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Assessing threat responses towards the symptoms and diagnosis of schizophrenia using visual perceptual biases

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ABSTRACT

Stigma towards individuals diagnosed with schizophrenia continues despite increasing public knowledge about the disorder. Questionnaires are used almost exclusively to assess stigma despite self-report biases affecting their validity. The purpose of this experiment was to implicitly assess stigma towards individuals with schizophrenia by measuring visual perceptual biases immediately after participants conversed with a confederate. We manipulated both the diagnostic label attributed to the confederate (peer vs. schizophrenia) and the presence of behavioural symptoms (present vs. absent). Immediately before and after conversing with the confederate, we measured participants' facing-the-viewer (FTV) biases (the preference to perceive depth-ambiguous stick-figure walkers as facing towards them). As studies have suggested that the FTV bias is sensitive to the perception of threat, we hypothesized that FTV biases would be greater after participants conversed with someone that they believed had schizophrenia, and also after they conversed with someone who presented symptoms of schizophrenia. We found partial support for these hypotheses. Participants had significantly greater FTV biases in the Peer Label/Symptoms Present condition. Interestingly, while FTV biases were lowest in the Schizophrenia Label/Symptoms Present condition, participants in this condition were most likely to believe that people with schizophrenia should face social restrictions. Our findings support that both implicit and explicit beliefs help develop and sustain stigma.

1. Introduction

Despite increasing public awareness about schizophrenia, stigma towards people with this disorder has actually increased (Link et al., 1999; Hinshaw, 2006; Pescosolido et al., 2010). The effects of stigma are devastating, including reduced employment opportunities (Hinshaw, 2005), social support availability (Sartorius, 1999), quality of life (Link and Phelan, 2001), and community acceptance (Hinshaw, 2006; Hinshaw and Stier, 2008). Indeed, stigma is one of the greatest barriers in achieving functional recovery (Berge and Ranney, 2005).

The lack of progress in reducing stigma may result from research employing mainly self-reports (Link et al., 2004). Measurement of stigma relies almost exclusively on questionnaires assessing explicit attitudes, introducing biases, such as the tendency to respond in a socially desirable way (Link et al., 2004; Stier and Hinshaw, 2007; Hinshaw and Stier, 2008). Implicitly and objectively measuring stigma with techniques that are less susceptible to response biases may thus offer new perspectives on how these negative beliefs are developed, sustained, and considered in stigma reduction programmes (Corrigan and Shapiro, 2010). Although implicit attitude measures such as the Implicit Association Task (Greenwald et al., 1998) and the Concept Association Task (Steffens et al., 2008) are widely used to measure implicit attitudes, there have been concerns regarding the validity of these measures (De Houwer et al., 2009). Some argue that these tasks may actually measure knowledge of societal views (Karpinski and Hilton, 2001), degree of stimulus salience (Rothermund and Wentura, 2004), or task switching neurocognitive abilities (De Houwer, 2001) as opposed to personal biases that would influence behaviour. Furthermore, these measures only provide a gross assessment regarding positive or negative attitudes, and ignore specific components, such as perceived dangerousness (Penn et al., 1999), which are thought to play a critical role in the stigmatization of people with schizophrenia. Recently, more objective methods for examining responses to the diagnosis and/or symptoms of schizophrenia have been developed (e.g., Best and Bowie, 2013; Lavelle et al., 2013). These methods are complex though (e.g., EEG), so there is a need for more easy-to-administer implicit measures that can be integrated into the evaluation of large scale stigma reduction programmes.

The belief that others are threatening or dangerous is an essential characteristic of stigmatization (Link et al., 1999; Corrigan, 2000; Blascovich et al., 2001; Angermeyer and Matschinger, 2003), but people are biased to not admit to feeling threatened (Blascovich et al., 2001). Using implicit measures, then, is especially important when assessing perceived threat. Corrigan (2000) argued that mental

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health stigma in particular is sustained by the majority's fear of the disparaged group, leading to avoidance of stigmatized individuals. For instance, Link et al. (1999) found that people who read about individuals labelled as having schizophrenia were significantly more frightened, and more likely to believe that people with schizophrenia should be institutionalized to keep the public safe.

