

## Sexual orientation, theory of mind and empathy: a comparison of male homosexual and male and female heterosexuals

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Received: 12 June 2015

Accepted: 3 August 2015

Published: 3 November 2015

### Abstract

**Background:** Researchers have been investigating similarities of and differences between homosexuals and heterosexuals for past few decades. Several studies have shown that in the particular domain (e.g., spatial ability), male homosexuals would resemble female heterosexuals better than male heterosexuals. Executive function, however, has received more attention than social cognition in this line of research.

**Methods:** This study focuses on theory of mind and empathy as two important components of social cognition in male homosexuals (N=14), male heterosexuals (N=15) and female heterosexuals (N=14).

**Results:** Applying Reading the Mind in the Eyes test and the Empathy Quotient, no significant difference between groups was identified.

**Conclusion:** This study suggests that similarities of male homosexuals and female heterosexuals may be confined to executive function and not extended to some social cognition abilities like theory of mind or empathy.

**Keywords:** Sexual Orientation; Theory of Mind; Empathy; Sex Differences.

*Cite this article as:* Shapouri S, Nejati V, Eftekhari Ardebili M. Sexual orientation, theory of mind and empathy: a comparison of male homosexual and male and female heterosexuals. *Med J Islam Repub Iran* 2015 (3 November). Vol. 29:286.

### Introduction

Back to mid-twentieth century, a line of research has been exploring the similarities of and differences between cognitive abilities of homosexuals and heterosexuals to put into perspective both sexual orientation and factors influencing cognitive processes. This body of scholarship also provides researchers with a good opportunity to study neurobiological foundations of cognition (1). Given some sort of sexual dimorphism in one area of cognitive abilities, it is proposed that male homosexuals would resemble heterosexual females better than their same-sex peers (2). A prime example is the area of spatial abilities in which men usually outperform women (3). Researchers (2) found that heterosexual men did better

than both homosexual men and heterosexual women with the latter two scoring almost similar results in three different tasks of spatial ability. Using Vincent Mechanical Diagrams, Sanders and Wright (1997) reached the same conclusion (4). In contrast, Gladue and Bailey could not find any significant difference in terms of spatial abilities between homosexuals and heterosexuals in a relatively large sample of participants (5). It is proposed that the gender's effect on spatial abilities is more easily observable in real-world tasks than paper-pencil ones (1).

Despite the interesting findings of some studies, for example Rahman, Wilson and Abrahams (6) who showed that sexual orientation could be a strong predictor of cog-

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native patterns; this line of research has rarely focused on social cognition and emotion. The only relevant study we found, used 240 healthy adult test subjects comprised of four groups of homosexual males, heterosexual males, homosexual females and heterosexual females (7). Controlling for age, IQ, socio-economic status, years of education and degrees of right-handedness, researchers failed to find any significant difference between male and female homosexuals, male and female heterosexuals, or men and women regardless of their sexual orientation. These results were interpreted as implying a constricted role of sex and sexual orientation in facial affect recognition.

As mentioned before, social cognitive and emotional aspects of homosexuality-heterosexuality is scarcely investigated. In order to contribute to this line of research, therefore, we conducted a study on theory of mind and empathy -- two domains of social-cognitive ability in which women have been shown to outperform men.

Broadly defined, social cognition refers to conscious or unconscious processes which help us form cultural practices, share a common world, learn about world from other conspecifics, and better interact with others in general (8). Theory of mind refers to a critical set of such processes which, cooperatively, enable people to explain and predict each other's mental states (9). Among various branches of Theory of Mind, researches may choose to study joint attention, attribute desires or monitoring eye gaze, depending on the question in hand (10). A major branch of Theory of Mind deals with recognizing and inferring mental states of others.

Baron-Cohen et al. developed a task to study the attribution of mental states and investigate Theory of Mind in adults (11, 12). Their Reading the Mind in the Eyes test, more commonly known as Eyes Task, has shown the power of distinguishing high function autistic adults and adults with Asperger Syndrome from normal subjects. It also establishes women as better "eye read-

ers" than men (11,12).

Empathy, another domain of social cognition inherently required for social life, comprises of cognitive and emotional elements. In addition to cognitive empathy which helps us represent others' emotions, we need emotional empathy that is our reaction to other people's feelings which works as motivator of prosocial behavior (13). Some researchers (14,15) consider Theory of Mind and its various components as the cognitive element of empathy. Theory of Mind researches on empathy have shown women to typically score higher than men (16). To our best knowledge, however, these researches also failed to investigate the possible intervening role of sexual orientation.

