



Components of schizophrenia liability are not uniformly associated with stress sensitivity, resilience, and coping



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ABSTRACT

Stress sensitization is a candidate final common pathway for the development of schizophrenia. In other psychopathologies, resilience attenuates the stressor-outcome relationships. Therefore, we sought to determine whether resilience moderates the association between stress sensitivity and schizophrenia liability. Undergraduates ($n = 230$) self-reported cognitive-perceptual, interpersonal, and disorganisation attributes of schizophrenia liability as well as ratings of sensitivity to stress, resilience, and dispositional coping behaviour. Bivariate analyses showed components of schizophrenia liability were significantly predicted by greater stress sensitivity, poor resilience and adaptive coping, and greater maladaptive coping behaviour. However, regression modelling suggested that cognitive-perceptual attributes were uniquely predicted by stress sensitivity in models that include resilience. In contrast, interpersonal attributes had a weaker relationship with stress sensitivity and were strongly predicted by poor resilience. In general, resilience did not moderate the relationship of stress sensitivity with schizophrenia liability. Unexpectedly, some specific attributes of resilience (personal strength, structured style) potentiated the relationship of stress sensitivity with schizophrenia liability. We conclude that the relationships of stress sensitivity, resilience, and coping with attributes of schizophrenia liability are not uniform and speculate that the pattern of associations may reflect the different influences of chronic stress exposures and neurocognitive functioning.

1. Introduction

Studies of daily hassles show that schizophrenia and schizophrenia liability are each associated with strong and negative affective reactions to everyday hassles and that hassles impact negatively on mental health (Malla and Norman, 1992; Myin-Germeys et al., 2005, 2001; Norman and Malla, 1991). Elevated reactions to daily hassles also predicts subsequent psychosis, mood, subjective distress, relapse rate, and quality of life (Caron et al., 2005; Corcoran et al., 2003). These and similar findings have prompted some to argue that stress sensitivity is a key mechanism in the pathogenesis of schizophrenia (Collip et al., 2008). Stress sensitivity is a stable personality trait evidenced as a heightened reactivity to everyday or commonplace annoyances and hassles (e.g., misplacing items, transportation problems). Stress sensitivity is often assessed through the measurement and reporting of daily hassles (Grattan et al., 2015).

Schizophrenia is also associated with compromised resilience (Herbert et al., 2013; Meesters, 2014). Although commonly conceptualized as *coping methods* or *coping styles* (El Sheshtawy, 2011; Jalbrzikowski et al., 2014; Montemagni et al., 2014; Phillips et al.,

2012), resilience involves a broad range of covert and overt behavioural and resource utilisation factors and dispositions that mitigate the negative effects of stressors (Herbert et al., 2013; Meesters, 2014). Resilience involves traits such as personal strength, organisation and goal-oriented behaviour (also called *structured style*), family cohesion, self-perception, social resources, engagement in emotion- and problem-focused coping behaviour, and avoidance of dysfunctional coping behaviour (Carver, 1997; Friborg et al., 2005). Key features of reduced resilience in schizophrenia include smaller social networks, perceptions of lack of social support, and engagement in maladaptive coping behaviour (Horan and Blanchard, 2003; Jalbrzikowski et al., 2014; Nuechterlein and Dawson, 1984). Schizophrenia and schizophrenia liability are also associated with utilisation of less adaptive emotion regulation strategies (Henry et al., 2009, 2008; O'Driscoll et al., 2014).

Previous research has shown that resilience attenuates the effects of traumatic experience on severe stress-related outcomes including post-traumatic stress disorder (Besser et al., 2014; Ying et al., 2014). This attenuation effect may generalize to other stressor-pathology relationships. Moreover, some aspects of emotion-focused coping may moderate the impact of stressors on subclinical paranoia (Westermann

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et al., 2013, 2012). Therefore, our objective was to determine whether resilience moderates the association between stress sensitivity and schizophrenia liability. We focus on schizophrenia liability on the assumption that the pathogenic processes that give rise to schizophrenia are active before disorder onset (Linscott et al., 2017; Meehl, 1990; Morton et al., 2016). We predicted that self-reported schizophrenia liability is associated with both stress sensitivity and resilience and that resilience moderates the relationship of stress sensitivity with schizophrenia liability.

2. Method

2.1. Participants and procedure

Undergraduates ($n = 230$) enrolled in introductory psychology courses volunteered to participate. Participants included 54 males (25%) and were aged from 17 to 33 years ($M = 20.0$ years, $SD = 2.1$). A quarter of participants identified as belonging to an ethnic minority including Chinese (9.3%), Māori (4.6%), Indian (1.9%), or other minority group (7.9%); the remainder identified as New Zealand or other European. There were no other inclusion or exclusion criteria.

Having provided written informed consent, participants completed measures of schizophrenia liability, stress sensitivity, resilience and coping behaviour, mood, and demographics. The study was reviewed and approved by the University of Otago Human Ethics Committee (Health).

2.2. Measures

Schizophrenia liability was measured using a Likert version of the Schizotypal Personality Questionnaire (Raine, 1991; Wuthrich and Bates, 2005). The SPQ contains 74 items that are rated on an agreement scale (0 = *strongly disagree* to 4 = *strongly agree*). Nine subscales, corresponding to the features of DSM-III-R schizotypal personality disorder, are summed to provide three factor scores: A cognitive-perceptual score based on self-reference ideation, magical thinking, unusual perceptual experiences, and suspiciousness; an interpersonal score based on social anxiety, no close friends, constricted affect, and suspiciousness; and a disorganised score based on odd behaviour and speech. The SPQ is reliable and its indices are meaningfully related to the schizophrenia construct (Raine, 2003). The SPQ is widely used as a measure of schizotypy or psychosis proneness.

