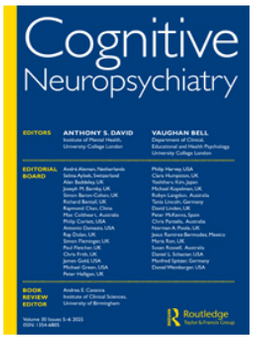

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Theory of mind skill predicts anticipatory guilt-proneness in schizophrenia

Rivkah Barbanel[a], Nathan Caruana[a,b], Robyn Langdon[a], Martin Brüne[c] and Paul F. Sowman[d,e]

[a]School of Psychological Sciences, Macquarie University, Sydney, NSW, Australia; [b]College of Education, Psychology and Social Work, Flinders Institute for Mental Health and Wellbeing, Flinders University, Adelaide, SA, Australia; [c]Department of Psychiatry, Psychotherapy and Preventive Medicine, Division of Social Neuropsychiatry and Evolutionary Medicine, LWL University Hospital, Ruhr University Bochum, Bochum, Germany; [d]Faculty of Medicine, Health and Human Sciences, Macquarie University, Sydney, NSW, Australia; [e]Faculty of Health and Environmental Sciences, Auckland University of Technology, Auckland, New Zealand

ABSTRACT

Background and Hypothesis: Adaptive management of guilt and shame is regulated by social approach and withdrawal and thus relates to the quantity and quality of our social interactions. People with schizophrenia (SZ) self-report reduced guilt-proneness compared to healthy controls (HC). However, previous studies have not distinguished between anticipatory and consequential guilt, nor between guilty affect and associated action tendencies.

Study Design: We compared 24 SZ with 24 HC on anticipatory guilt, (TOSCA-3, GASP); consequential guilt (PFQ-2), and empathy and Theory of Mind (ToM).

Study Results: Differing profiles emerged: SZ reported higher consequential relative to anticipatory guilt, while HC reported the opposite pattern. SZ self-reported reduced repair and increased withdrawal compared to HC. In SZ, anticipatory guilt was predicted by empathic concern and ToM; consequential guilt by social withdrawal and ToM skill.

Conclusion: SZ participants anticipated equal affective guilt-proneness but reduced adaptive behavioural responses to guilty feelings, resulting in more chronic guilt in daily life than would be predicted by TOSCA-3 and GASP responses. The discrepancy between emotional experience and expression may partly explain previous findings of reduced TOSCA-3 guilt-proneness, as TOSCA-3 operationalises guilt as reparative, prosocial behaviours. Results highlight perceptions of reparation potential as an intervention target, with likely downstream reductions in chronic and delusional guilt and shame.

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CONTACT Rivkah Barbanel rivkah.barbanel@students.mq.edu.au School of Psychological Sciences, Macquarie University, Sydney, NSW 2109, Australia

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Introduction

Although people with schizophrenia exhibit a range of social-cognitive deficits (Billeke & Aboitiz, 2013; Green et al., 2015), very few studies have explored the relationship between these deficits and the quintessentially social emotions of guilt and shame. Guilt and shame motivate doing good and avoiding wrongdoing (Tangney et al., 2007). Guilty displays are vital to relationship maintenance; we care that the person who has wronged us genuinely feels sorry (Ferguson et al., 2007). Accordingly, guilty displays increase social inclusion and likeability (Stearns & Parrott, 2012). By contrast, shame associates with withdrawal (Kim et al., 2011), reduced compensatory action (Giner-Sorolla et al., 2011) and diminished quality of interpersonal problem-solving (Covert et al., 2003).

The most frequently used measure of self-reported guilt and shame, the Test of Self-Conscious Affect (TOSCA-3; Tangney et al., 2000), is based on the self vs behaviour distinction: shame arises from a global negative evaluation of the self, whereas guilt emerges from focusing on the specific negative behaviour (Lewis, 1971). TOSCA-3 guilt is associated with approach, repair and apology (Howell et al., 2012; Tangney et al., 2007). The TOSCA-3 is a "situated" measure, as it presents guilt- or shame-eliciting hypothetical scenarios and asks respondents to forecast their reaction. By contrast, The Personal Feelings Questionnaire 2 (PFQ-2; Harder & Zalma, 1990), a well-validated "unsituated" questionnaire (Harder & Greenwald, 1999) asks how frequently respondents experience various lexical representations of guilt and shame. People with schizophrenia typically report lower TOSCA-3 guilt (Keen et al., 2017; Vivas et al., 2021). We wondered if these reports might underestimate the experience of guilt in schizophrenia. TOSCA-3 guilt items operationalise guilt as reparative, prosocial behaviours, and thus the TOSCA-3 Guilt scale conflates affect and behaviour (Cohen et al., 2011; Maley & Harman, 2019). Hence, lower TOSCA-3 guilt may represent reduced inclinations to initiate reparative behaviour rather than diminished experience of guilty affect. Additionally, situated measures ask respondents to forecast their response to a situation. Such measures capture anticipatory guilt, not actual "consequential" guilt, which follows a perceived transgression. Clinical observation documents the guilt and shame people with schizophrenia experience around the diagnosis and symptoms of schizophrenia (Hogarty, 2002; Miller & Mason, 2005) and people with schizophrenia can experience chronic and delusional guilt (Beck, 2014; Birchwood et al., 2014; Lake, 2008). Therefore, there is a need to take a multidimensional approach to understanding guilt experiences in schizophrenia, differentiating between anticipatory and consequential guilt and guilt as affect and guilt as behaviour.

The experience of anticipatory guilt and consequential guilt in schizophrenia is likely not universally impaired, but associated with specific factors such as symptoms, theory of mind skill, and empathy impairments. There are several reasons schizophrenia may detrimentally affect anticipatory, adaptive guilt. Difficulties in drawing from past experiences, prospecting future experiences, and anticipating pleasure (Painter & Kring, 2016; Yang et al., 2018) could inhibit anticipatory guilty affect and the expectation of the rewarding aspects of making amends after a transgression. Theory of Mind (ToM) skills are fundamental to understanding guilt processes in schizophrenia, as they constitute the cognitive foundation necessary for adaptive interpersonal guilt responses. For instance, anticipating guilt about disappointing another person requires an imagining

of their expectations and beliefs about our intentions. In children and adolescents, stronger ToM skills are associated with greater guilt-proneness and understanding of guilt (Misailidi, 2018, 2020) while in adults guilt-proneness consistently correlates with perspective-taking ability and proclivity (Leith & Baumeister, 1998; Tangney et al., 2007). Deficits in theory of mind skill (Brüne, 2005; Harrington et al., 2005), empathy (Bonfils et al., 2017; Lee et al., 2011), and metacognition (Lysaker et al., 2021) could compromise anticipatory (and consequential) interpersonal guilt, paradoxically resulting in elevated feelings of chronic guilt and shame. Impaired perspective-taking abilities prevent individuals from anticipating how their actions may disappoint others, resulting in the commission of behaviours that do cause disappointment. The subsequent salient reactions of anger and sadness from others then trigger intense feelings of guilt and shame, creating a cycle where deficient anticipatory guilt ultimately produces the very emotional distress it would have prevented. Additionally, higher levels of self-reported personal distress (Bonfils et al., 2017), may interfere with perspective-taking and the capacity to assume personal responsibility in interpersonal conflict.

