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Panic attacks and the risk of personality disorder

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ABSTRACT

Objective. The goal of this study is to determine the association between panic attacks in adolescence and the risk of personality disorders during young adulthood.

Method. Data were drawn from the Children in the Community Study, a longitudinal epidemiological study of psychopathology across the life-course in 717 individuals in the community. Multiple logistic regression analyses were used to determine the association between panic attacks during adolescence in 1983 and the risk of personality disorders during young adulthood in 1993, adjusting for differences in sociodemographic characteristics, adolescent personality disorders, and co-morbid depressive and substance use disorders.

Results. Panic attacks during adolescence (in 1983) were associated with an increased risk of any DSM-IV personality disorder (in 1993) during young adulthood, which persisted after adjusting for differences in sociodemographic characteristics, adolescent personality disorders, and co-morbid depressive and substance use disorders. Panic attacks were associated with a statistically significantly increased risk of Cluster A, B, and C personality disorders.

Conclusions. These data provide initial evidence that panic attacks early in life are a marker or risk factor for the development of personality disorders in young adulthood. Replication of these findings is needed, as is more in-depth investigation into the mechanism of this link. If replicated in future research, these results may reveal a novel potential pathway for identifying youth at high risk for personality disorders.

INTRODUCTION

Personality disorders are common and associated with significant physical and psychiatric morbidity, functional impairment in work and social roles, and increased risk of suicidal behavior among adults in the community (Reich & Troughton, 1988; Bernstein *et al.* 1993; Reich *et al.* 1994; Kasen *et al.* 1999; Zimmerman & Mattia, 1999; Dammen *et al.* 2000; Latas *et al.* 2000; Rodriguez Solano & Gonzalez de Chavez, 2000; Skodol *et al.* 2002; Soloff *et al.* 2002; Torgensen *et al.* 2002). That personality disorders and Axis I mental disorders co-occur more often than would be expected by chance has been demonstrated in cross-sectional and longitudinal, epidemiological studies (Reich *et al.* 1994; Kasen *et al.* 1999; Zimmerman & Mattia, 1999; Latas *et al.* 2000; Rodriguez Solano & Gonzalez de Chavez, 2000; Soloff *et al.* 2002; Torgensen *et al.* 2002). Associations between personality disorders and poorer outcomes among medical patients and psychiatric patient samples have also been shown (Marlowe *et al.* 1997; Dammen *et al.* 2000). Most co-morbidity studies to date have looked at the relationship between personality disorders and the risk of mental disorder onset, rather than the reverse. This focus on the relationship between personality disorders and risk of mental disorder onset, however, has not allowed for a more thorough investigation of the relationship between psychiatric symptoms and the development of personality disorders. Many Axis I disorders are more readily treated than are

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personality disorders (Roy-Byrne *et al.* 2000, 2001; Fava *et al.* 2001), making this a public health question of practical clinical significance in terms of opportunities for prevention. As such, the potential utility of identifying early predictors of personality disorders as a route for prevention is important.

Panic attacks co-occur with a wide range of mental disorders, including major depression, schizophrenia, bipolar disorder, and anxiety disorders, more often than would be expected by chance (Klerman *et al.* 1991; Starcevic *et al.* 1993; Eaton *et al.* 1995; Andrade *et al.* 1996; Reed & Wittchen, 1998; Bovasso & Eaton, 1999; Roy-Byrne *et al.* 2000; Fava *et al.* 2001; Rihmer *et al.* 2001; Goodwin, 2002). Panic attacks have also been shown to independently predict the onset of depression, bipolar disorder, psychotic symptoms, agoraphobia, and panic disorder in youth and adult community-based samples (Klerman *et al.* 1991; Starcevic *et al.* 1993; Reed & Wittchen, 1998; Roy-Byrne *et al.* 2000; Fava *et al.* 2001; Rihmer *et al.* 2001; Goodwin, 2002). The clinical significance of these associations lies not only in the etiological links that may be revealed through these associations, but also in the potential for primary prevention of secondary co-morbidity (Kessler & Price, 1993).