Drawing on past studies on sexual dimorphism carried out by Theory of Mind and Empathy researchers, and the female-typical performance of male homosexuals in some cognitive skills, we predicted that: 1) male heterosexuals would score lower than female heterosexuals in theory of mind and empathy tasks; and 2) male homosexuals and female heterosexuals would score similarly in those tests. The objective of our study was to investigate the effect of sexual orientation on two components of social cognition.

## Methods

*Subjects and Procedure:* Fourteen homosexual males (HmM), 15 heterosexual males (HtM) and 14 heterosexual females (HtF) were recruited through social networks, personal contacts and snowball sampling. Upon briefly explaining the nature and purpose of the study to obtain informed consents, interested participants were given a battery of tests including a demographic questionnaire, Kinsey Homosexual-Heterosexual Scale, Empathy Quotient and Reading the Minds in the Eyes, to do at home or at the cognitive science institute. Data provided by participants who had a history of head injury, neurological or psychiatric disorders, drug abuse and the only left-handed participant were discard-



Fig 1. An Example of Questions in Eyes Test: 1.arrogent 2.annoyed 3.upset 4.terrified

ed. The study obtained the ethical approval from Institute for Cognitive Science Studies, Tehran, Iran.

**Sexual Orientation:** the sexual orientation of the participants was determined by Kinsey Heterosexual-Homosexual Scale, which is a self-report single item question about the predominant sexual orientation on a 7-point scale from 0 to 6 (17). Conventionally, people scoring 0 or 1 are classified as heterosexual and those which get a score of 5 or 6 are considered homosexual. Therefore, participants who scored 0 or 1 considered as heterosexuals, 5 or 6 as homosexuals and the rest were excluded from the data analysis.

Empathy Quotient (EQ-60; 60-item version) is a self-report questionnaire which contains 60 items in a forced choice format with 40 items for measuring empathy and 20 control questions. Each item has 4 choices and participants can score 0, 1 or 2 for each question: each item scores +1 if respondent choose "slightly agree" and +2 if he/she choose "strongly agree". The range of total score is minimum of zero and maximum of 80 (16). Various forms of validity and test-retest reliability have been established for the test (18,16). Sex differences are also documented (18,16). We used a Persian (Farsi) edition of the test, validity of which was established by other authors at Iranian Institute for Cognitive Science Studies (19).

Reading the Mind in the Eyes or Eyes task (revised version) contains thirty six 15\*10 cm black and white photographs.

Each photo comes with 4 choices, i.e. all mental states terms of the same emotional valance. The subject has to choose the best answer that, in his/her opinion, fits the photo depicting eyes region of a face. Each correct answer is worth 1 point, making the range of potential scores from 0 to 36 (11,12). We used a Persian edition of the test translated from original edition at Shahid Beheshti University, Tehran, Iran. Due to difficulties of getting access to homosexuals, we used the hard-copy edition of the Eyes Task rather than the computerized version.

## Results

**Age and education:** Three groups were matched in terms of age and education. Both age and years of education, calculated from the first grade of elementary school, had a normal distribution. One-way ANOVA revealed that groups were not statistically different in terms of either age ( $F=0.94$ ,  $p=0.39$ ) or education ( $F=0.28$ ,  $p=0.97$ ) (Table 1).

**Theory of mind:** Eyes Test scores were normally distributed. We used one-way ANOVA to find any possible differences between groups. Although HtF performed slightly better than HtM and HmM performed poorest, the differences were not statistically significant ( $F=0.17$ ,  $p=0.84$ ) (Table 2). Sexual orientation was shown to have an extremely small effect size (0.009) on scores of theory of mind with the power of 0.075 for the Eyes Test.

**Empathy:** Scores on Empathy Quotient

Table 1. Participants' Age and Years Spent in Education

	Age (yrs)			Education length (yrs)		
	Minimum	Maximum	Mean (SD)	Minimum	Maximum	Mean (SD)
Homosexual: Males	19	28	23.5 (2.68)	11	19	14.64 (2.79)
Heterosexual: Males	22	29	25 (2.50)	10	20	14.67 (3.45)
Heterosexual: Females	17	32	23.43 (4.84)	11	18	14.43 (2.44)

Table 2. Scores on Reading the Mind in the Eyes

	Minimum	Maximum	Mean	SD
Homosexual Males	16	23	18.5	2.17
Heterosexual Males	13	23	18.67	2.66
Heterosexual Females	14	27	19.14	3.92

Table 3. Scores on Empathy Quotient.

