Physical proximity in anticipation of meeting someone with schizophrenia: The role of explicit evaluations, implicit evaluations and cortisol levels

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ABSTRACT

It has been suggested that the study of the stigma of mental illness should include more behavioral measures and further investigation of the possible importance of implicit evaluations in predicting responses to those with such illness. In the current paper, we report a study testing the relationship of implicit and explicit evaluations to physical proximity and cortisol levels in anticipation of meeting someone with schizophrenia. The results showed that both explicit evaluations and cortisol levels independently predicted physical proximity. Implicit evaluations were not related to either physical proximity or cortisol levels. The findings suggest that there are aspects of emotional response to those with mental illness that are not reflected in explicit measures of evaluation and that these, as well as explicit responses, can contribute to the prediction of behavior.

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1. Introduction

The stigma of mental illness interferes with access to treatment (Compton et al., 2004; Corrigan, 2004; de Haan et al., 2002; Hui et al., 2006), places individuals who have received psychiatric treatment at a disadvantage with respect to employment, housing, personal relationships and health-care (Lloyd et al., 2005; Manning and White, 1995; Page, 1995; Wahl, 1999; Warner, 2001), and has negative impacts on their psychological well-being and self-esteem (Corrigan and Watson, 2002; Link et al., 2002; Pyne et al., 2004). Stigma is likely to increase stress and decrease social support, both of which influence recovery (Norman and Malla, 1993; 1994; Norman et al., 2005).

Past research has focused on predicting and changing explicit statements of beliefs, attitude and behavioral intentions towards those with a mental illness (Angermeyer and Matschinger, 2003; Angermeyer and Matschinger, 2004; Gaebel and Baumann, 2003; Penn et al., 2003; Pinfold et al., 2003, 2005). Recently, it has been suggested that researchers examine additional indices of reaction to those with mental illness, in particular, indirect or implicit measures of evaluation or attitude (Hinshaw, 2007; Lincoln et al., 2008; Norman et al., 2010; Teachman et al., 2006), and overt behavior (Hinshaw, 2007; Hinshaw and Stier, 2008; Link et al., 2004; Norman et al., 2010).

Social psychologists make a distinction between explicit evaluations, as assessed by traditional self-report attitude scales, and implicit evaluations that are reflected in performance-based indirect measures such as the Implicit Association Test or sequential priming tasks (Fazio and Olson, 2003; Gawronski and Bodenhausen, 2006; Strack and Deutsch, 2004). It has been suggested that greater use be made of

indirect measures of reactions to the mentally ill because they may be less susceptible to distortion when an individual is motivated to appear non-prejudiced (Hinshaw, 2007; Hinshaw and Stier, 2008). There is, however, evidence that direct measures of explicit evaluation and indirect measures of implicit evaluation each reflects valid forms of response. For instance, it has been argued that implicit evaluations reflect immediate affective reactions resulting from the particular associations that are activated when encountering an entity; whereas explicit evaluations are based primarily on the subjective truth or falsity of propositions such as beliefs about the target's characteristics (Gawronski and Bodenhausen, 2006, 2007). Evaluative responses assessed by indirect measures are generally more predictive of spontaneous rather than deliberate behaviours, while the opposite is true of direct measures (Asendorpf et al., 2002; Bessenoff and Sherman, 2000; Dovidio et al., 1997; Fazio et al., 1995; Perugini et al., 2010).

In this paper, we report a study investigating the role of explicit evaluation and implicit evaluation in predicting two kinds of responses in anticipation of interacting with a person with schizophrenia: physical proximity and cortisol levels. Physical proximity has been used in the investigation of overt responses to stigmatized individuals (Barrios et al., 1976; Bessenoff and Sherman, 2000; Hayduk, 1978; Worthington, 1974), but seldom with reference to the stigma of mental illness (Penn and Corrigan, 2002). There is evidence that physical proximity may be predicted by both implicit evaluations (Amodio and Devine, 2006; Bessenoff and Sherman, 2000) and explicit evaluations (Byrne et al., 1971; Byrne et al., 1970; Gifford and O'Connor, 1986; Hayduk, 1978). Pryor et al. (2004) using a computer analog task, presented evidence that approach–avoidance responses involve both spontaneous and deliberate components with their relative influence varying over even brief periods of time (Pryor et al., 2004).

