

ORIGINAL ARTICLE

# CO-OCCURRING SAD SYMPTOMATOLOGY AND SCHIZOPHRENIA AT HIGH LATITUDE: A PILOT STUDY

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## ABSTRACT

**Objectives.** Recent research investigates major depression with seasonal pattern, also called seasonal affective disorder (SAD), depression in schizophrenia and seasonality in schizophrenia, but there exists limited research investigating SAD in schizophrenia. This study documents co-occurring SAD symptomatology in patients with schizophrenia at high latitude.

**Study Design.** Clinical cross-sectional study of patients with schizophrenia attending treatment centres in Alaska.

**Method.** Twenty-eight patients completed a structured interview assessing seasonal patterns in mood, depression, negative symptoms of schizophrenia and alcohol use.

**Results.** Thirty-six percent of patients with schizophrenia met the criteria for SAD used in previous general population research on SAD in Alaska. When a presence of major depressive episode was confirmed using a structured clinical interview for depression in schizophrenia, the rate was 25%. Severity of SAD symptoms was greatest among patients with alcohol-abuse history.

**Conclusions.** Co-occurring SAD symptomatology was identified in this extreme latitude sample of patients with schizophrenia. The frequency and severity of symptomatology was greater than found in a general population study of SAD conducted in Alaska using identical criteria. SAD may be under-diagnosed in schizophrenia at moderate and extreme latitudes, highlighting clinical assessment considerations, potential utility of bright light therapy and the need for additional research (*Int J Circumpolar Health* 2007; 66(3): 248-256).

**Keywords:** depression with seasonal variation, seasonal affective disorder, SAD, schizophrenia, co-occurring disorders

## INTRODUCTION

The growing awareness of depressive symptoms in schizophrenia has prompted the formation of the International Survey of Depression in Schizophrenia to examine the diagnosis and treatment practices for this comorbid condition (1). A substantial body of research evidence now documents depression as a secondary diagnosis in schizophrenia. Descriptive and epidemiologic studies have identified depressive symptoms co-occurring in 25% to 81% of individuals with schizophrenia; this confers significant additional burden on the individual through additional need for relapse-related mental health services, increased risk for violence and victimization, heightened substance-related problems and poorer quality of life (2).

Major depressive disorder (MDD) with seasonal pattern, or “seasonal affective disorder” (SAD), is also a subject of current inquiry (3–5). SAD is characterized by seasonal fluctuation in sleep patterns, eating patterns, weight, mood, libido and energy level, with a craving for carbohydrates during the depressive cycle and has a higher prevalence in women (6–8). Typically, patients with SAD experience depressive symptoms during the winter months, with the shortened photoperiod in winter attributed as a major causal factor (8). Winter depression, the most common manifestation of SAD, is characterized by a number of atypical symptoms that include hypersomnia, overeating and carbohydrate craving; in contrast, insomnia and loss of appetite are features associated with non-seasonal MDD (7). Diagnosis of MDD with seasonal pattern, or SAD, requires the onset and remission of seasonal major depres-

sive episodes (MDE) during the last 2 years (16). Subsyndromal SAD (S-SAD) is a less severe form of the disorder with seasonal depressive episodes that do not meet the criteria for MDE; the physiological changes in S-SAD appear similar to those in SAD (7). The prevalence of SAD in Fairbanks, Alaska, is 9.2% and 19.1% for S-SAD (11). Although some studies have shown SAD prevalence increases with latitude, more recent findings are contradictory, suggesting the relationship between latitude and prevalence is complex and potentially interacts with other variables, including seasonal temperatures, local climate, individual genetic vulnerability and sociocultural context (7, 9–10).

Research has identified seasonality in schizophrenia with regards to hospital admission rates (12), relapse rates (13), prolactin levels (14) and serotonin levels (15). However, studies of seasonality in depressive symptoms in schizophrenia are lacking. This study examined the prevalence of SAD symptomatology in a convenience sample of patients with schizophrenia residing above latitude 60° in Fairbanks and Anchorage, Alaska.