We examined self-reported anticipatory and consequential guilt and shame in chronic schizophrenia and associations with cognitive and affective perspective-taking. Impaired emotion coherence in schizophrenia (Kring & Elis, 2013) suggests that even when guilty affect is intact, behaviour may not reflect subjective feelings. We compared the TOSCA-3 and another situational "anticipatory" measure, the Guilt and Shame Proneness scale (GASP; Cohen et al., 2011), with the unsituated PFQ-2, which measures how frequently guilt and shame are experienced. The GASP separates affect and behaviour with two different subscales: (i) the Negative Behaviour Evaluation (NBE) subscale measuring self-identified guilty affect, and (ii) the Repair subscale measuring the action tendency associated with guilt affect.

We hypothesised that participants with schizophrenia would score lower than healthy controls on anticipatory guilt measures but higher on consequential guilt (they would report feeling guilt more often) and higher on both anticipatory and consequential shame. We expected anticipatory guilt to associate with higher levels of perspective-taking, empathic concern, and better ToM. We expected consequential guilt (PFQ-2 guilt) to associate less with social-cognitive self-report measures and task scores. To control for possible confounders, we also assessed levels of depression, anxiety and stress, and memory.

Method

Participants

The clinical sample comprised 24 participants (12M:12F) with schizophrenia (SZ) (n = 15) or schizoaffective disorder (n = 9). Clinical participants were stable community outpatients and recruited from the Australian Schizophrenia Research Bank and an internal register. All clinical participants were taking antipsychotic medication and were an older, chronic sample. DSM-5 diagnosis was confirmed using the Diagnostic Interview for Psychosis (Castle et al., 2006) and clinical history.

The healthy control (HC) sample comprised 24 participants (9M:15F), recruited via internal registers and online advertisements to match the clinical participants' age and

gender. Control participants were screened using the Affective, Psychotic and Substance Use Screening Modules of the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-1) (First et al., 1997). Exclusion criteria for both groups were intellectual disability, neurological illness or head injury, and current substance/alcohol abuse.

Procedure

Participants gave informed consent, completed the following tasks, and underwent clinical/control interviews. The study was carried out in concordance with the Declaration of Helsinki. Macquarie University Human Research Ethics Committee approved the study.

Materials

Positive and negative symptoms of schizophrenia

The Scales for Assessment of Positive and Negative Symptoms (SAPS & SANS; Andreasen, 1983b, 1983a); were used to assess the severity of schizophrenia symptomatology. Ratings range from 0 = Absent to 5 = Severe (see Table 1).

General psychopathology

The Depression Anxiety Stress Scales 21 (DASS-21; Lovibond & Lovibond, 1995) assessed general psychopathology. Participants rate their experience of each state over the past week using a 4-point frequency scale from *never* (0) to *almost always* (3). Maximum score 21 on each scale.

Table 1. Demographics and clinical characteristics of participant groups.

	Schizophrenia ($n = 24$) *M* (*SD*)	Control ($n = 24$) *M* (*SD*)	Test statistic	*p*
Age	53.21 (7.96)	52.13 (13.19)	t (37.798) = −0.30	0.73
Gender (M:F)	12:12	9:15	$\chi^2 = 0.76$	0.38
Education (years)	13.94 (2.93)	14.71 (2.76)	t (46) = 0.94	0.35
NART-estimated IQ	106.21 (9.39)	108.52 (9.07)	t (45) = 0.86	0.40
DASS Depression	Md: 8.00	Md: 1.00	$U = 470.00$	<0.001
DASS Anxiety	Md: 7.00	Md: 1.00	$U = 514.50$	<0.001
DASS Stress	Md: 7.00	Md: 4.00	$U = 408.50$	0.01
RBANS Immediate memory	75.08 (19.28)	92.58 (13.10)	t (40.505) = 3.68	0.001
RBANS Delayed memory	90.79 (13.37)	100.25 (10.87)	t (46) = 2.69	0.01
SAPS Global (Average)[a]	1.36 (0.90) Range: 0–3.0			
SANS Global (Average)[a]	2.01 (0.66) Range: 0.6–3.6			
SAPS Persecutory delusions[a]	0.96 (1.30) Range: 0–4.0			

Note: Mdn, Median; NART, National Adult Reading Test (Nelson & Willison, 1991); DASS, Depression, Anxiety and Stress Scale (Lovibond & Lovibond, 1995); RBANS, Repeatable Battery for the Assessment of Neuropsychological Status (Randolph, 1998); SAPS, Scale for the Assessment of Positive Symptoms (Andreasen, 1983b); SANS, Scale for the Assessment of Negative Symptoms (Andreasen, 1983a).

[a]Ratings for 21 patients were based on the current interview assessing past month severity. Ratings from a current interview were unavailable for three patients. Two of these individuals had been repeatedly interviewed by the research group and found stable over time. Results were similar whether we excluded clinical data for these two patients or used ratings from their most recent interview, administered four months prior. We therefore report clinical data for 23 patients.

Premorbid IQ

The National Adult Reading Test (NART; Nelson & Willison, 1991) assessed premorbid IQ. Participants read aloud a list of 50 written words with irregular spellings. WAIS Full-scale IQ can be estimated from the reading error score and was used for this study.

Memory

The Immediate Memory and Delayed Memory tasks of The Repeatable Battery for Assessment of Neuropsychological Status (RBANS; Randolph, 1998) were used to assess memory.

Theory of mind tasks

The False Belief Picture Sequencing Task (FB-PST; Langdon & Coltheart, 1999) was used to assess theory of mind reasoning. Participants organise 4-card cartoon pictures so each set forms a logical sequence of events. There are 4 types of sequence: "mechanical" to assess cause and effect reasoning, "social script" to assess social-script reasoning, "capture" to assess inhibitory control, and "false belief" to assess understanding of mistaken belief. Scores range 0–24 for each story type.