Despite the public health consequences of personality disorders, the strength of panic attacks in predicting onset of Axis I DSM mental disorders (APA, 1994), and the well-documented associations between panic attacks and personality disorders in cross-sectional samples, previous studies have not examined the relationship between panic attacks and the risk of personality disorders over time. The goal of the current study is to begin to fill this gap by addressing this issue in a longitudinal, community-based sample of young adults. Based on previous clinical and epidemiological data, we hypothesized that panic attacks would be associated with increased risk of onset of personality disorders during young adulthood.

METHOD

Participants and procedure

Participants in the present study were 717 youths (51%, $n=366$, were female) and their mothers who completed research interviews conducted in 1983, 1985–1986, and 1991–1993 (Cohen & Cohen, 1996). The participating families were a subset of 976 randomly sampled families from two upstate New York counties, with children ranging in age from 1 to 10 years, with whom maternal interviews had been conducted in 1975 (Cohen *et al.* 1987). During the three follow-up interviews, which were administered by extensively trained and supervised lay interviewers, both youths and mothers provided information on Axis I and Axis II disorders, as well as demographic and other psychosocial variables. One child per family was interviewed. The mean age of the youths was 13·8 years (S.D. = 2·6, range = 9–19) in 1983, 16·1 (S.D. = 2·7, range 11–23) in 1985–1986, and 22·0 (S.D. = 2·7, range 17–28) in 1991–1993. The families in this study were generally representative of families in the northeastern United States with regard to socio-economic status and most demographic variables (Kogan *et al.* 1977) but reflected the sampled region with regard to high proportions of Catholic (54%) and Caucasian participants (91%). Study procedures were approved according to appropriate institutional guidelines. Written informed consent was obtained after study procedures were fully explained. Youths and their mothers were interviewed separately, and both interviewers were blind to the responses of the other informant. Response rates were over 90% in each wave. Additional, more detailed information regarding the study methodology is available from previous reports (Cohen *et al.* 1987; Cohen & Cohen, 1996; Kasen *et al.* 1999).

Assessment of panic attack and Axis I disorders

The parent and youth versions of the Diagnostic Interview Schedule for Children (DISC; Shaffer *et al.* 1996*a*) were administered in 1983, 1985–1986, and 1991–1993 to assess anxiety, disruptive, eating, mood, and substance use disorders. One DISC module assesses panic attacks and related information. The focus of the present study was on panic attacks that were reported in 1983. Parents and youths were both interviewed, because research has shown that the use of multiple informants tends to increase the reliability and validity of psychiatric diagnoses (Costello *et al.* 1984; Bird *et al.* 1992; Piacentini *et al.* 1992), although lack of consensus

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especially in reports of internalizing behaviors is an ongoing problem in the assessment of childhood psychiatric disorders and behavioral problems. A report by either informant that a symptom was present was accepted as valid. Previous research has indicated that the reliability and validity of this assessment is comparable to those of other structured interviews (Piacentini *et al*. 1992).

Panic attack

Panic attack was defined with an affirmative response to the question, 'Have there been times when you suddenly felt very scared and didn't know why?' Respondents who responded affirmatively were then asked, 'How many times has that happened?' Possible responses included: (*a*) one or two times; (*b*) more than two times but not many; and (*c*) many times. Only respondents who reported this experience more than two times [(*b*) or (*c*)] were included in the current analyses, in an effort to minimize false positives. Respondents who answered yes to this question were then asked about a series of 13 panic symptoms (e.g. heart beating fast, breathlessness, choking sensations), and whether each of these symptoms was associated with the respondent having been in real danger or running quickly. Only respondents who provided an affirmative response to the gate question and at least one panic symptom were included in these analyses. Those respondents who said that any of their symptoms were related either to being in danger or to running were considered not to have had panic attacks.