Cortisol release is an integral and relatively spontaneous part of the human biological stress response (Herman et al., 2005). There have been inconsistent findings with respect to the relationship between explicit measures of personal dispositions and cortisol indices (Croes et al., 1993; Lai et al., 2005; Schommer et al., 1999; Steptoe et al., 2007). Consistent with past evidence that indirect measures of affect are important in the prediction of physiological indices of stress (Egloff et al., 2002; Lerner et al., 2005; Phelps et al., 2000), Quirin et al. (2009) have demonstrated that an indirect measure is a better predictor of individual differences in cortisol indices than explicit measures (Quirin et al., 2009).

The hypotheses tested in the current study were that (1) both implicit and explicit evaluations will predict physical proximity; and (2) implicit evaluation will be more strongly related to cortisol response in anticipation of meeting an individual with schizophrenia than explicit evaluation.

2. Methods

2.1. Subjects

Eighty-nine individuals (59 females, 30 males) at The University of Western Ontario were recruited through posters asking for participants in a study of "opinions about mental

health issues". Inclusion/exclusion criteria were having English as a first language and never having been treated for a psychiatric disorder or psychological difficulties. Subjects were compensated with $15.00 for participating in the study.

2.2. Procedures

The study was carried out in the social psychology laboratory of The University of Western Ontario. Sessions were scheduled for the afternoon to control for diurnal variation in cortisol concentrations. Upon arrival, a participant was invited to a room with eight chairs along one wall. The experimenter then sat in the next to last chair from one end and asked the participant to be seated, without indicating a specific chair, so that informed consent could be obtained. This initial choice of seating was used as a baseline. Proximity was measured on a scale from 1 to 6, with 1 indicating choice of the chair next to the experimenter, and 6 indicating choosing to sit as far away as possible. Participants then read a letter of information, which indicated that the study was examining psychological and biological factors related to opinions about mental health issues; and that they would be asked for two saliva samples for hormonal determination. After obtaining signed consent, the first saliva sample was obtained. To maximize the quality of the samples, participants had been asked not to eat, drink, smoke or brush their teeth for 1 h prior to their arrival. Saliva was collected into polystyrene tubes and then stored at $-20\,^{\circ}C$ prior to assay.

Participants then completed a computerized assessment protocol of both explicit and implicit evaluations with reference to schizophrenia. The order of the measures of explicit and implicit evaluations was counterbalanced. Explicit evaluations were obtained by having individuals rate "people with schizophrenia" on four 7-point semantic differential type scales. The scales were anchored by dangerous versus safe; friendly versus hostile, pleasant versus unpleasant and nasty versus nice. The mean rating of the scales was used as the index of explicit evaluation and with higher scores indicating more negative evaluations. Semantic differential scales were chosen for the measure of explicit evaluation for two reasons. First, semantic differential type scales are one of the most commonly used methods of assessing the central evaluative component of attitudes (Krosnik et al., 2005; Summers, 1970). In addition, using semantic differential type ratings allows us to ensure that the dimensions of evaluative responses are as similar as possible between the explicit and implicit measures (Hofmann et al., 2005; Teachman et al., 2006). Cronbach's alpha for the four-item explicit measure was 0.61.

The Implicit Association Test (IAT, Greenwald et al., 1998) is a widely used method of assessing implicit evaluations. In the IAT a series of stimuli (words or pictures) are classified into categories (for instance flowers versus insects) by pressing one of two response keys. Then the same task is repeated using evaluative response categories such as good versus bad. These are followed by sets of trials in which the respondent is asked to press the same key for examples of flowers or good things; insects or bad things; flowers or bad things; insects or good things. The difference in the latency to respond to particular pairings of concept and attribute (for

example insect + good and flower + bad) compared to the other set of pairings (insect + bad and flower + good) provides an index of the relative strength of association between a category and evaluative attribute from which a measure of implicit evaluation is derived.

Given the challenges associated with selecting stimuli to represent categories, such as schizophrenia and healthy, we used a modification of the IAT, the Concept Association Task (CAT; Steffens et al., 2008) in which the concepts themselves, rather than exemplars, are used as stimuli. The synonyms used for the schizophrenia category were "schizophrenia" and "schizophrenic" and "healthy" and "health" for the comparison category. The evaluative response categories corresponded to those described earlier for the explicit evaluations (dangerous–safe; friendly–hostile, etc.). To maximize comparability to the explicit evaluations, subjects were asked to think of people with schizophrenia when completing the CAT tasks. The initial block of 20 trials on the CAT required that participants use keyboard responses to classify the terms (healthy, health, schizophrenia and schizophrenic) related to the concepts schizophrenic and healthy, followed by 20 trials of classifying the words unpleasant, dangerous, nasty, hostile, pleasant, safe, nice and friendly as positive or negative. In the third block of 60 trials, participants were required to make the same response to terms related to "schizophrenia and negative" versus "healthy and positive". Block 4 repeated the classification task of block 1 with the location of the categories reversed. The final block of 60 trials required the different responses to "healthy or negative" versus "schizophrenic or positive".