Faux Pas Task (FP Task; Baron-Cohen et al., 1999). A faux pas occurs when someone says something they didn't realise would be inappropriate or offensive. Understanding a faux pas requires the ability to understand the cognitive state of false belief, and the affective understanding that the victim of the faux pas will be hurt or offended. Thus, faux pas understanding requires social awareness and perspective-taking, both of which promote the experience of both interpersonal guilt. Twenty stories are read aloud while the participant reads along. If they detect a faux pas, five further questions are asked for understanding of inappropriateness, intention, false belief and emotion.

Self-reported anticipatory guilt and shame

Anticipatory guilt and shame were assessed using the TOSCA-3 and GASP (see Supplementary Table 1 for an overview of constructs measured by each scale).

Test of Self-Conscious Affect 3 (TOSCA-3; Tangney et al., 2000). The TOSCA-3 is composed of 16 hypothetical scenarios. For each scenario participants rate phenomenological descriptions of Shame-proneness, Guilt-proneness, Externalization, Detachment/Unconcern, Alpha Pride and Beta Pride in terms of how likely they would be to respond in that manner, from Not Likely (1) to Very Likely (5). Maximum scores for each subscale are Shame (80), Guilt (80), Externalization (80), Detachment (55), Alpha Pride (25) and Beta Pride (25). The TOSCA-3 has been shown to have construct validity for measuring dispositional guilt and to discriminate well between guilt and shame (Lacerenza et al., 2019). The internal consistencies for the current SZ sample were good for the guilt subscale (Cronbach's $\alpha = 0.82$) and acceptable for the shame subscale (Cronbach's $\alpha = 0.73$). Low internal consistency for the guilt subscale in healthy controls in the current sample ($\alpha = 0.53$) replicates previous findings (Giner-Sorolla et al., 2011; Rüsch et al., 2007), and is likely due to the heterogeneity of scale items and sample characteristics. Given the TOSCA-3 is the most commonly used guilt-proneness questionnaire, we include the TOSCA-3 scores and analysis for comparison with previous studies.

Guilt and Shame Proneness Scale (GASP; Cohen et al., 2011). The GASP measures individual differences in guilt- and shame-proneness using hypothetical scenarios

describing a range of personal transgressions. Respondents indicate how likely they would be to react in the way described on a scale from Very Unlikely (1) to Very Likely (7). The GASP differs from the TOSCA-3 in distinguishing between anticipated emotional/moral evaluations of hypothetical personal transgressions and anticipated behavioural responses. To capture these different dimensions, the GASP contains four 4-item subscales: Guilt-Negative Behaviour Evaluation (Guilt-NBE), Guilt-Repair, Shame-Negative Self Evaluation (Shame-NSE) and Shame-Withdraw; maximum subscale score = 28. In the current SZ sample, Cronbach's α were acceptable to good for the subscales: 0.72 (Guilt-NBE), 0.69 (Guilt-Repair), 0.68 (Shame-NSE) and 0.82 (Shame-Withdraw).

Self-reported consequential guilt and shame

The Personal Feelings Questionnaire-2 (PFQ-2; Harder & Zalma, 1990). The PFQ-2 lists 22 emotion adjectives corresponding to shame, guilt, or "filler" emotions. Respondents indicate on a scale from 0 (you never experience the feeling) to 4 (you experience the feeling continuously or almost continuously) how "common the feeling is for you". Maximum scores are Guilt (24) and Shame (40). In the current SZ sample internal consistency for the guilt subscale was $\alpha = 0.78$ and for the shame subscale, $\alpha = 0.77$.

Self-reported empathy

Interpersonal Reactivity Index (IRI; Davis, 1980). The IRI contains 28 items answered on a 5-point Likert scale ranging from "Does not describe me well" (0) to "Describes me very well" (4). The measure is composed of 4 subscales: *Perspective Taking* – the tendency to spontaneously adopt the psychological point of view of others; *Fantasy* – the tendency to transport oneself into the feelings and actions of fictitious characters in books, movies and plays; *Empathic Concern* – the tendency to experience feelings of sympathy and concern for unfortunate others; and *Personal Distress* – the tendency to experience self-oriented personal anxiety and unease in tense interpersonal settings. Maximum scores are 28 for each scale.

Statistical analyses

Independent samples *t*-tests and non-parametric Mann–Whitney tests were used, as appropriate, to compare groups on demographics, DASS measures, premorbid IQ and RBANS memory scores. To test the primary hypotheses profile analyses were used to compare patient and control performance across the different guilt and shame scales. Next, we examined whether different profiles of guilt and shame, if found, co-occur with reduced self-reported empathy and poorer ToM task performances in patients compared to controls. Specifically, we conducted correlation and regression analyses; first we examined intercorrelations between the guilt and shame measures, then examined the associations between the guilt and shame measures and other variables. Spearman's rho correlations were calculated as appropriate. To reduce the data and limit the risk of a Type 2 error, we drew upon the results of the profile analyses to focus on the most relevant guilt and shame measures. Correlation analyses were used to identify direction and degree of associations between our variables of interest, after which regression

analyses were used to identify the predictors of guilt and shame within patients. We adjusted alpha to 0.01 to reduce the Type 2 error rate.

Results

Preliminary analyses

Groups did not differ in age, gender, education, or NART-estimated IQ. Patients reported higher levels of DASS Depression, Anxiety and Stress, and scored lower on immediate and delayed memory (see Table 1). Males and females within each group did not differ on guilt and shame subscales. Participants with schizophrenia ($n = 15$) did not differ from participants with schizoaffective disorder ($n = 9$) on the guilt and shame subscales, nor the DASS. To conduct our primary analyses, we therefore collated data across diagnostic categories for the clinical participants and gender for clinical and control groups. We also note the generally lower levels of current schizophrenia symptoms in the clinical sample, although severity ratings ranged from zero to severe.

