Very difficult O 23. How easy to do you find it to tell a friend about your weaknesses and failures? Quite easy Quite difficult 1
a in an office on my own, without any visitors during the day. b in an office on my own, with an occasional visitor during the day. c in an office with one or two others. d in an open plan office.	24. How easy do you find it to tell a friend about your achievements and successes? Very easy
For the next set of questions, please tick the box to indicate your answer. 16. How easy do you find discussing your feelings with your friends? Very easy Not very easy Very difficult O The discussing your feelings with your friends? Very easy Quite easy A Very difficult O	25. How interested are you in the everyday details (e.g., their relationships, family, what's currently going on in their lives) of your <i>close</i> friends' lives? Completely disinterested Not very interested Quite interested Very interested 5

26.	How interested are you in tails (e.g., their relationship currently going on in the casual friends' lives? Completely disinterested Not very interested	ps, family, what's cir lives) of your	Not very easy 2 Quite difficult Very difficult 0 32. What would be the <i>minimum</i> social cont	<u>4</u>
	Quite interested	3	you would need to get through a <i>day?</i> No contact—I don't get lonely	0
27.	Very interested When you are in a grou school, church, parent gro portant is it for you to know who dislikes who, who's h	oup etc., how im- the "gossip," e.g.,	Just being near to people, even if I am talking to them A casual chat, e.g., with a shop assistant	no
	with who, secrets. Of no importance Of little importance	iau a reiationship	Two or three chats with friends during to day	3 the 4
	Fairly important 2 Very important 4		33. What would be the <i>minimum</i> social cont you would need to get through a <i>week?</i>	
28.	Of great importance 5 Do you work harder at you	our career than at	None—I don't get lonely Being around people, even if I wasn't talki	0
	maintaining your relationsh Yes 0 No 5		to them Casual chats, e.g., with a shop assistant	1
29.	How often do you make p friends?	lans to meet with	hairdresser One chat with a friend	3
	Once or twice a year Once every 2 or 3 months	0	Two or three chats during the week w friends	ith 3
	Once a month Once every couple of week	2	One chat every day with a friend Two or three chats every day with a friend	
	Once or twice a week 3 or 4 times a week	[4] [5]	More than any of the above	<u>5</u>
20	More than any of the above	e <u>5</u>	34. When talking with friends, what proportion of your time do you spend talking about	
30.	How would you prefer to k friends?		following: (Please put: 1 in the box next to the to	pic
	preferred r	_	that you talk most about, 2 in the box next to the to	
	preference	next to your second next to your third	you talk next most abo etc., through to 7 in the box next to the to	
	preference	•	you talk least about.	
	Face to face contact	Scoring If first choice,	Use each number only once, i.e., there shows be no ties.)	иla
	E-mail/letters	5 points If first choice, 0 points	Politics and current affairs Hobbies and interests (e.g., sport, TV, mus- cinema, fashion, holidays, gardening, D	
	Telephone calls	If first choice, 2 points Second and third choices are not scored.	etc.) Personal matters (e.g., life choice decisio arguments, feelings) Work Family and friends	

	The weather
	Scoring If either of the two asterisked items are chosen as the most frequently talked about topic, 5 points are awarded. Otherwise no points are awarded. All other rankings are ignored
35.	At social occasions, when you meet someone for the first time, how likely are you to talk about the following.
	(Please put: 1 in the box next to the topic that you talk most about, 2 in the box next to the topic you talk next most about, etc., through to 7 in the box next to the topic you talk least about. Use each number only once, i.e., there should
	be no ties.) Politics and current affairs Hobbies and interests (e.g., sport, TV, music, cinema, fashion, holidays, gardening, DIY, etc.) Personal matters (e.g., life choice decisions, arguments, feelings) Work Family and friends
	The weather What you've been doing recently

Thank you for completing this questionnaire. Please return it in the Freepost envelope provided.

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