One method of implicitly measuring perceived threat that has never before been examined in the context of stigma is to measure one's facing-the-viewer (FTV) bias for stick-figure walkers (SFWs). These stimuli consist of a series of connected points depicting three-dimensional human-like figures that are displayed 'walking' (Johansson, 1973). Originally used to study biological motion perception, these figures are projected orthographically on a two-dimensional plane and are therefore depth-ambiguous. Because such stimuli do not provide information regarding their position in depth (e.g., by means of occlusion), observers may perceive SFWs as either facing-the-viewer or facing away (Vanrie et al., 2004). Interestingly, examination of the frequencies with which individuals perceive either of these percepts has revealed that these stimuli are more often seen as facing-the-viewer, and this phenomenon is known as the FTV bias (Vanrie et al., 2004; Brooks et al., 2008; Schouten et al., 2010).

As a preference to see ambiguous human figures as facing towards oneself would be intuitively beneficial for survival, researchers have hypothesized that the FTV bias may exist for sociobiological reasons (Vanrie et al., 2004; Brooks et al., 2008; Schouten et al., 2010). That is, mistakenly perceiving an ambiguous human figure as approaching would be advantageous compared to making the opposite error. This implies that the facing-towards percept of SFWs is more threatening, and in support, more anxious individuals have stronger FTV biases (Heenan and Troje, 2014). Furthermore, observers perceive male walkers as facing-the-viewer more often than female walkers (Brooks et al., 2008; Schouten et al., 2010), and males are typically perceived as more threatening than approaching females (Cicone and Ruble, 1978).

The purpose of this experiment was to implicitly measure perceived threat by examining participants' FTV biases as a function of the presence of symptoms and/or diagnosis of schizophrenia in a social interaction partner. In a 2 (Symptoms Absent vs. Symptoms Present) × 2 (Peer Label vs. Schizophrenia Label) between-subjects design, we assessed the difference in FTV biases before and after participants conversed with a confederate. We hypothesized an interaction between variables such that FTV biases would range from the lowest to the highest in the following order of conditions: Peer/Symptoms Absent, Peer/Symptoms Present, Schizophrenia/Symptoms Absent, and Schizophrenia/Symptoms Present.

2. Method

2.1. Participants

Fifty-one (44 women, 7 men) university undergraduate students participated in the study and were compensated with either partial course credit or $15.00. Of the 51 people recruited, 10 were excluded (all women) because they guessed the purpose of the experiment. Included participants did not differ significantly from excluded participants in terms of their age, questionnaire data, or perceptual biases (before or after manipulation). All statistical analyses were performed on the remaining 41 participants (34 women, 7 men), who ranged in age from 18 to 21 years ($M = 18.85$, $SD = 1.08$).

2.2. Materials & stimuli

2.2.1. Stick-figure walker (SFW) task

To avoid confounding the variable of interest with a simple response bias (e.g., Is the walker facing towards or away?), we presented SFWs rotating about a vertical axis and asked participants to indicate their spinning direction. Together with information about the "veridical" orientation of the 3D walker, we inferred perceived facing direction from participants' responses (Jackson et al., 2008). All SFWs were based on biological motion point-light walkers and consisted of 15 dots (depicting the centre of major skeletal joints) with connecting lines (Troje, 2008, 2002). The main dependent variable in this study was participants' FTV biases elicited by the SFW task (see Supplementary material 1).

2.2.2. Confederate

A confederate conversed with participants while portraying behaviours that are characteristic of individuals with schizophrenia. The presentation of symptoms in an individual with schizophrenia can have substantial variation day-to-day, making it difficult to standardize which symptoms to display. Using a confederate allowed us to standardize the portrayal of schizophrenia across participants and thus carefully assess the differential effects of diagnostic labels and symptoms on perceived threat (see Supplementary material 2).

2.2.3. CAMI

Participants completed the Community Attitudes Toward the Mentally Ill questionnaire (CAMI; Taylor and Dear, 1981; Taylor et al., 1979). This questionnaire consists of 40 statements regarding attitudes towards persons with mental disorders and produces subscales on four dimensions: authoritarianism (the belief that people are responsible for their own mental health), benevolence (the belief that people with mental disorders deserve help), tolerance of rehabilitation in the community, and social restrictiveness (the belief that people with mental disorders should be restricted from social experiences such as voting or unsupervised community participation). We modified items so that they specifically pertained to those with schizophrenia.

2.2.4. Conversation Ratings Questionnaire

For the purpose of this study, we designed a questionnaire to assess participants' ratings of their conversation with the confederate (see Supplementary material 3). The items on this scale were divided into three subscales that required participants to 1) rate their own abilities during the conversation, 2) rate their partner's abilities during the conversation, and 3) rate how they thought their conversation partner (i.e., the confederate) would rate them.