Primary analyses

A profile analysis was conducted to test the primary hypothesis of different profiles of anticipatory versus consequential guilt and shame between groups. To examine whether SZ and HC showed distinct patterns across emotion and scales, we conducted a three-way ANOVA (emotion x scale x group) to test for differential profiles. Scores on the guilt and shame subscales of the 4 scales (TOSCA-3, GASP evaluations and GASP behaviour to assess anticipatory/situated guilt and shame; and PFQ-2 to assess consequential/unsituated guilt and shame) were standardised across the sample as a whole. A $2 \times 4 \times 2$ mixed ANOVA was conducted on the z-scores, with 2 levels of emotion (guilt vs shame) and 4 levels of scale (TOSCA-3 vs GASP evaluations vs GASP behaviour vs PFQ-2) as repeated measures, and 2 levels of group (SZ vs HC) as the between-subjects factor. The Huynh-Feldt correction is reported where sphericity was violated.

There was a significant 3-way interaction of scale by emotion by group, F (2.523, 113.542) = 5.292 ($p = 0.003$). This significant interaction indicated that group differences varied by both emotion type and measurement approach, justifying separate analyses for guilt and shame. To investigate the 3-way interaction in more detail, and in accord with our specific hypotheses, the different profiles for SZ and HC across the 4 scales were examined separately for guilt and shame, using 2 (group) × 4 (scale) mixed ANOVAs.

Guilt

Figure 1 illustrates a crossover pattern: SZ scored lower than HC on anticipatory guilt (TOSCA-3 and GASP evaluations and behaviour) and higher than HC on consequential guilt (PFQ-2). See Supplementary Figure 1 for individual variation across scale and emotion. Consistent with this cross-over pattern, the main effect of group across guilt scales was non-significant, $F(1, 45) = 0.63$, $p = 0.43$, while there was a significant two-way interaction between scale and group, $F(3,135) = 8.02$, $p < 0.001$. Difference contrasts for scale revealed that the significant interaction was driven by differences in between-

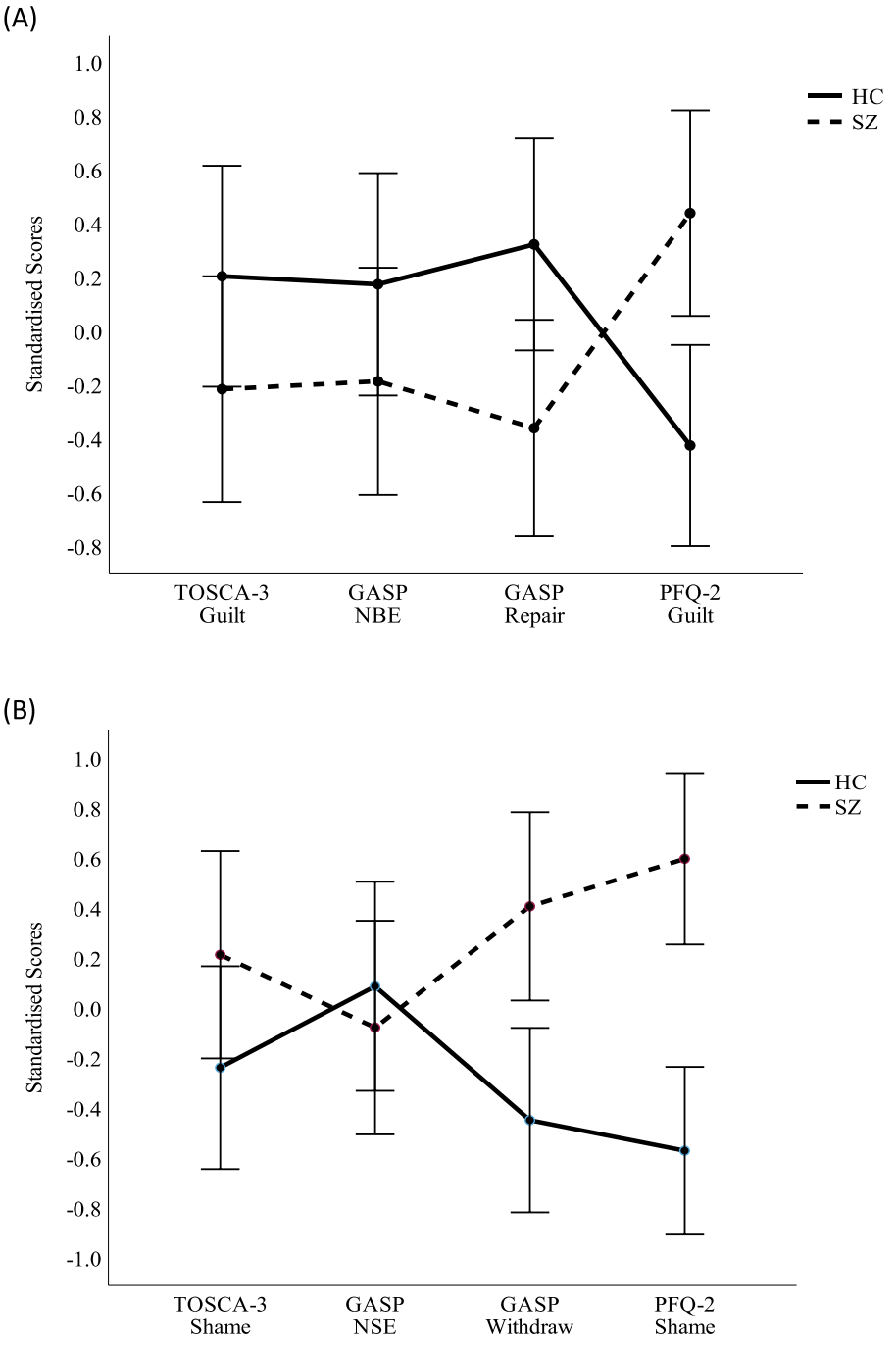

Figure 1. Guilt and shame profile analysis by group. (A) (B). Note: Z-scores (with 95% CI's) for (A) guilt and (B) shame subscales by group. TOSCA-3, Test of Self-Conscious Affect; GASP, Guilt and Shame Proneness scale; PFQ-2, Personal Feelings Questionnaire-2; NBE, Negative Behaviour Evaluation; NSE, Negative Self-Evaluation; SZ, Schizophrenia; HC¸ Healthy Control.

groups profiles for the consequential guilt measure (PFQ-2) versus the other three measures of anticipatory guilt, $F(1,45) = 15.45$, $p < 0.001$. Consistent with this pattern, a 2 × 3 ANOVA comparing groups across the three anticipatory guilt measures revealed only an effect of group, $F(1, 45) = 4.47$, $p = 0.04$; SZ scored significantly lower than controls across all anticipatory guilt measures. In contrast, SZ self-reported significantly higher levels of PFQ-2 (consequential) guilt than HC (see Table 2 for raw scale data and simple independent t-test results, which accord with the results reported above). The simple main effect of scale was also significant within both the SZ [$F(3,66) = 3.37$, $p = 0.02$] and HC groups [$F(3,69) = 4.97$, $p = 0.004$]. However, different patterns characterised each group; within SZ, while there was no difference between anticipatory measures, PFQ-2 Guilt trended ***higher*** than the combined average of the anticipatory measures, $F(1,22) = 6.28$, $p = 0.02$. Conversely, within HC, while there was no difference between the anticipatory measures, PFQ-2 Guilt was significantly ***lower*** than the combined average of the anticipatory guilt measures, $F(1,23) = 10.06$, $p = 0.004$.