Stress sensitivity was assessed using the Acute Hassles Scale (AHS), a 19-item short form adaptation of the Kanner Hassles Scale, a measure of daily hassles (Kanner et al., 1981). The AHS was developed by Grattan et al. (2015) to assess reactivity to daily hassles that are neither chronic in nature nor related to psychopathology. Respondents rate their reactivity to stressors experienced during the previous two weeks using a 4-point severity scale (0 = *not affected*, 1 = *somewhat severe*, 2 = *moderately severe*, 3 = *extremely severe*). Unpublished data from a separate sample ($n = 184$) from the same sampling population as recruited here (undergraduates in introductory psychology courses; age $M = 20.5$ years, $SD = 3.9$; 77.2% female) assessed on 4 occasions at 2-monthly intervals show that the AHS has good test-retest reliability ($r = 0.64$ – 0.73 , $p < 0.001$) and internal consistency ($\alpha = 0.78$ – 0.84).

The Resilience Scale for Adults (RSA; Friberg et al., 2005) was used as a self-report measure of resilience attributes. The RSA contains 33-items across five subscales: personal strength (comprising perception of self and perception of future components), structured style, social competence, family cohesion, and social resources. Ratings are made using 5-point scales with item-specific anchor phrases. Higher scores reflect greater resilience. The RSA has good internal consistency for all subscales ($\alpha = 0.76$ – 0.87 ; Friberg et al., 2005) as well as high test-retest reliability ($r \geq 0.70$; Windle et al., 2011). Item content in two of the RSA subscales (social competence and social resources) overlaps significantly with the interpersonal schizotypy construct. For example,

endorsement of the RSA social competence item, *I enjoy being by myself*, is coded as indicative of low resilience; endorsement of the RSA social resources item, *the bonds among my friends is weak*, is similarly coded as low resilience. Therefore, data from the RSA social competence and social resources subscales were not used.

The dispositional form of the Brief COPE (Carver, 1997) was used to assess coping behaviour. The Brief COPE contains 28 items that comprise 14 subscales that combine to generate problem-focused, emotion-focused, and dysfunctional coping indices (Cooper et al., 2008). The emotion-focused index reflects use of emotional support, positive reframing, humour, acceptance, and religion; the problem-focused index reflects use of active coping behaviour, instrumental support, and planning; and the dysfunctional coping index reflects use of self-distraction, denial, substances, disengagement, venting, and self-blame. Respondents describe how they generally respond in the face of stressors using a four-point anchored scale (1 = *I usually don't do this at all*, 2 = *I usually do this a little bit*; 3 = *I usually do this a medium amount*, 4 = *I usually do this a lot*). Alpha coefficients for the 14 subscales range from $\alpha = 0.50$ – 0.90 (Carver, 1997). Modest alpha coefficients and retest reliabilities have been reported for the emotion-focused ($\alpha = 0.72$, $r = 0.58$), problem-focused (0.84, 0.72), and dysfunctional coping indices (0.75, 0.68; Cooper et al., 2008).

A composite index of resilience was obtained by extracting the first factor from a principal components analysis of the four RSA and three Brief COPE subscales. Coefficient alpha for the simple sum of these seven subscales was $\alpha = 0.73$. The first factor eigenvalue was 2.77 (39.6% of variance). The loading coefficient for Brief COPE dysfunction was -0.21 and the loadings for the remaining subscales ranged from 0.30 to 0.49. Proportions of unexplained variance ranged from 0.34 (RSA personal strength future) to 0.87 (Brief COPE dysfunction).

Depression was assessed using the depression subscale of the Depression Anxiety and Stress Scale (DASS; Lovibond and Lovibond, 1995). The DASS contains 42 items that are rated on a 4-point anchored scale (0 = *did not apply to me at all* to 3 = *applied to me very much*). Higher scores indicated higher levels of depressed affect. In a non-clinical sample, the DASS depression subscale has been shown to have good reliability ($\alpha = 0.95$) as well as good convergence with other measures of the same construct including the Hospital Anxiety and Depression Scale ($r = 0.66$) and the Personal Disturbance Scale ($r = 0.78$; Crawford and Henry, 2003).

Disingenuous responding was assessed using 6 response validity items distributed among items of the SPQ (3 items) and DASS (3 items). Validity items instructed participants to provide a specific response to each item (e.g., *Answer this question by selecting number 3*). If participants answered more than one item incorrectly, their data were removed from the analyses.

2.3. Statistical analyses

Data analyses were performed using Stata. Key predictors and outcomes were tested for skewness using *sktest*. Bivariate correlations were obtained using Spearman's rank-order coefficients or Pearson's r , depending on normality of variables involved. Differences in the magnitude of correlations were tested using Williams' T_2 (Steiger, 1980). Continuous measures were standardized for regression and moderation modelling. Regression modelling generally proceeded in three steps: The outcome variable was regressed onto control variables at the first step and key predictors were added at the second. Where moderation was tested, the interaction term was entered at the third step. Moderation effects were explored with Johnson-Neyman regions of significance using online tools by Preacher et al. (2006). Residual plots were obtained to test assumptions of linearity and homoscedasticity, and variance inflation factors to test for multicollinearity. Influential cases were identified using leverage. Where the criterion was non-normal, bootstrapped confidence intervals and p -values were also obtained using 1000 replications. A sequentially-rejective correction for

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