2.3. Procedure

Upon arriving at the lab, participants sat 90 cm in front of a laptop computer. The experimenter instructed participants to indicate whether they saw stimuli rotating clockwise or counter-clockwise by clicking the appropriate 'button' on the screen using a computer mouse. Participants then completed the initial SFW task.

Next, the experimenter told participants that they would be conversing with another student. Participants either interacted with the confederate who was: (1) labelled as a peer and displayed no symptoms, (2) labelled as a peer but displayed symptoms of schizophrenia, (3) labelled as a person diagnosed with schizophrenia but displayed no symptoms, or (4) labelled as a person diagnosed with schizophrenia and displayed symptoms of schizophrenia. The experimenter communicated this to each participant according to a predetermined script (see Appendix A). Depending on the condition, participants were either told that the other student had schizophrenia (i.e., Schizophrenia Label) or that the student was studying engineering (i.e., peer label). Then, the confederate entered the room after a random wait time of 30 to 120 s and sat in a chair across from the participant, positioned within view of the video camera. The experimenter introduced the participant and confederate to each other and asked them to get to know one another.

After 10 min, the experimenter interrupted the conversation between the confederate and the participant and then escorted the confederate out of the room. The participant then completed the conversation ratings questionnaire and the SFW task again.

Following the SFW task, participants completed a short demographics questionnaire and the CAMI. Before debriefing participants, the experimenter performed a manipulation check them by asking the participant "*Did you notice anything unusual about the experiment?*". Participants were excluded if they guessed that the confederate did not have schizophrenia (i.e., for those in the Schizophrenia Label conditions).

3. Results

3.1. Stick-figure walker (SFW) task

3.1.1. FTV biases

In order to analyze FTV biases, we performed a 2 (Label) × 2 (Symptom) ANCOVA, using participants' FTV biases at baseline as a covariate. The ANCOVA was significant (see Table 1). The main effect of Label was not significant, nor was the main effect of Symptom, but the interaction between Label and Symptom was significant (see Fig. 1).

A simple main effects analysis revealed that participants' FTV biases were significantly greater in the Peer/Symptoms Present condition ($M = 1.07$, $SE = 0.17$) than in the Schizophrenia/Symptoms Present condition ($M = 0.53$, $SE = 0.20$, $p = .048$). Furthermore, FTV biases were significantly greater in the Peer/Symptoms Present condition than in the Peer/Symptoms Absent condition ($M = 0.57$, $SE = 0.15$, $p = .033$). There was no difference between the Peer/Symptoms Absent condition and the Schizophrenia/Symptoms Absent condition ($M = 0.86$, $SE = 0.16$, $p = .195$). Similarly, there was no significant difference in FTV biases between the Schizophrenia/Symptoms Present condition and the Schizophrenia/Symptoms Absent condition ($p = .208$; see Fig. 1). For all analyses, post-hoc comparisons were adjusted using the Bonferroni correction for family-wise error rate.

3.2. CAMI

Separate 2 (Label) × 2 (Symptom) ANOVAs were performed on the four subscales of the CAMI. There were no significant group differences on three of the four CAMI subscales: authoritarianism, benevolence, and tolerance of rehabilitation in the community ($Fs < 1$, $ps > .05$). There was, however, a significant interaction between Label and Symptom for the social restrictiveness subscale, $F(1, 36) = 4.45$, $MSE = 0.69$, $p = .042$, $\eta^2_{partial} = .110$, as participants in the Schizophrenia/Symptoms Present condition held significantly stronger beliefs that restrictions should be placed upon individuals with schizophrenia ($M = 2.40$, $SE = 0.15$) compared to those in the Schizophrenia/Symptoms Absent condition ($M = 1.96$, $SE = 0.12$, $p = .025$; see Fig. 2). The main effects of Label and Symptom were not significant.

3.3. Conversation ratings

Separate 2 (Label) × 2 (Symptom) ANOVAs were performed on participants' conversation rating scores. There was a significant main effect of Label, $F(1, 36) = 4.34$, $MSE = 0.55$, $p = .044$, and $\eta^2_{partial} = .108$.