Assessment of personality disorders

Interview items used to assess personality disorders were drawn from the Personality Diagnostic Questionnaire (Cohen & Brook, 1987; Hyler *et al*. 1988; Johnson *et al*. 2001), the Disorganizing Poverty Interview (Kogan *et al*. 1977; Cohen & Cohen, 1996), the parent and youth versions of the DISC (Costello *et al*. 1984; Bird *et al*. 1992; Shaffer *et al*. 1996*a*) and other measures (Cohen & Cohen, 1996). Personality Diagnostic Questionnaire items were modified so that they were age-appropriate and could be administered in an interview format. Although the DISC was not originally developed for the purpose of diagnosing personality disorders, items in the obsessive–compulsive and schizophrenia sections corresponded so closely with specific DSM-III-R criteria that they were used to augment the assessment of obsessive personality disorder and symptoms. Items were originally selected on the basis of their correspondence with DSM-III-R criteria and were combined by using algorithms developed by consensus between one psychiatrist and two clinical psychologists (Cohen & Cohen, 1996). After the publication of DSM-IV, the items selected from the study measures and the algorithms were modified to maximize correspondence with DSM-IV criteria. The items used to assess personality disorders are available upon request. In total, 152 items were available at all three assessments to cover 88 (93·6%) of the 94 DSM-IV personality disorders criteria, 31 from mothers, 116 items from youths, and five items from the interviewer. The overall correlation between sums of the youth and the mother responses to all items assessing personality disorder symptoms was significant ($r = 0{\cdot}34$, $df = 748$, $p < 0{\cdot}0001$) (see 3, 35, 56). Thirty-six diagnostic criteria were assessed with a single interview item. The remaining 52 criteria were assessed with two or more interview items. Thresholds for determining whether item responses were diagnostically significant were established on the basis of correspondence with DSM-IV criteria and extremity of response. Although diagnostic criteria are not determined in a way that maximizes inter-item reliability, the median alpha, the statistic used to determine the degree of inter-item reliability on a scale from 0 to 1, was 0·67 in 1983 and 0·63 in 1985–1986, with a range of 0·60–0·83 for personality disorder diagnostic clusters (i.e. A, B, C).

DSM-IV stipulates that personality disorder symptoms must be persistent in order for an adolescent to be diagnosed with a personality disorder. Therefore, adolescent personality disorder diagnoses were assigned only if youths met DSM-IV criteria in both 1983 and 1985–1986 or if they met DSM-IV criteria at one assessment and were within one criterion of the diagnosis at the other assessment.

Assessment of socio-economic status

Parental education and parental income were assessed in 1975, 1983, and 1985–1986 during

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Table 1. *Association between panic attacks during adolescence in 1983 and DSM-IV personality disorders in 1993 among young adults in the community*

DSM-IV Personality disorders	No panic attacks in 1983 (%) ($n=575$)	Panic attacks in 1983 (%) ($n=59$)	p value	No panic attacks in 1983 (reference group)	Panic attacks in 1983 OR (95% CI)	Panic attacks in 1983		
						AOR[a] (95% CI)	AOR[b] (95% CI)	AOR[c] (95% CI)
Any personality disorder	12·5% (72)	28·8% (17)	$p=0·001$	1·0	2·83* (1·53–5·23)	2·86* (1·53–5·34)	2·63* (1·34–5·17)	2·74* (1·36–5·52)
Cluster A personality disorder	2·8% (16)	10·2% (6)	$p=0·003$	1·0	3·95* (1·49–10·53)	4·01* (1·45–11·03)	4·58* (1·56–13·42)	5·4* (1·74–16·74)
Cluster B personality disorder	3·7% (21)	10·2% (6)	$p=0·018$	1·0	2·99* (1·16–7·72)	2·98* (1·14–7·82)	2·77* (1·93–8·23)	3·3[d] (1·09–10·02)
Cluster C personality disorder	4·0% (23)	15·3% (9)	$p<0·0001$	1·0	4·32* (1·9–9·84)	4·07* (1·76–9·38)	4·0* (1·69–9·47)	4·3* (1·79–10·32)

Cluster A, Paranoid, schizoid, schizotypal personality disorder. Cluster B, Antisocial, borderline, histrionic, narcissistic personality disorder. Cluster C, Avoidant, dependent, obsessive–compulsive personality disorder.

[a] Adjusted for age, gender, race, and socio-economic status.

[b] Adjusted for age, gender, race, socio-economic status, and adolescent personality disorders.

[c] Adjusted for age, gender, race, socio-economic status, adolescent personality disorders, major depression, and substance use disorders.

[d] When the Bonferroni correction is applied, this association is no longer statistically significant.