For each trial, participants were shown the categories in the upper corners of the computer screen followed by a 250 ms interval before the target word appeared in the center of the screen. Upon a correct response, the next trial began. If the response was incorrect, "error" would appear on the screen for 1000 ms with the next trial following. Parallel to the usual IAT procedure, scores reflect the difference in the response time associated with using the same key for schizophrenia and negative terms (block 3) in comparison to schizophrenia and positive terms (block 5) using the D-600 algorithm suggested by Greenwald et al. (2003), with higher scores indicating more negative implicit evaluations (Greenwald et al., 2003).

For exploratory purposes, we also included a measure of level of experience with individuals with mental health problems. We adopted the measure used by Angermeyer and Matschinger (1996), which enquired about personal experience with mental illness, the experiences of family members, and experiences through acquaintances (Angermeyer and Matschinger, 1996). The relevant questions were asked twice, once with reference to mental illness in general and once with reference to schizophrenia. The four point scale of experience used by Angermeyer and Matschinger was calculated with respect to both sets of items. No respondent attained a score of 1 (self as patient) on this scale because having been treated for a mental illness was an exclusion criterion for participation in the study.

The physical proximity measure was similar to that used by Penn and Corrigan (2002). After completing the computerized protocol, each participant was told that he or she would be meeting someone who had been diagnosed as having schizophrenia and would be describing some of their personal experiences. The person was referred to as Scott or Sarah to match the sex of the subject. The experimenter and participant then moved to another room to meet the person.

Upon arrival in the next room, participants found a seating arrangement similar to that in the first room with a backpack and some papers on the second from furthest chair from the door. The experimenter then said that Scott/Sarah was meeting with another individual and the materials indicated where he/she had been sitting. It was explained that the person would return in about 15 min and that the subject should take a seat. The participant was also given information to read about schizophrenia while waiting. The participant's choice of seat in relationship to Scott/Sarah's belongings was unobtrusively recorded using the same 6-point scale as for the earlier measure of seating in relation to the experimenter.

After 15 min, the experimenter returned and explained that Scott/Sarah would soon arrive and asked for another saliva sample. After the second saliva sample the subject was debriefed and it was explained that he/she would not be meeting someone with schizophrenia. Debriefing occurred orally and in written form. The reasons for leading them to anticipate meeting someone with schizophrenia was explained with the context of the study, but it was noted that such an encounter was neither feasible nor necessary for current purposes. Participants were thanked for their participation and asked not to describe the study to anyone else. Finally, participants were asked questions to assess compliance with instructions regarding activities prior to coming for the session.

Questioning revealed a high level of compliance with instructions concerning avoidance of eating, drinking, tooth brushing, and smoking. Cortisol determinations were carried out by the Neuroendocrinology Assay Lab at the University of Western Ontario employing the ^{125}I Coat-A-Count kit from Diagnostic Products Corporation (Los Angeles, CA) modified for use with saliva. Samples were analyzed in duplicate in a single batch. The sensitivity of the assay was 0.6 nmol and the intra-assay coefficient of variation was 7.5%. The period of 20 min between being informed that they would meet someone with schizophrenia and the second saliva sample should allow sufficient time for maximum effect size on cortisol (Dickerson and Kemeny, 2004).

2.3. Data analysis

Differences between baseline physical distance and baseline cortisol, and the same measures in anticipation of meeting someone with schizophrenia were assessed using a paired t-test. Bivariate relationships between measures were assessed by Pearson correlation coefficients. Multiple regression was used in prediction of seating distance and cortisol levels in anticipation of meeting someone with schizophrenia.

3. Results

3.1. Participants

Three participants were dropped because of a failure to record seating choice. There were 30 men and 56 women in the final sample with a mean age of 24.8 years (range 18 to 54).