Table 1
Results of 2 (Label) × 2 (Symptom) Analysis of Covariance (ANCOVA) for facing-the-viewer (FTV) biases.

	df	*F*	*p*	$\eta^2_{partial}$
Corrected model	4, 36	19.80	<.001[a]	.687
FTV baseline (covariate)	1, 36	65.67	<.001[a]	.646
Label	1, 36	<1	.464	.015
Symptoms	1, 36	<1	.628	.007
Label × Symptom	1, 36	5.81	.021[b]	.139

Note. Degrees of freedom (*df*), and results of inferential statistics (F, p, $\eta^2_{partial}$) provided for covariate (FTV biases at baseline), both main effects, and the interaction.
[a] Represents statistical significance of $p < .01$.
[b] Represents statistical significance of $p < .05$.

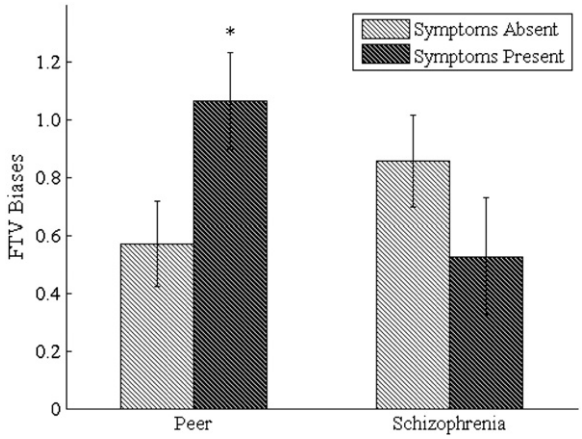

Fig. 1. Mean facing-the-viewer (FTV) biases for participants (after correcting for FTV biases at baseline) after conversing with a confederate whom they believed was either a peer or someone diagnosed with schizophrenia. Whether or not symptoms were present during the conversation with the confederate was also manipulated. There was a significant interaction, as participants had higher FTV biases in the Peer Label/Symptoms Present condition, and higher FTV biases (but not significantly so) in the Schizophrenia Label/Symptoms Absent condition. Error bars represent +/−1 standard error from the mean. * represents significance at the $p < .05$ level.

Specifically, participants rated their own conversation performance better when they thought that they had been conversing with someone with schizophrenia (Schizophrenia Label; $M = 4.24$, $SE = 0.09$) than when they thought that they had been conversing with a peer (Peer Label; $M = 4.00$, $SE = 0.08$; see Fig. 3). Neither the main effect of Symptom Group ($F < 1$, *ns*) nor the interaction between Label and Symptom groups ($F < 1$, *ns*) were significant.

With respect to participants' ratings of their partner, the ANOVA was significant $F(3, 36) = 3.05$, $MSE = 0.95$, $p = .041$, and $\eta^2_{partial} = .203$. Although there was no main effect of Label, $F(1, 36) = 0.91$, $MSE = 0.28$, $p = .346$, and $\eta^2_{partial} = .025$, there was a significant main effect of Symptom, $F(1, 36) = 7.72$, $MSE = 2.40$, $p = .009$, and $\eta^2_{partial} = .176$. Specifically, participants rated the confederate's conversation performance significantly poorer when the confederate had been displaying symptoms (Symptoms Present; $M = 3.69$, $SE = 0.14$), than when they did not (Symptoms Absent; $M = 4.19$, $SE = 0.12$; see

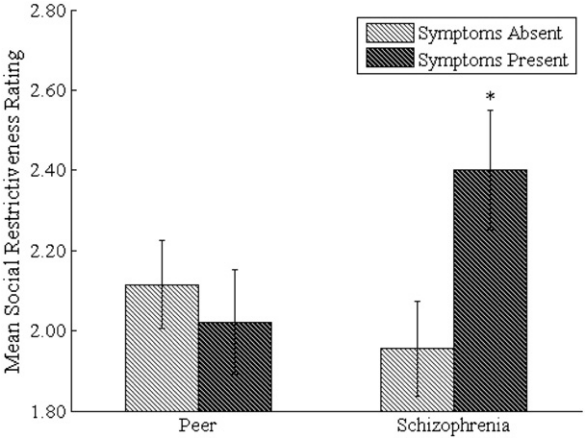

Fig. 2. Mean ratings are displayed for *social restrictiveness*, a subscale of the Community Attitudes Towards Mental Illness (CAMI) questionnaire. Higher scores on this subscale indicate that participants believe that individuals with schizophrenia should face more social restrictions (e.g., they should not be allowed to live independently in the community without supervision). A significant interaction was observed, as participants were significantly more likely to believe that people with schizophrenia should face social restrictions being in the Schizophrenia Label/Symptoms Absent condition. Note that the scale for social restrictiveness can range from 0 to 5. Error bars represent +/−1 standard error from the mean. * represents significance at the $p < .05$ level.