* $p<0·05$.

the maternal interviews. Low parental socio-economic status was considered present if neither parent completed high school and if family income was below the US poverty levels in 1975, 1983, or 1995–1996. If data regarding the father's education was not available, the mother's education was used.

Analytical strategy

χ^2 tests were used to determine the association between panic attacks during adolescence and personality disorders during young adulthood, which was approximately 10 years later. Personality disorders were examined in three clusters (i.e. A, B, C) and as any personality disorder. Multiple logistic regression analyses were then used to determine the association between panic attacks in adolescence and personality disorder in young adulthood by calculating odds ratios (OR) with 95% confidence intervals (CI). Analyses were re-run adjusting for differences in sociodemographic characteristics, then controlling for adolescent personality disorders, and then additionally for co-morbid major depression and substance use disorders. Analyses were performed using SPSS (SPSS Inc., 1999).

RESULTS

Sociodemographic characteristics associated with panic attacks

There were no significant differences in gender (48·3% *v.* 54·1% female, N.S.), race (89·9% *v.* 90·5% white, N.S.), age [13·9 (2·58) *v.* 13·53 (2·62) years] in 1983 [$F=1·46$, df (1, 638), $p=0·2$], or socio-economic status [9·96 (0·98) *v.* 9·79 (0·9), $F=2·17$, df (1, 682), $p=0·1$] between those with and without panic attacks. There were no statistically significant differences in sociodemographic characteristics between participants with personality disorders with and without panic attacks.

Association between panic attacks and personality disorders

In univariate analyses, panic attacks in 1983 were associated with a significantly higher prevalence of any personality disorder in 1993 (28·8% *v.* 12·5%, $p=0·001$) (see Table 1). Specifically, panic attacks were associated with significantly higher rate of Cluster A (10·2% *v.* 2·8%, $p=0·003$), Cluster B (10·2% *v.* 3·7%, $p=0·018$), and Cluster C (15·3% *v.* 4·0%, $p<0·0001$) personality disorders, compared to those without panic attacks.

Adjusted association between panic attacks and personality disorders

Panic attacks were associated with a significantly increased risk of any DSM-IV personality disorder (OR 2·74, 95% CI 1·36–5·52), which persisted after adjusting for differences in sociodemographic characteristics, adolescent personality disorders, and co-morbid major depression and substance use disorders during adolescence (see Table 1). Panic attacks were

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also still associated with strongly increased risk of Cluster A (OR 5·4, 95% CI 1·74–16·75), Cluster B (OR 3·3, 95% CI 1·09–10·02), and Cluster C (OR 4·3, 95% CI 1·79–10·32) personality disorders after adjustment for these covariates. When the Bonferroni correction is applied, the association between panic attacks and Cluster B personality disorders is no longer statistically significant at the 0·05 level.

DISCUSSION

Consistent with our hypotheses, these data suggest that panic attacks during adolescence are reflective of a significantly increased risk of personality disorders during young adulthood. Panic attacks were associated with increased risk of Cluster A, B, and C personality disorders, which persisted after adjusting for demographic differences, adolescent personality disorders, and co-morbid depression and substance use disorders. These data provide initial evidence documenting an association between panic attacks early in life and increased risk of DSM-IV personality disorder during young adulthood in the community.

The mechanism of the observed association between panic attacks and personality disorders is not known. It could be that panic attacks are a risk factor for the development of personality disorders and may be modifiable either through treatment or preventive intervention. For instance, experiencing panic attacks early in life when obtaining a cognitive understanding of this event is less feasible, may lead to maladaptive coping behaviors in social and academic/occupational roles. This would be relatively consistent with evidence that cognitive recognition and insight regarding panic attacks is associated with significantly more favorable prognosis in adults (Weekes, 1978; Breier *et al*. 1986; Goldberg, 2001). For instance, engaging in avoidant and impulsive behaviors, which are commonly associated with efforts to cope with or avoid panic attacks could contribute to the development of behavior and emotions characteristic of personality disorders. Alternatively, panic attack may reflect a prodromal stage of the onset of a personality disorder, or a part of an emerging clinical syndrome, characterized by affective instability and severe anxiety, which is frequently a harbinger to personality disorders (Bernstein *et al*. 1993; Johnson *et al*. 2001). It is also possible that a third outside factor is associated with the onset of both panic attacks and personality disorders (Cohen *et al*. 1987). This could be an early environmental risk factor (e.g. parental loss, trauma) (Mulder *et al*. 1994), as these risks have been linked with both panic attacks and personality disorders, or a common genetic vulnerability. In addition, previous studies have shown heritability of both panic attacks (Hamilton *et al*. 2000, 2001) and personality disorders (Skodol *et al*. 2002*a*), therefore, it is conceivable that some of this link is due to overlapping heritability of both, although this has not been explicitly investigated to date.