## MATERIAL AND METHODS

The sample consisted of 28 adults diagnosed with schizophrenia. This included 22 men and 6 women (mean age 41, range 29–63 years). All participants were currently in treatment programs: 20 were receiving outpatient services at Fairbanks Community Behavioral Health Center (FCBHC) in Fairbanks, latitude 64° north, and 8 were receiving inpatient treatment at Alaska Psychiatric Institute (API) in Anchorage, latitude 60° north.

FCBHC provides outpatient and supported-living services to approximately 700 children and adults residing in Fairbanks and outlying areas. API is a 74-bed acute inpatient facility serving individuals throughout the state of Alaska. Inpatients and outpatients were combined in order to maximize sample size. Ethnicities were 19 European-American, 8 Alaska Natives and 1 African-American.

Convenience sampling was used to recruit subjects at presentations during psychosocial clubhouse functions, case management meetings or inpatient clinical rounds during the months of November through February. Because preconceptions about seasonal variation are noted confounds in retrospective studies (17), patients were invited to participate “in a study looking at your moods and thoughts,” without reference to seasonality. The University of Alaska Fairbanks and the Alaska Psychiatric Institute Institutional Review Boards approved the research protocol. Participants completed signed informed consent procedures.

Participants were recruited based upon the following inclusion criteria: (1) over age 18, (2) clinical diagnosis of DSM-IV schizophrenia, (3) residence north of latitude 60° for at least 3 years previous and (4) ability to provide informed consent. Exclusion criteria included (1) history of DSM-IV schizoaffective disorder and (2) history of head trauma. Of the 40 consecutive patients referred to the research team by their psychiatrist or case manager, 3 did not meet these inclusion/exclusion criteria and 9 chose not to participate.

The first and third author, a psychology graduate student and a psychiatrist, together conducted patient chart reviews. Axis I diagnoses using DSM-IV (16) criteria were

identified and schizophrenia diagnoses were confirmed with the patient’s treating psychiatrist. Schizophrenia subtype diagnoses were 16 paranoid subtype, 10 undifferentiated, 1 disorganized and 1 residual. All patients were receiving anti-psychotic medication. Eleven patients were diagnosed with at least one co-occurring alcohol abuse or dependence, poly-substance dependence or cocaine dependence diagnosis. No patient charts included a concurrent mood disorder diagnosis or symptom descriptions consistent with such diagnoses, and none were receiving bright light therapy. However, despite the absence of Axis I mood disorder diagnoses, 10 patients were receiving antidepressant medications and 6 additional patients were receiving mood-stabilizers (lithium, valproic acid, carbamazepine, gabapentin).

The first author, who was trained in diagnostic interviewing and research methods and who was supervised by the co-authors, a psychiatrist and clinical psychologist, conducted a structured interview with each participant lasting approximately 1 hour. This consisted of interview versions of the Seasonal Pattern Assessment Questionnaire (SPAQ) (18) and Center for Epidemiologic Studies for Depression Scale (CES-D) (19), along with the Negative Symptom Rating Scale (NSRS) (20), Calgary Depression Scale for Schizophrenia (CDSS) (21) and Case Manager Rating Scale for Alcohol Disorder (CMRS) (22).

**SPAQ.** The Global Seasonality Score (GSS) is comprised of 5 items rated on a 5-point Likert scale measuring seasonal variations in mood, appetite, weight, sleep, energy and socialization. A sixth complaints item evaluates the degree seasonal changes are perceived as a problem on a 5-point scale.

The measure has high internal consistency ( $\alpha = .82$ ) (23), displays convergent validity with the Hamilton Rating Scale for Depression (HRSD) (24), and when SAD and S-SAD are combined into a “winter problem” group has a sensitivity of 94% and specificity of 73% (25).