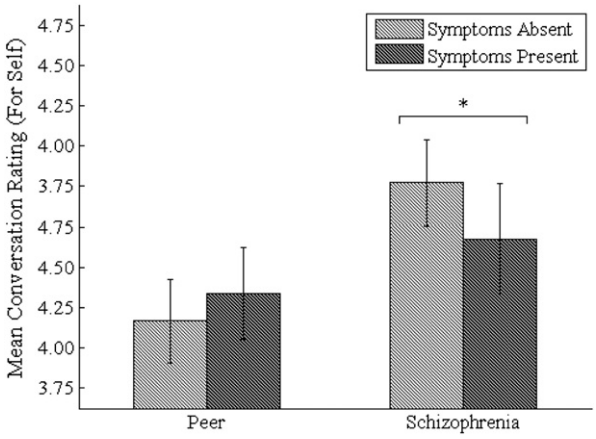

Fig. 3. Mean conversation ability ratings for self are displayed. Higher scores indicate that participants thought that they had performed better during the conversation task on a variety of factors (e.g., ability to maintain proper eye contact). A significant main effect was observed, as people rated their own conversation abilities significantly better in the Schizophrenia Label group than the Peer Label group. Note that the scale for these ratings can range from 0 to 5. Error bars represent +/− 1 standard error from the mean. * represents significance at the $p < .05$ level.

Fig. 4). The interaction between Label and Symptom was not significant ($F < 1$, *ns*).

For participants' ratings of how they estimated their conversation partner (i.e., the confederate) would rate their own conversation performance, the ANOVA revealed no significant differences across groups.

4. Discussion

The purpose of this experiment was to assess implicit measures of perceived threat in participants after we manipulated both knowledge of a diagnostic label and the presence of schizophrenia symptoms. To accomplish this, we examined participants' FTV biases after they conversed with a confederate trained to display symptoms associated with schizophrenia. We predicted that FTV biases would be greater in conditions thought to evoke stigma and found partial support for this, as participants' FTV biases were greater after conversing with a peer who displayed symptoms. Our findings support that implicit perception of

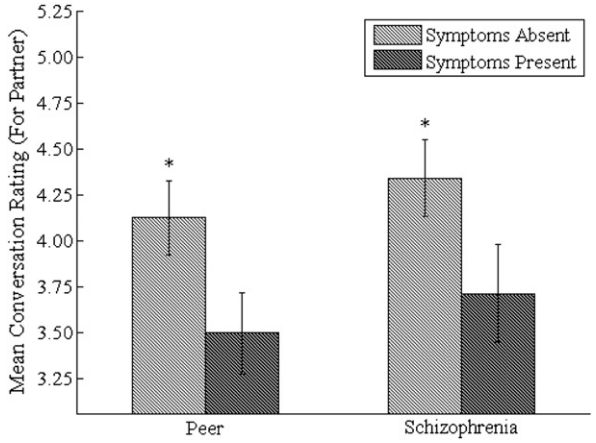

Fig. 4. Participants' mean conversation ability ratings for their partners are displayed. Higher scores indicate that participants thought that their partner had performed better during the conversation task on a variety of factors (e.g., ability to maintain proper eye contact). A significant main effect was observed, as people rated their partner's conversation abilities significantly higher after they had conversed with a confederate whom had not displayed any symptoms of schizophrenia. Note that the scale for these ratings can range from 0 to 5. Error bars represent +/− 1 standard error from the mean. * represents significance at the $p < .05$ level.

threat varies depending on the diagnostic label attributed to someone, as well as whether he/she presents symptoms.

Of interest, we found that FTV biases after participants conversed in the Schizophrenia/Symptoms Present condition were just as low as the Peer/Symptoms Absent condition. Participants in this condition may have had relatively lower FTV biases because they felt less threatened when they saw what symptoms of schizophrenia actually look like, taking on a sympathetic view. Researchers have found that knowledge of the acute symptoms of schizophrenia increases stigma, while knowledge of the more subtle impairments of those with this disorder decreases stigma (Penn et al., 1994). In our experiment, the symptoms our confederate displayed were more subtle and only moderately severe, which may explain why FTV biases were lowest for the Schizophrenia/Symptoms Present condition.