Shame

There was a significant two-way interaction between scale and group on shame scores, $F(3, 135) = 6.23$, $p = 0.001$. However, the pattern of results differed from that found for guilt scores. Specifically, there was no cross-over pattern, and the main effect of group across the four shame scales was significant, $F(1, 45) = 9.74$, $p = 0.003$. See Figure 1 for illustration of the differing group profiles. The interaction occurred because the between-groups profiles differed for the GASP Behaviour measure (i.e., Withdraw) compared to the TOSCA-3 and the GASP NSE, $F(1,45) = 6.13$, $p = 0.017$ and for the PFQ-2 (consequential) Shame scale score compared to all other measures of anticipatory shame, $F(1, 45) = 10.74$, $p = 0.002$. See Table 2 for raw scores and t-test results, which are consistent with this pattern of results. There was a simple main effect of scale

Table 2. Guilt and shame scores by group.

	SZ ($n = 24$)	α (SZ)	HC ($n = 24$)	α (HC)	F ratio	p-value	Effect size ω^2
TOSCA-3							
Guilt	64.94 (7.85) [61.63, 68.25]	0.82	67.79 (5.63) [65.41,70.17]	0.53	2.09	0.155	0.02
Shame	51.38 (7.70) [48.13, 54.63]	0.73	47.00 (10.08) [42.74, 51.26]	0.79	2.85	0.098	0.04
GASP							
NBE	23.25 (4.78) [21.23, 25.27]	0.72	24.79 (3.84) [23.17, 26.41]	0.71	1.51	0.225	0.01
Repair	21.88 (4.76) [19.87, 23.89]	0.69	24.54 (2.84) [23.34, 25.74]	0.55	5.56	0.023	0.09
NSE	23.63 (3.61) [22.11, 25.15]	0.68	24.25 (3.67) [22.70, 25.80]	0.50	0.35	0.555	−0.01
Withdraw	17.71 (5.93) [15.21, 20.21]	0.82	12.00 (5.50) [9.68, 14.32]	0.73	11.95	0.001	0.19
PFQ-2							
Guilt	12.04 (4.37) [10.15, 13.93]	0.78	8.08 (3.97) [6.40, 9.76]	0.79	10.59	0.002	0.17
Shame	19.60 (5.86) [17.07, 22.13]	0.77	11.38 (5.65) [8.99, 13.77]	0.84	24.06	<0.001	0.33

Note: Group results expressed as Mean (SD) with [95% CI's] for participants with schizophrenia (SZ) and healthy controls (HC). Interpretation of ω^2 effect sizes as advised by (Kirk, 1996): Small effect: $\omega^2 = 0.01$. Medium effect: $\omega^2 = 0.06$. Large effect: $\omega^2 = 0.14$. TOSCA-3, Test of Self-Conscious Affect-3; GASP, Guilt and Shame Proneness scale; NBE, Negative Behaviour Evaluation scale.; NSE, Negative Self-Evaluation scale; PFQ-2, Personal Feelings Questionnaire-2.

within both SZ, $F(3,66) = 3.18$, $p = 0.03$ and HC, $F(3,69) = 3.07$, $p = 0.03$. Difference contrasts within each group showed that within SZ, the anticipatory scales did not differ significantly among the average of each other, however PFQ-2 (consequential) Shame was significantly ***higher*** than the combined average of the anticipatory shame measures, $F(1,22) = 7.74$, $p = 0.011$. While for HC, GASP Withdraw trended lower than the combined TOSCA-3 Shame and GASP NSE scores, $F(1,23) = 4.78$, $p = 0.04$. Among HC, PFQ-2 (consequential) Shame also trended ***lower*** when compared to the combined anticipatory shame measures, $F(1,23) = 3.961$, $p = 0.06$.

Next, we examined correlations between the anticipatory measures TOSCA-3 & GASP, with the consequential measure, PFQ-2 (see Table 3). Anticipatory guilt (TOSCA-3 Guilt residual, GASP NBE and GASP Repair) was not associated with PFQ-2 Guilt or PFQ-2 Shame. TOSCA-3 Shame (residual) trended with PFQ-2 Shame. The behavioural component of anticipatory shame – GASP Withdraw – trended with PFQ-2 Guilt. TOSCA-3 guilt trended towards a negative association with TOSCA-3 shame, but was positively associated with both GASP NBE and GASP NSE.

Self-reported empathy: Interpersonal Reactivity Index (IRI)

Groups did not differ significantly on the IRI subscales (see Supplementary Table 2 for raw scores and test statistics).

False Belief Picture Sequencing Task (FB-PST)

The FB-PST task results were analysed using a (2 × 4) mixed ANOVA, with group (SZ vs control) as a between-factor, and four levels of the within-factor story type. There was a significant interaction, $F(3,138) = 2.97$, $p = 0.03$. Follow up ANOVAs indicated groups did not differ on Social Script ($p = 0.42$), Mechanical ($p = 0.82$), or Capture ($p = 0.16$). However, for False belief, SZ ($M = 16.58$, $SD = 6.24$) performed significantly worse than HC ($M = 20.42$, $SD = 3.24$), $F(1, 34.574) = 7.13$, $p = 0.01$ (Welch-corrected). There was a main effect of story type, $F(3, 138) = 28.13$, $p < 0.001$, with post-hoc tests with Bonferroni adjustment indicating, false belief stories did not differ significantly in difficulty from mechanical or capture stories, and were only significantly more difficult than social script stories. The main effect of group was not significant, $F(1, 46) = 3.49$, $p = 0.07$.

Faux Pas task. SZ ($Mdn = 51.50$) had significantly lower Faux Pas Total Scores than HC ($Mdn = 56.00$), $U = 115.00$, $Z = -3.29$, $p = 0.001$, but did not differ on their understanding of control questions for Faux Pas stories, ($U = 240.00$, $Z = -1.08$, $p = 0.28$).