The observed link between panic attacks and Cluster A personality disorders, which include paranoid, schizoid, and schizotypal, is of interest for several reasons. There is clinical and epidemiological evidence of a significant association between panic attacks and schizophrenia and psychotic symptoms (Bermanzohn *et al*. 1999; Chen *et al*. 2001; Goodwin *et al*. 2004). These data have been primarily cross-sectional in nature, although there is one report of panic attacks predicting the onset of psychotic symptoms among young adults in the community (Goodwin *et al*. 2004) and several clinical studies linking these phenomena (Reich & Troughton, 1988; Reich, 1989; Reich *et al*. 1994). Moreover, several clinical studies of youth have found strong linkages between panic attacks and psychotic symptoms (Ulloa *et al*. 2000). This association, while based largely on clinical reports and theory rather than quantitative, epidemiological data, between schizoid personality disorder, schizophrenia, and psychosis is well studied (Battaglia *et al*. 1995). Data from several sources suggest that schizoid personality disorder may be a derivative, less severe and debilitating, but related, disorder to schizophrenia and other psychotic disorders. Family studies have also shown evidence of familial links between schizophrenia and schizoid personality disorder (Filbey *et al*. 1999). Therefore, the link between panic attacks and Cluster A personality disorders is noteworthy from an etiological perspective as there may be common familial or genetic origins to both panic and psychotic-like symptoms such as those which may characterize individuals with Cluster A personality disorders,

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but in less severe forms. Previously noted links between panic attacks and increased risk of paranoid personality disorder in epidemiological samples of adults adds additional support for this theory as paranoia has also been linked with panic attacks (Bermanzohn *et al.* 1999; Goodwin *et al.* 2004), and is a core feature of schizophrenia. Alternatively, it is also possible that panic attacks serve as a prodrome reflecting earlier onset of the syndromes involved in Cluster A personality disorders, or as an indicator of severity of illness in these personality disorders as it may be in social phobia (Jack *et al.* 1999).

The observed link between panic attacks and increased risk of Cluster B personality disorders is also potentially of interest. For example, borderline personality disorder, which is included in Cluster B, is a disabling illness, with unknown etiology, associated with poor outcomes and high rates of psychiatric co-morbidity (Reich & Troughton, 1988; Reich *et al.* 1994; Zimmerman & Mattia, 1999; Kasen *et al.* 1999; Dammen *et al.* 2000; Latas *et al.* 2000; Skodol *et al.* 2002*a*). Yet, little is known about the development or longitudinal course of borderline personality disorder with regard to co-morbid mental disorders. This result is also consistent with the well-documented link between borderline personality disorder and co-morbid anxiety disorders and major depressive disorder (Reich & Troughton, 1988; Dammen *et al.* 2000; Latas *et al.* 2000). One possible explanation for this link is that panic attacks are associated with higher levels of trait anxiety, which may also increase the risk of panic disorder onset (Reich & Troughton, 1988). As such, the data suggest that further research into the etiology and mechanism of the direct link between panic attacks and Cluster B personality disorders could provide new data on etiology, as well as potential new avenues to explore in the prevention of borderline personality disorder. The strength of the link between Cluster B personality disorders and panic attacks, in light of the frequently observed association between each of these and suicidal ideation and suicide behavior is also noteworthy (Mulder *et al.* 1994; Zimmerman & Mattia, 1999). For instance, both panic attacks and antisocial personality disorder, another Cluster B disorder, are independent risk factors for suicide behavior in youth and adults (Shaffer *et al.* 1996*b*; Reed & Wittchen, 1998; Kessler *et al.* 1999). Future efforts aimed at understanding both the independent, joint, and possible synergistic link between panic attack and Cluster B personality disorders in the risk of suicidal ideation and suicide behavior, as well as investigation of the effects of specific personality disorders, may also provide worthwhile leads in improving our understanding of, and potential for prevention in, suicidality among young adults in the community.