	Minimum	Maximum	Mean	SD
Homosexual Males	31	52	39.28	5.25
Heterosexual Males	22	56	38.33	10.99
Heterosexual Females	24	50	36.71	8.11

had normal distribution and One-Way ANOVA identified no significant difference between groups ( $F=0.326$ ,  $p=0.724$ ) (Table 3). An extremely small effect size (0.016) was found for empathy scores while the power of the test was 0.098.

### Discussion

The effect of sexual orientation on social cognitive abilities has been scarcely investigated. We hypothesized that male homosexuals would perform similar to female heterosexuals and both groups would perform better than male heterosexuals in theory of mind and empathy tasks. We found that male homosexuals' performance was similar to that of female heterosexuals. Against our prediction, however, neither group was different from male heterosexuals.

Despite similarities of the male homosexual with the female heterosexual and their differences from the male homosexual in some cognitive domains including spatial ability, our results show that these resemblances and differences may not extend well beyond executive function to social emotional faculties like empathy or theory of mind. Our results are consistent with those of Rahman, Wilson and Abrahams (7). Their study used an experimental approach to investigate facial affect recognition and the role of sex and sexual orientation on it. Since Eyes Task has some aspect

of emotion recognition and face perception (11), the results may be comparable. Considering the two studies, it seems that male homosexuals do not differ from their heterosexual peers in social emotional cognitive domains.

Although sex differences were not main focus of our study, it was interesting that men and women did not perform differently in our tests. This finding contradicts some previous studies which used the same task. In the process of developing Eyes Task, Baron-Cohen et al. (11) found that women had a significant superiority. In the revision procedure, women superiority was still visible although sex difference was not significant (12). According to our findings, the women's mean score was higher than that of men, though not significantly. The reason that this difference did not reach a significant level could, at least partly, be attributed to our small sample size. Another plausible explanation is that Theory of Mind as attribution of mental states is more of a cognitive nature than emotional; thus, differences of men and women differences, if any, would remain very subtle in this domain. It might be wise to say that women have a subtle advantage in attribution of mental states, though no major difference in emotion recognition was identified.

With regards to Empathy Quotient, male homosexuals were more empathetic than the other groups but their difference did not

reach the significant level. In parallel with the results of Theory of Mind, female-typical performance of male homosexuals is not verified in empathy task of our tests. Previous studies (16,18) have reported sex differences in empathy using the Empathy Quotient. Again, our findings failed to reproduce those results. Women had the lower mean score in empathy though not significantly different from men. Keep in mind that gender differences in empathy somehow depend on the aspect of empathy under investigation. For example, in Riggio, Tucker and Coffaro's study (20), women scored higher than men in emotional empathy but not in cognitive, perspective-taking empathy. Moreover, empathy, as far as measured in a cognitive approach, has overlapping neural substrates with Theory of Mind (21). Hence it may not yield gender dissimilarities until measured more emotionally. In general, gender dissimilarities and female-typical performance of male homosexuals, if any, might not be visible unless emotional aspects of theory of mind and empathy are scrutinized.

In conclusion, it seems that the relationship between sexual orientation (or bio-psycho-social factors that form it) and some of social cognitive abilities might be more complicated than the straightforward relationship between sexual orientation and some aspects of executive function like spatial ability. Given the strong social pressures on homosexuals, similarity of homosexual men to heterosexual men and women is more interesting. Before drawing general conclusions, however, other aspects of social abilities need be studied. In the domain of empathy, a positive relationship of EQ and brain activity is shown (22), though we should not rush into inferring actual empathetic behavior from empathy questionnaires (23). As for "sexual-orientation-related differences in verbal ability" (24) and the possible contributing role of verbal ability in Eyes Test and Empathy Quotient (18), further research should control for verbal intelligence.

Financial issues in procuring higher-

quality hard copies of the Eyes Task and the difficulties in finding and recruiting homosexuals unfortunately limited our samples. To achieve a better understanding of the dynamics of social cognition and sexual orientation, larger samples and inclusion of female homosexuals are necessary.

### Acknowledgements

The first author appreciates the valuable comments of Dr. Anahita Khorrami and the help given by Dr. Bahar Sadeghi Abdollahi. The authors would also acknowledge Dr. Fereydoun Mehrabi for his support.

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