Groups did not differ in faux pas detection ($q1 + q2$ summed), $U = 219.50$, $Z = -1.27$, $p = 0.20$. However examination of a more nuanced understanding of the faux pas indicated differences: SZ scored lower than HC on understanding of inappropriateness ($U = 140.00$, $Z = -2.87$, $p = 0.004$), on understanding intention ($U = 155.50$, $Z = -2.42$, $p = 0.02$), on accurately identifying the false belief that caused the faux pas ($U = 138.00$, $Z = -2.92$, $p = 0.004$), and on empathic understanding ($U = 166.50$, $Z = -2.47$, $p = 0.01$).

Correlations

Following the recommendation of Tangney et al. (1992), for the TOSCA-3 subscales we conducted part correlations, producing TOSCA-3 shame-free guilt residuals and TOSCA-3 guilt-free shame residuals, and examined against the variables of interest.

Table 3. Pearson's *r* correlations between guilt and shame scales within SZ group.

		1	2	3	4	5	6	7	8	9
1	TOSCA-3 Guilt Residual	1.00								
2	TOSCA-3 Shame Residual	−0.418*	1.00							
3	TOSCA-3 Externalising	−0.370	0.409*	1.00						
4	GASP NBE	**0.661*****	**−0.237**	**−0.567*****	**1.00**					
5	GASP Repair	**0.551****	**−0.292**	**−0.170**	**0.536****	**1.00**				
6	GASP NSE	**0.562****	**0.047**	**−0.279**	**0.635****	**0.432***	**1.00**			
7	GASP Withdrawal	**−0.072**	**0.336**	**0.102**	**−0.187**	**0.043**	**0.112**	**1.00**		
8	PFQ-2 Guilt	−.0169	0.218	−0.008	**0.029**	**−0.043**	**0.273**	**0.473***	1.00	
9	PFQ-2 Shame	−0.097	0.491**	0.066	**−0.157**	**−0.269**	**0.400**	**0.360**	0.621***	1.00

Note: Spearman Rho correlations in bold. TOSCA-3 Guilt and Shame residuals refer to TOSCA-3 Guilt after controlling for TOSCA-3 Shame, and TOSCA-3 Shame after controlling for TOSCA-3 Guilt. TOSCA-3, Test of Self-Conscious Affect; GASP, Guilt and Shame Proneness scale; NBE, GASP Negative Behaviour Evaluation; NSE, GASP Negative Self-Evaluation; PFQ-2, Personal Feelings Questionnaire-2.

*$p < 0.05$, **$p < 0.01$, ***$p < 0.005$.

See Supplementary Table 3 for correlation matrix. TOSCA-3 guilt- and shame-proneness were not associated with ToM skill. TOSCA-3 Guilt associated with self-reported IRI Empathic Concern, *rho* = 0.549, $p = 0.005$, and IRI Perspective Taking, $r = 0.596$, $p = 0.002$.

The GASP anticipatory measures were more sensitive to ToM task performance and self-reported empathy. FB-PST scores showed a moderate negative correlation with GASP Withdraw, rho = −0.483, $p = 0.017$, while the association with GASP NBE was weaker and did not reach statistical significance at the adjusted alpha level (rho = 0.413, $p = 0.045$). GASP NBE related to Faux Pas Total Scores, *rho* = 0.522, $p = 0.013$. IRI Empathic Concern was associated with GASP NBE (*rho* = 0.690, $p < 0.001$), GASP Repair (*rho* = 0.483, $p = 0.017$) and GASP NSE (*rho* = 0.692, $p < 0.001$). IRI Perspective Taking was associated with GASP NBE (*rho* = 0.542, $p = 0.006$) and with GASP Repair, (*rho* = 0.639, $p < 0.001$). GASP Withdraw was unrelated to all IRI measures. These patterns suggest that adaptive responses to guilt are associated with better theory of mind skill and propensity, while diminished mentalising ability may be associated with greater withdrawal following transgressions.

PFQ-2 Shame trended negatively with Faux Pas Empathy (*rho* = −0.520, $p = 0.016$), suggesting those with less subtle cognitive and emotional theory of mind understanding may be more vulnerable to shame. The PFQ-2 subscales were unrelated to the IRI self-report measures.

DASS Depression was related only to consequential measures, PFQ-2 Guilt ($r = 0.600$, $p = 0.002$) and PFQ-2 Shame ($r = 0.468$, $p = 0.02$). Memory did not associate with anticipatory guilt or shame, however poorer performance on the RBANS Delayed Memory task associated with higher PFQ-2 consequential guilt ($r = -0.546$, $p = 0.007$).

Earlier age of diagnosis associated with higher PFQ-2 Guilt ($r = -0.497$, $p = 0.03$) and PFQ-2 Shame ($r = -0.717$, $p < 0.001$).

Regression analyses

Regression analyses were conducted to determine the best predictors of anticipatory and consequential guilt in SZ. Because GASP NBE showed the greatest sensitivity to ToM variables, and does not conflate affect and behaviour, we used GASP NBE as our outcome variable for anticipatory guilt. This also made sense because GASP NBE indexes affect, not behaviour, and thus is more comparable to PFQ-2 Guilt (we wanted to compare predictors for anticipatory and consequential PFQ-2 guilt). See Table 4 for full details on each regression model.

A hierarchical multiple regression was run to determine the best predictors of PFQ-2 Guilt. We entered DASS Depression into the first block to control for depression in SZ. We were interested to see the predictive value of GASP Withdraw, given we had theorised poor social cognitive skills would associate with higher consequential guilt. While not significantly associated with PFQ-2 Guilt, ToM Skill negatively associated with GASP Withdraw, so it was also entered. And finally, because we hypothesised that those with worse memories would be more likely to make social mistakes resulting in guilty feelings – we entered RBANS Delayed Memory. We had no *a priori* hypotheses as to the differential importance of these remaining predictors, and entered RBANS Delayed Memory, GASP Withdraw and ToM Skill into the 2nd block. The full model (Model 2), was significant, $R^2 = 0.633$, $F(4,17) = 7.33$, $p = 0.001$, adjusted $R^2 = 0.547$.

Table 4. Hierarchical Multiple Regressions Predicting (1) GASP NBE (Anticipatory Guilt) and (2) PFQ-2 Guilt (Consequential Guilt).