Three different individuals served as experimenter. Multivariate analyses of variance showed no significant main effects of experimenter or participant sex on the variables being examined in this study.

3.2. Baseline versus anticipation measures

There was no significant correlation between baseline seating distance and distance in anticipation of meeting someone with schizophrenia ($r = 0.11$). Subjects sat significantly closer to the experimenter than in anticipation of meeting someone with schizophrenia (1.9 versus 2.8; $t = 8.08$; $df = 85$; $p < 0.001$). There was a significant correlation between baseline cortisol levels and cortisol while anticipating encountering the person with schizophrenia ($r = 0.61$; $p < 0.001$). Many participants, however, did not show evidence of a marked stress response; in fact, cortisol levels in the first saliva sample were significantly higher than those in the second (5.06 nmol/L versus 4.49; $t = 2.30$; $df = 85$; $p < 0.05$). Mean cortisol levels at both times fell within the range expected based on time of day (Kirschbaum and Hellhammer, 1989).

3.3. Prediction of physical proximity and cortisol levels

Table 1 shows the bivariate correlations between explicit and implicit evaluations, cortisol levels and physical proximity. Consistent with our predictions, explicit evaluations were significantly correlated with seating distance in anticipation of meeting someone with schizophrenia. Contrary to our hypotheses, implicit evaluations were not related to cortisol response or seating distance. There was, however, a significant correlation between cortisol levels and physical distance in anticipation of encountering someone with schizophrenia.

A multiple regression analysis was carried out using explicit evaluations, implicit evaluations and cortisol levels to predict seating distance. As there was a correlation between the initial and second cortisol levels, we included both in the regression. Table 2 shows that both explicit evaluation and cortisol in anticipation of the encounter made independent contributions to the prediction of seating distance.

3.4. Experience with mental illness

Scores on the scale assessing experience with mental illness in general or with schizophrenia specifically were unrelated to measures of explicit attitude, implicit attitude, cortisol or proximity. Also, there was no evidence of level

Table 1
Correlations of evaluations, seating distance and cortisol in anticipation of meeting someone with schizophrenia.

Explicit evaluation	0.10		
Seating distance	0.10	0.24 [*]	
Cortisol	0.07	0.09	0.32 [**]
	Implicit evaluation	Explicit evaluation	Seating distance

[*] $p < 0.05$.
[**] $p < .01$.

Table 2
Regression prediction of seating distance.

Predictor	Standardized beta	t	Sig.
Explicit evaluation (EE)	0.215	2.11	<0.05
Implicit evaluation	0.059	0.577	n.s.
Baseline cortisol	0.074	0.575	n.s.
Cortisol in anticipation of encounter	0.258	2.00	<0.05

of experience moderating the role of implicit or explicit evaluation or cortisol in predicting the proximity measure.

3.5. Suspiciousness

At debriefing participants were asked to rate how certain they had been that they would actually be meeting an individual with schizophrenia. Ratings were made on a 10-point scale with 1 indicating "very uncertain" and 10 indicating "very certain". We repeated the analyses reported above omitting 23 participants who did not give ratings above the mid-point on the certainty scale. The results did not differ significantly from those reported above. The correlations of explicit evaluations and cortisol with physical proximity remained significant ($r = 0.31$, $p < 0.05$ and $r = 0.34$, $p < 0.01$, respectively). Similarly, both explicit evaluations and cortisol independently predicted physical proximity (standardized beta = 0.270, $p < 0.05$; and 0.322, $p < 0.05$, respectively).

4. Discussion

There has been little investigation of the relationship between evaluative or attitudinal measures with reference to schizophrenia and actual behavior towards individuals with the disorder. In this study, participants showed greater physical distance when anticipating meeting someone with schizophrenia in comparison to the experimenter. Moreover, physical proximity in anticipation of the encounter was predicted by explicit evaluations and cortisol levels, but not by implicit evaluations. Although we expected that cortisol levels would be higher when expecting contact with an individual with schizophrenia in comparison to baseline, the opposite was found. Levels at both baseline and in anticipation of the encounter were within normal ranges for afternoon assessments and do not suggest high stress levels (Kirschbaum and Hellhammer, 1989). The reduction over time may reflect the impact of physical inactivity during the study in comparison to time before the baseline measure. In addition, a meta-analysis by Dickerson and Kemeny (2004), suggests that psychological stressors with implications for social evaluation are more likely to bring about cortisol increases and evaluation concerns may not have been prominent in our protocol. Although cortisol levels in anticipation of meeting an individual with schizophrenia were not elevated, they did independently predict chosen physical proximity. This is consistent with other findings that individual differences in cortisol levels within normal range can reflect variation in emotional responses such as fear (Moons et al., 2010).