Panic attack during adolescence was associated with a more than threefold increased risk of Cluster C personality disorders during young adulthood. This link is not surprising in light of the theoretical and evidence-based associations between Cluster C personality disorders and anxiety disorders, such as agoraphobia, social phobia, obsessive–compulsive disorder, and separation anxiety disorder, which overlap with panic attacks. For instance, previous data has suggested associations between childhood separation anxiety disorder and the development of panic disorder in adulthood (Gittelman & Klein, 1984). Based on these results, it could be suggested that panic attacks in childhood are associated with the development of dependent personality disorder, which may be a similar phenomena. For instance, it is possible that the development of panic attacks during youth, if in situations when the child is alone, could result in dependent personality disorder in which the individual seeks company in order to avoid panic attacks. At the same time a reverse phenomena could occur in the association between panic attacks and the development of avoidant personality disorder in an individual who may be socially anxious and experience panic attacks in social situations. These speculations will require empirical testing in future studies with more precise data on each of these measures will be needed in order to disentangle these associations. It is also possible that panic attacks early in life reflect a common vulnerability to various types of anxiety and personality disorders and that an interaction between this inherited vulnerability and environmental influences results in various patterns of co-morbidity, and possible phenotypes, of this underlying vulnerability expressed in various ways throughout the lifespan (Reich, 1989).

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Limitations of this study should be carefully considered when interpreting our results. First, we used a relatively liberal definition of panic attack. This was done for several reasons, and should be kept in mind when considering the study implications. This definition of panic attack (i.e. use of a single item variable) is consistent with previous epidemiological studies investigating the consequences and correlates of panic attacks among youth and young adults in the community. We did, however, exclude respondents who reported that they had one or two panic attacks only but no more, with the goal of minimizing the rate of false positives. Second, there is no known dichotomy based on empirical evidence for the number or specific type of symptoms needed for a panic attack (Leon *et al*. 1992). Third, from a public health and prevention screening perspective, we thought that the use of a single-item question, while it may result in false positives, could be useful in a screening based in a school, primary-care practice or other community-based setting and administered by interviewers without clinical training, which is the ultimate goal of identifying these links and, therefore, serves our purposes better than a clinician-administered structured diagnostic interview, which is likely to be unfeasible in practice in these community-based settings or with large samples. Assessment of panic attacks in youth is problematic in terms of validity and reliability of assessment (Gittelman & Klein, 1984; Hayward *et al*. 1989, 1997). Therefore, we thought it conservative to take an over-inclusive approach as the diagnosis and detection of panic in youth remains actively studied and in question. It could be that some percentage of the panic attack cases are 'subclinical panic attacks'. Future studies will be needed to more precisely determine the difference in risk of personality disorders associated with clinical and subclinical panic attacks, although previous studies suggest that subclinical panic attacks may be of potential prognostic significance as well (Fava & Mangelli, 1999). The measure of personality disorders, while used extensively in previous studies (e.g. Zimmerman & Mattia, 1999; Johnson *et al*. 2000, 2001), is based on report by either informant and relies on items drawn from a range of measures, some of which needed to be drawn from others scales as the complete assessment of personality disorders was not provided for at the outset of the study, due in part to unavailability of measures at that time. Finally, we were not able to investigate the linkages between panic attacks and specific personality disorders, due to small cell size, but this is suggested in a larger sample.

In summary, these data provide initial evidence suggesting that panic attacks are a non-specific risk factor or marker for later personality disorders in the community. This is relatively consistent with previous work suggesting that panic attacks, with onset early in life, are associated with increased risk of a wide range of Axis I mental disorders, suggesting that they may also be predictive of a range of personality disorders. Given the limited current understanding of both panic attacks and personality disorders, these data suggest that future studies focusing on this link may be worthwhile.

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DECLARATION OF INTEREST

None.

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