**CES-D.** This 20-item scale is a composite measure derived from other established measures of depression. Items assess presence and frequency of depressive symptoms, including depressed mood, feelings of guilt and worthlessness, feelings of helplessness and hopelessness, psychomotor retardation, loss of appetite and sleep disturbance over the previous week. The measure displays convergent validity with the HRSD (19).

**NSRS.** The NSRS summary score is comprised of 4 subscales measuring thought processes, cognition, volition and affect/relatedness. The scale displays high convergent validity with the Scale for the Assessment of Negative Symptoms (20, 26). The NSRS was administered as a semi-structured interview, augmented with collateral information from case managers, social workers, licensed nurse practitioners, halfway house staff, family members and patient charts.

**CDSS.** This 9-item structured interview was developed for assessing depression in schizophrenia, using items from the Present State Examination (27) and the HRSD. The global depression score is comprised of 8 items assessing the presence and severity of depression, hopelessness, self-deprecation, guilty ideas of reference, pathological guilt, morning depression, early wakening and suicide over the previous 2 weeks, and 1 item assessing observed symptoms of depression during the interview. The CDSS displays high internal

consistency reliability ( $\alpha = .79$ ) (28) along with convergent validity with other depression measures and discriminant validity with measures of positive, negative and extra-pyramidal, and medication side-effect symptoms (41). Other research has found the CDSS but not the HRSD distinguishes between depression and negative symptoms in schizophrenia (29). In pilot work, the first author established interrater reliabilities on the CDSS with 3 other psychology graduate students of  $r = .93-.99$  using 7 videotaped interviews of individuals with schizophrenia.

**CMRS.** The participant’s case manager or social worker rated the extent of alcohol-related problems over the past year using this 4-point scale. The CMRS displays high interrater reliability and concurrent validity (30, 31).

To allow contrasts with a general population study of SAD prevalence in Fairbanks, Alaska (11), while minimizing risk of overestimation, we applied the more stringent of the 2 SPAQ screening criteria used in this previous research: SPAQ criteria for SAD was  $GSS \geq 11$  and complaints rated  $\geq 2$ ; criteria for S-SAD was  $GSS \geq 11$  and complaints rated 0 or 1, or  $GSS = 9$  or 10 and complaints rated 1. In recent studies diagnostic interviews confirmed SAD in approximately half of cases identified by the SPAQ GSS (32). Therefore, we also report cases identified by the SPAQ confirmed using CES-D scores and CDSS interviews. Although the CES-D is a screening instrument for depressive symptoms and not a clinical diagnostic tool, scores of 16 or more may indicate clinical depression (33). The CDSS was designed to identify depression in patients with schizophrenia; the instrument has a diagnostic sensitivity of 85% and specificity of 82% using scores of 7

or greater (34). This second criteria for SAD using the CES-D and CDSS was (1) SPAQ GSS  $\geq 11$  and complaints rated  $\geq 2$ ; (2) CES-D  $\geq 16$ ; and (3) CDSS  $\geq 7$ .

### Statistical Analyses

The data were analysed using the SPSS 13 statistical package. The results are presented as means and standard deviations. Group comparisons used t-tests, and associations between measures were explored using Pearson  $r$ . Results were considered statistically significant at  $p < 0.05$  (2-tailed).

## RESULTS

Means, standard deviations and coefficient alpha internal consistencies ( $\alpha$ ) for each measure are reported in Table I. Using the SPAQ criteria from the Fairbanks stratified random general population study (11), 36% of this schizophrenia sample met criteria for SAD, while an additional 11% met criteria for S-SAD. Mean CES-D Scale score in the schizophrenia sample was  $21.9 \pm 12.5$  (mean  $\pm$  SD). When cases identified by the SPAQ were confirmed by CES-D scores and CDSS interviews, patient SAD rates remained high at 25%. CDSS criterion identified a more restricted subset of patients within those identified by CES-D criterion, suggesting the CES-D does not provide incremental validity in addition to the CDSS.