The pattern of results we observed for FTV biases could also be interpreted as being caused by a mismatch of expectations. Expectations regarding how the confederate would likely act would have been primed by the message that participants received about her. Although we did not assess participants' expectations of how someone with schizophrenia would act, based on previous research, it is reasonable to assume that expectations would include unpredictability and dangerousness, whereas expectations regarding a peer would not (Corrigan, 2000). Indeed, perceived threat (as measured by FTV biases) was greatest after unexpected symptoms were observed (Peer Label/Symptoms Present).

More generally, the role of expectation mismatch may highlight a positive consequence of receiving a diagnosis for an individual experiencing a first episode of psychosis. We found that threat response was largest in response to the display of symptoms when no diagnostic label was given that might explain them, but when a diagnosis was provided, the display of symptoms did not elicit a threat response. Our findings are especially relevant in this case, as the confederate in this experiment was trained to display mild symptoms similar to those that someone recovering from a first episode of psychosis may experience.

Researchers have typically studied explicit stigma by measuring beliefs with the use of questionnaires (Stier and Hinshaw, 2007; Hinshaw and Stier, 2008). We implicitly measured subtle changes in perceptual biases that are sensitive to perceived threat, which is crucial to the development of stigma (Link et al., 1999). In our study, we observed that perceived threat can vary depending on the relationship between the diagnostic label attributed to a confederate and whether or not the confederate displayed symptoms of schizophrenia while conversing with participants. Interestingly, while we observed that FTV biases were lowest in the Schizophrenia Label/Symptoms Present condition, these participants were the most likely to believe that people with schizophrenia should face social restrictions. This dichotomy between implicit and explicit attitudes towards people with schizophrenia needs to be further explored, and might underscore some of the discrepant results in the literature concerning attempts to measure stigma reduction.

There are several limitations of this study. For one, we relied on the use of a trained confederate, rather than someone with schizophrenia, in order to standardize the presentation of symptoms across participants. However, it is possible that there are subtle characteristics of symptom presentation that cannot be captured by an actor and researchers may wish to examine stigma elicited by people with an actual schizophrenia diagnosis in the future. Furthermore, improved statistical power would allow for a more definite interpretation of the results. One of the main reasons why explicit, self-report measures of stigma are still consistently used is that more controlled experimental manipulations of stigma like the one described in this study require considerably more time and resources, and result in smaller sample sizes. Nevertheless, rigorous, objective, experimental designs provide valuable insights into the mechanisms underlying stigmatization, and have been largely lacking in the literature to date.

Stigma varies depending on diagnostic labels and the presence or absence of symptoms. In the current experiment, perceived threat was highest when the confederate was introduced as a peer but displayed

unexpected symptoms of schizophrenia. This study reflects the first attempt to implicitly and objectively measure perceived threat and to demonstrate how it is affected differently by the presence of labels and symptoms. Development of measures that do not rely on subjective self-reporting is critical as the field advances. The role of perceived threat in developing and maintaining stigma needs to be studied further, and implicit measures like the FTV bias may provide researchers and clinicians with a tool with which to study the nature of stigma and to evaluate stigma reduction programmes.

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Contributors

CRB designed the study with the assistance from MWB, SJO, and EM. SJO and EM ran participants and conducted preliminary analyses. NFT and AH were responsible for the design of study stimuli, writing, and data analysis. All authors contributed to the writing of the manuscript.

Conflict of interest

None of the authors have any conflicts to report.

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Appendix A. Prompt scripts

A.1. Schizophrenia Label condition

Now you will be having a conversation with another Queen's student. Just so you know a little more about your conversation partner, she is a first year here at Queen's and has been diagnosed with schizophrenia. Schizophrenia is a disorder that affects approximately 1% of the population and can lead to abnormal thoughts, behaviours and communication disturbances. This conversation is about getting to know each other; don't worry about what to say, anything will be fine. This interaction will be timed for ten minutes and video-recorded so that I can work with it later. Do you have any questions?

A.2. Peer Label condition

Now you will be having a conversation with another Queen's student. Just so you know a little more about your conversation partner, she is first year here at Queen's in Engineering. This conversation is about getting to know each other; don't worry about what to say, anything will be fine. This interaction will be timed for ten minutes and video-recorded so that I can work with it later. Do you have any questions?

Appendix B. Supplementary data

Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.schres.2014.07.024.

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