	Anticipatory Guilt					Consequential Guilt			
	Model 1		Model 2			Model 1		Model 2	
Variable	B	β	B	β	Variable	B	β	B	β
Constant	10.054**		1.436		Constant	7.667***		10.404	
IRI PT	0.003	0.004	0.044	0.058	DASS Depression	0.507**	0.596	0.251	0.295
IRI EC	0.633**	0.720	0.527**	0.600	ToM Skill			0.113*	0.366
ToM Skill			0.155**	0.447	GASP Withdraw			0.317*	0.414
					RBANS Delayed Memory			−0.145*	−0.392
R^2	0.523		0.715			0.355		0.633	
F	10.965**		15.909***			10.992**		7.334***	
ΔR^2	0.523		0.192			0.355		0.278	
ΔF	10.965**		12.827**			10.992**		4.301*	

Note: SZ sample, $n = 22$. Anticipatory Guilt = GASP NBE. Consequential Guilt = PFQ-2 Guilt. IRI PT, Interpersonal Reactivity Index Perspective Taking; IRI EC, Interpersonal Reactivity Index Empathic Concern; ToM Skill, composite total score on Faux Pas and Theory of Mind Picture Sequencing tasks; GASP, =Guilt and Shame Proneness scale [29]; RBANS, Repeatable Battery for the Assessment of Neuropsychological Status [36].
*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

Adding GASP Withdraw, ToM Skill and RBANS Memory led to an increase in R^2 of 0.278, $F(3,17) = 4.30$, $p = 0.02$.

A hierarchical regression was run to determine whether ToM skill (combined total score on Faux Pas task and ToM-PST) explained anticipatory guilty affect (GASP NBE) above and beyond the contribution of self-reported empathy and perspective-taking. The full model of IRI Perspective Taking, IRI Empathic Concern, and ToM Skill in predicting Anticipatory Guilt (Model 2) was significant, $R^2 = 0.715$, $F(3,19) = 15.91$, $p < 0.001$, adjusted $R^2 = 0.670$. Adding ToM skill to the prediction of guilty affect (GASP NBE) led to an increase of R^2 of 0.192, $F(1, 19) = 12.83$, $p = 0.002$, indicating in SZ, ToM skill is a unique, incremental predictor of guilty affect above and beyond empathic concern.

Secondary aims

Relationships between symptoms and guilt and shame were examined (see Supplementary Table 4). Based on the strong intercorrelations of TOSCA-3 Guilt, GASP NBE and GASP Repair, we calculated a composite "Anticipatory Guilt" score by adding the z-scores of each. This was to reduce the data and the possibility of a Type 2 error.

SAPS global scores trended with PFQ-2 Shame ($r = 0.484$, $p = 0.02$) but not PFQ-2 Guilt ($r = 0.397$, $p = 0.07$), and were not associated with anticipatory guilt.

SANS global scores trended negatively with anticipatory guilt and were negatively related to PFQ-2 consequential Guilt and Shame (but not significantly so). Closer examination indicated that the social dimensions of negative symptoms – ability to feel intimacy and closeness, and relationships with friends and peers – trended negatively with anticipatory guilt (p's < 0.05) and were negatively associated with PFQ-2 Guilt but not significantly so. Reduced "ability to feel intimacy/closeness" associated with lower GASP guilty affect ($rho = -0.568$, $p = 0.005$) and lower GASP shame affect ($rho = -0.557$, $p = 0.006$).

Discussion

This study examined self-reported anticipatory and consequential guilt and shame in chronic schizophrenia, and associations with theory of mind skill and empathy. Utilising three different self-report measures of guilt and shame, our results align with previous studies to show current self-report guilt measures are not comprehensive measures of "guilt-proneness" but capture different dimensions of guilt experience. We did not find evidence of diminished anticipatory guilt in people with schizophrenia, based on TOSCA-3 and GASP NBE scores. However, in situations that arouse guilt or shame, participants with schizophrenia were less likely to anticipate repairing the situation and more likely to anticipate withdrawing instead. Additionally, as predicted, participants with schizophrenia reported experiencing more guilt and shame in everyday life than controls on the consequential PFQ-2 scales. Thus, while both the PFQ-2, TOSCA-3 and GASP all claim to measure "guilt-proneness", responses to the PFQ-2 indicated people with schizophrenia experience more guilty affect in daily life than would be predicted by their TOSCA-3 and GASP scores.

Our findings thus only partially supported the prediction of reduced anticipatory guilt in schizophrenia. This prediction was based on reduced empathy and perspective-taking in schizophrenia (Bonfils et al., 2017). In our sample, SZ did not differ from controls on these variables, and this may partly explain why we did not see group differences in TOSCA-3 guilt and GASP guilty affect. IRI Empathic Concern and Perspective-Taking were strongly associated with TOSCA-3 guilt, and GASP guilt and repair tendencies. However, although patients self-reported equal empathy, they demonstrated less nuanced understanding of the beliefs and feelings of others. Performance on the ToM Picture Sequencing Task indicated a selective, basic ToM impairment, and performance on the Faux Pas task illustrated patients' difficulty understanding emotion and belief in more complex social situations. These results may partly explain why, although guilty affect was intact, the social display of guilt in terms of repair was diminished in patients. The proclivity to anticipate and modify behaviour to reduce guilt still depends on social cognition. Additionally, withdrawal tendencies negatively associated with false belief performance, indicating that those who have a harder time understanding the beliefs and intentions of others are more likely to try to escape situations that arouse guilt and shame. These findings accord with previous studies showing that accurate mental state attribution is the best predictor of social skills in patients with schizophrenia (Brüne et al., 2011). While withdrawal may be natural – and even adaptive – in some circumstances, it removes the opportunity to make amends, and lack of interpersonal resolution perpetuates guilt and shame, and may also increase attempts to self-punish (Nelissen & Zeelenberg, 2009). The key takeaway is that while guilty affect may not be diminished, lower repair and higher withdrawal tendencies indicate the socially adaptive behavioural regulation of the moral emotions is reduced in some individuals with schizophrenia. This highlights an important target for intervention with likely downstream reduced risk of chronic and delusional guilt and shame.