Our hypotheses focused on the role of individual differences in evaluations as predictors of physical proximity and cortisol. We hypothesized that physical proximity in

anticipation of meeting someone with schizophrenia would be significantly related to explicit evaluations concerning the disorder. The data support this prediction. Contrary to our hypotheses, there was no support for implicit evaluations, as assessed by the CAT, being related to either physical proximity or cortisol levels when anticipating such an encounter.

It may be that implicit evaluations are not related to physical proximity or cortisol measures. The failure of the measure of implicit evaluation to predict physical proximity might be explained by choice of seating in our experimental procedure being a result of deliberate rather than spontaneous processes. Given, however, that the CAT did not show meaningful relations to any of our measures, we should acknowledge the possibility that the procedure we used for assessing implicit evaluations was not optimal. Although there have been controversies concerning the predictive validity of the IAT (Blanton et al., 2009; McConnell and Leibold, 2009), a recent meta-analysis concludes that IAT based measures predict behavioral and physiological response (Greenwald et al., 2009). There has, however, been little past research on the ability of the CAT specifically to predict behavior.

There have been few studies of implicit evaluations related to mental illness. Teachman et al. (2006) concluded that implicit evaluations of mental illness were more negative than for physical illness. Lincoln et al. (2008) found implicit evaluations of terms associated with schizophrenia did not correlate with behavioral intentions towards those with the disorder. The only previous study that examined the relationship of implicit evaluation of mental illness, as assessed by the IAT to behavior, was reported by Peris et al. (2008). They found that implicit evaluations, but not explicit evaluations, were related to a tendency to "over diagnose" psychopathology in vignettes, but this may reflect the IAT (more than the explicit measure) being focused on diagnostic terms. Therefore, the correlation between the IAT and over-diagnosis may have been a reflection of both measures being influenced by familiarity with diagnostic terminology.

Our data indicate that explicit evaluations of schizophrenia can predict actual behavior with reference to individuals with the disorder. As noted earlier, we elected to use semantic differential type scales to assess explicit evaluations because they emphasize overall evaluative response rather than specific beliefs or behavioral intentions, which are sometimes used to assess the stigma of mental illness (Angermeyer and Matschinger, 2004; Link et al., 1987). It is certainly possible that these other explicit methods of assessment would differ in their power to predict the physical proximity measure. The finding that explicit evaluations are unrelated to individual differences in cortisol level in anticipation of meeting someone with schizophrenia, and that both measures independently predict physical proximity, also suggests that there are additional spontaneous personal responses that predict behavior, which are not reflected by our measure of explicit or implicit evaluation. Whether alternative measures of implicit evaluations can predict these responses merits further investigation.

Our findings certainly indicate that research on explicit measures of attitude to those with mental illness may have implications for behavior. Proximity is likely to be one indicator of degree of comfort versus discomfort or stress in anticipating an interaction (Barrios et al., 1976; Hayduk, 1978; Worthington, 1974). Such an interpretation is consistent with the finding of a preference for great distance with respect to someone with schizophrenia in comparison to the experimenter. While the magnitudes of the correlations of explicit evaluation and cortisol with proximity are modest, they might be increased if cumulative indices, including other non-verbal indicators of comfort, were used. People's level of comfort in anticipation of interacting with a person with schizophrenia is likely to have direct implications for availability of housing, employment, friendship, etc., and using such behavioral indices of ease to assess the impact of anti-stigma interventions could, therefore, be of value.

The current study was focused on the prediction of a behavioral response in anticipation of meeting someone with schizophrenia. It remains to be seen whether similar results would be obtained with respect to other psychiatric diagnoses. It will also be of interest to examine predictors of other behavioral responses and to see the extent to which our findings replicate in non-student samples.

Contributors

The first author (Norman) contributed to the design of the study, finalized the analyses and had primary responsibility for the manuscript. Drs. Gawronski, Hampson and Sorrentino each contributed to the design of the study and interpretation of the data. The final two authors (Szeto and Ye) contributed to the design of the study, data collection and interpretation. All authors contributed to, and have approved, the final manuscript.

Conflict of interest

All authors declare that they have no conflicts of interest.

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