SPAQ scores were unrelated to CES-D, NSRS and CMRS scores, but displayed modest relationship to CDSS scores. The CDSS and CES-D intercorrelated high ( $r = .91$ ), but both displayed non-significant associations with the NSRS (Table II).

**Table I.** Means and standard deviations for measures of depression, negative symptoms of schizophrenia and alcohol abuse.

	Mean (SD)	$\alpha^6$
SPAQ <sup>1</sup>	8.96 (6.45)	.85
CES-D <sup>2</sup>	21.93 (4.88)	.86
CDSS <sup>3</sup>	6.11 (12.46)	.79
NSRS <sup>4</sup>	13.46 (9.21)	.86
CMRS <sup>5</sup>	1.71 (0.66)	-.*

<sup>1</sup>Seasonal Pattern Assessment Questionnaire. <sup>2</sup>Center for Epidemiologic Studies for Depression Scale. <sup>3</sup>Calgary Depression Scale for Schizophrenia. <sup>4</sup>Negative Symptom Rating Scale. <sup>5</sup>Case Manager Rating Scale for Alcohol Disorder. <sup>6</sup> $\alpha$  = coefficient alpha. \*The CMRS is a single item, 5-point rating scale.

**Table II.** Correlations between measures of seasonal depression, depression, negative symptoms of schizophrenia and alcohol abuse.

	SPAQ <sup>1</sup>	CES-D <sup>2</sup>	CDSS <sup>3</sup>	NSRS <sup>4</sup>
CES-D	.34			
CDSS	.37*	.91 <sup>†</sup>		
NSRS	.18	.36	.32	
CMRS <sup>5</sup>	.34	.21	.22	-0.14

\* $p < .05$  <sup>†</sup> $p < .01$

<sup>1</sup>Seasonal Pattern Assessment Questionnaire. <sup>2</sup>Center for Epidemiologic Studies for Depression Scale. <sup>3</sup>Calgary Depression Scale for Schizophrenia. <sup>4</sup>Negative Symptom Rating Scale. <sup>5</sup>Case Manager Rating Scale for Alcohol Disorder.

The mean CMRS score was  $1.71 \pm 0.66$  (mean  $\pm$  SD), where 2 or less indicates non-problematic drinking, indicating low levels of current alcohol abuse in this sample. The CMRS displayed limited association with measures of depression, but this lack of relation seems due to an item "floor effect" on the CMRS, reflecting limited current alcohol abuse in the sample. However, SPAQ scores of the 10 patients with past alcohol abuse or dependence were  $13.78 \pm 7.3$  (mean  $\pm$  SD) and higher than those of the 18 patients without such history with scores averaging  $6.68 \pm 4.6$  (mean  $\pm$  SD), [ $t(26) = -3.13, p < 0.005$ ].

## DISCUSSION

A substantial proportion of patients with schizophrenia in this extreme latitude sample reported co-occurring SAD/S-SAD symptomatology. The observed rate of 36% is almost four times greater than the 9.2% SAD prevalence found in the Fairbanks general population, while the 11% observed rate of less severe S-SAD was less than the 19.2% general population S-SAD prevalence rate (11). In addition, the schizophrenia sample mean score on the CES-D was 21.9, which also exceeded the mean score of 7.8 in this same general population study (11). The schizophrenia mean score also exceeded the CES-D cut-off score of 16 for probable depression (33). Ten patients were receiving antidepressant treatment, but only 3 meeting SPAQ criteria for SAD confirmed using the CDSS were receiving antidepressants, and none were receiving bright light therapy. None had received a concurrent mood disorder diagnosis, suggesting SAD and other mood disorders were under-diagnosed. The ratio of SAD to S-SAD in the schizophrenia sample was higher than reported elsewhere (5, 7, 11); patients with schizophrenia in this study tended to report more severe SAD symptoms. SAD appeared more frequently among patients with alcohol abuse or dependence histories; this suggests an increased vulnerability to SAD within this group, even in the absence of current alcohol problems.