These interpretations must be considered against the background of higher baseline depression in schizophrenia. While TOSCA-3 and GASP anticipatory guilt were unrelated to depression, higher PFQ-2 Guilt in schizophrenia was no longer significant when we compared groups equivalent on depression, thus replicating previous research

showing that the TOSCA-3 and GASP NBE and Repair scales capture adaptive guilt, and the PFQ-2 captures maladaptive guilt (Rüsch et al., 2007). The finding of a stronger relationship between guilt and depression in schizophrenia than in controls may provide a clue as to how guilt is processed and experienced by some people with schizophrenia. One possibility is that differences in self- versus other-focus (as evidenced by higher levels of shame) lead to consequential guilt taking on a different qualitative character. While patients' empathic concern was strongly associated with anticipatory guilt, it was not related to PFQ-2 guilt. Thus, a qualitative difference between adaptive and maladaptive guilt may be the level of other-focus instead of self-focus. Reparative behaviours may be more likely to occur where other-focus is strong, promoting resolution.

In contrast, where self-focus is predominant – for example, when a very shame-afflicted person feels guilty – the bad self and self-punishment may become the focus and the behavioural outcome. Henriksen and Skodlar (2018) argued that guilt in schizophrenia and guilt in depression differ in their intersubjectivity. Specifically, guilt in depression is characterised by intersubjective concern for the other person, while those with schizophrenia can be "remarkably vague, subjective or solipsistic about [their] complaints of guilt" (p. 73), and lack the intersubjective direction observed in depression, "indicative of a transformed self-world relation" (p. 73). This observation is resonant with our findings insofar as PFQ-2 guilt and shame were not associated with empathy, even after adjusting for depression. Conversely, among controls several perspective-taking variables trended positively with PFQ-2 Guilt and Shame.

These findings reveal a complex pattern regarding guilt processing in schizophrenia that supports theoretical predictions about the role of social cognition. The significant model predicting consequential guilt (PFQ-2) demonstrates that beyond depression, withdrawal tendencies contribute meaningfully to guilt experiences, with the overall model explaining an additional 27.8% of variance. While Theory of Mind skills showed a trend-level associated with consequential guilt ($p < 0.05$), this relationship did not meet the stringent criterion for significance ($p < 0.01$) and should be treated cautiously. Nevertheless, the pattern would suggest that individuals who withdraw from social situations and possess better ToM abilities experience heightened consequential guilt, possibly because enhanced perspective-taking makes them more acutely aware of interpersonal disappointments without facilitating adaptive responses.

Conversely, the finding that ToM skill uniquely predicts anticipatory guilt (GASP NBE) above empathic measures is particularly noteworthy, contributing an additional 19.2% of variance beyond self-reported empathy. This indicates that cognitive perspective-taking abilities, rather than emotional empathy alone, optimise anticipatory guilt in schizophrenia. Together, these results suggest a dissociation between anticipatory and consequential guilt processing, where ToM skills clearly facilitate adaptive guilt anticipation, while their relationship to maladaptive consequential guilt experiences remains tentative and requires further investigation to clarify the complex relationship between social cognitive abilities and moral emotions in this population.Our small sample with low symptoms may explain why we did not find robust associations between discrete symptoms and anticipatory guilt and shame. Globally, positive symptoms trended with higher PFQ-2 Guilt and Shame. Negative symptoms associated with reduced PFQ-2 Guilt and Shame. The GASP scales were more sensitive to symptoms: higher asociality and an inability to feel closeness trended negatively with guilty

affect and repair inclinations, consistent with previous studies showing associations between adaptive guilt and better social wellbeing (Tignor & Colvin, 2017).

Implications and future studies

This study highlights guilt and shame as important regulators of social contact for people with schizophrenia, particularly in the context of stressful social interactions. Follow-up research is required to determine whether differences in behavioural responses are due to more general social-cognitive and motivational deficits as proposed above, or also reflect differences in moral reasoning and accountability. Identifying the implicit attitudes mediating between guilt and "repair vs withdrawal" will be useful for social-cognitive interventions: do feelings of guilt direct attention more to punishment concepts or repair concepts? Any trends found may be related to trauma-experiences and higher fear levels in this vulnerable population.

Null group differences on the GASP NBE point to preserved moral understanding in chronic schizophrenia, aligning with preserved moral judgment findings (Koelkebeck et al., 2018; McGuire et al., 2017). Further, suppose transgressions of social rules associate more with shame (Schaumberg & Flynn, 2012), and moral transgressions more with guilt. In that case our data tracks with McGuire et al.'s (2017) finding of a slower reaction time for patients when judging moral transgressions, but not social transgressions. Higher PFQ-2 guilt and shame in schizophrenia (suggesting increased self-blame), also align with McGuire et al.'s finding that patients, compared to healthy controls, rated conventional (but not moral) transgressions more harshly. If people judge their social mishaps more harshly, we might expect them to report higher maladaptive guilt and shame. Our study implies that in everyday moral scenarios people with chronic schizophrenia anticipate equal levels of moral emotion – if not more, if we regard shame as a moral emotion when considering oneself as an agent of transgression.

Limitations

An important limitation of our study is that we did not control for stigma-based shame. Stigma-based shame may interact with moral shame (Deonna et al., 2011) in people with schizophrenia and contribute to higher levels of both shame and guilt. Additionally, our small sample was older and had low symptoms; thus, we cannot generalise to those with greater impairment. While the TOSCA-3 guilt scale in healthy controls had poor internal consistency (observed elsewhere, c.f. Giner-Sorolla et al., 2011; Rüsch et al., 2007) the TOSCA-3, GASP and PFQ-2 guilt and shame scales all showed good internal consistency for the SZ group, and discriminant validity. Performance was not related to memory deficits. However, questionnaire hypotheticals were likely less ambiguous to patients than real life scenarios, and thus our results possibly overestimated socio-moral functioning. Additionally, our study may have been underpowered to detect smaller effect sizes for some variables, meaning that non-significant and trend-level findings (such as the association between ToM and consequential guilt) should be interpreted cautiously as they may reflect either genuine weak associations or Type II error. Future research with larger samples would help to clarify the strength and reliability of these relationships.

Conclusion

The current study demonstrates that people with schizophrenia anticipate equal levels of guilt and shame in moral scenarios to healthy controls, *when prompted*. However, the proclivities for adaptive behavioural responses to guilt and shame differ. These findings expand on recent studies which have failed to identify divergent affective responses during moral decision-making in schizophrenia in everyday scenarios. Our findings indicate that a key point of divergence in schizophrenia may be experiences of guilt that are perceived by patients to be irreparable, even if otherwise appropriate and specific. The reduced perception of reparation potential may result in chronic experiences of guilt that in turn may maintain depression. If these preliminary findings hold in following replication studies, they highlight that experiences of guilt in schizophrenia need not be delusional to be of clinical significance.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Data availability

The data that support the findings of this study are available from the corresponding author (RB) upon reasonable request.

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