In the study of depression co-occurring with schizophrenia, a concern arises regarding the potential overlap of depressive symptoms with the negative symptoms found in schizophrenia. In current general-

population SAD research, following the SPAQ screening, SAD diagnosis is typically confirmed using the HRSD-Seasonal Affective Version (HRSD-SAV). The HRSD-SAV is an adapted 29-item version of the HRSD that additionally taps the atypical depression symptoms reported in SAD (4, 22). However, the HRSD also correlates with negative symptoms in schizophrenia (40). Consistent with previous research (41), in this study the CDSS displayed no such overlap with negative symptoms, suggesting that use of the CDSS instead of the HRSD-SAV may be a more appropriate methodological approach for research on co-occurring SAD in schizophrenia.

This study employed a convenience sample that was non-random and not stratified. For this reason, selection factors may have affected results. This schizophrenia sample was not matched on important demographic variables with the Fairbanks general population sample. Therefore, the two samples could differ in important ways unrelated to schizophrenia diagnosis. The lack of a matched general population sample precludes clear conclusions regarding contrasts of the prevalence of SAD and S-SAD between the schizophrenia and Fairbanks general population samples. In addition, the SPAQ is a retrospective measure susceptible to bias and memory limitations, and suboptimal diagnostic sensitivity and specificity has been reported (42). Though the presence of MDE was identified among those meeting criteria on the SPAQ using the CDSS, which is a validated structured diagnostic interview specifically designed for schizophrenia, a more conclusive research

diagnosis for SAD in schizophrenia would include use of a modified version of the CDSS that also taps atypical symptoms of SAD, along with follow-up assessments to establish remission of winter depression in the summer and recurring onset the following winter. The schizophrenia sample in this study was predominately male, yet SAD prevalence is highest among pre-menopausal women (8). Although lifetime alcohol abuse was common in the sample, few had current abuse problems. Higher levels of current alcohol problems (31% to 47%) are typical in epidemiological studies of schizophrenia (43, 44). The sample resided at high latitude where SAD symptomatology may differ given extremes of diurnal light variation. Given these limitations, though the current study identifies SAD symptomatology in a schizophrenia sample, results should not be interpreted as population prevalence estimates of SAD.

Clinical implications of this first examination of co-occurring SAD in schizophrenia at high latitudes suggests the importance of clinical assessment for depression in patients with schizophrenia and SAD in particular for locations with high SAD prevalence rates. Though slightly more than a third of patients in this sample were receiving antidepressant medication, less than half of those with SAD were receiving them, suggesting this co-occurring syndrome was undiagnosed.

In addition, bright light therapy (45) was not utilized in this study's treatment settings. Initial research has demonstrated the efficacy of bright light therapy for SAD among patients with schizophrenia (46). In the study,

depressive symptoms decreased in response to phototherapy among patients with schizophrenia. Unexpectedly, schizophrenia symptoms also decreased in response to bright light therapy, suggesting a syndromatologic link between these co-occurring disorders and their shared response to phototherapy. Research findings suggest serotonin dysfunction in both SAD and schizophrenia, possibly identifying vulnerability to SAD in schizophrenia through a common, interconnecting neuronal pathway (35–39).

Together, these findings point to the need for further research on the prevalence of seasonal as well as non-seasonal depression co-occurring with schizophrenia. Specifically, research on the prevalence of SAD co-occurring with schizophrenia using research criteria diagnoses with matched general population samples at separate latitudes is warranted. The influence of schizophrenic withdrawal, disability and inpatient status on daylight exposure and detailed study of the specific co-occurring symptom change in both SAD and schizophrenia in response to light therapy are additional important areas for future research.

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