TABLE 1. The number of subjects by school grade, GHQ-12 scores and PLEs in Japanese high school students (n = 341)

	Twins		Singletons		Total		
	Male	Female	Male	Female	Male	Female	All
Number of students	24	38	149	130	173	168	341
7th grade (mean age = 12.3 years)	10	18	48	42	58	60	118
9th grade (mean age = 14.2 years)	8	12	50	44	58	56	114
11th grade (mean age = 16.3 years)	6	8	51	44	57	52	109
GHQ-12 scores (mean ± SD)	1.4 ± 2.3†	2.9 ± 3.0	2.7 ± 2.8	4.1 ± 3.4	2.5 ± 2.8‡	3.8 ± 3.3	3.1 ± 3.1
GHQ-12 scores > 4 (*N* (%))	1 (4%)§	14 (37%)	44 (30%)	65 (50%)	45 (26%)¶	79 (47%)	124
PLEs > 1 (*N* (%))	2 (8%)	2 (5%)††	23 (15%)	34 (26%)	25 (14%)	36 (21%)	61
with distress (*N* (%))	1 (4%)	2 (5%)	16 (11%)	24 (18%)	17 (10%)	26 (15%)	43

†P = 0.021 between twins and singletons in males (t-test).
‡P < 0.001 between males and females (t-test).
§P = 0.006 between twins and singletons in males (Fisher's exact test).
¶P < 0.001 between males and females (Fisher's exact test).
††P = 0.006 between twins and singletons in females (Fisher's exact test).
GHQ-12, 12-items General Health Questionnaire; PLEs, Psychotic-like experiences; SD, standard deviation.

TABLE 2. Comparisons of variables related with lifestyle and social environment between twins and singletons

Variable		Twins		Singletons		P value†
Number of students		62		279		
Length of sleep (mean ± SD)	Hours	6.9 ± 1.2		7.0 ± 0.7		NS
Irregular sleep schedule	*N* (%)	24	(39%)	129	(46%)	NS
Alcohol	*N* (%)	5	(8%)	33	(12%)	NS
Domestic violence from adults	*N* (%)	4	(6%)	17	(6%)	NS
Being bullied	*N* (%)	3	(5%)	21	(8%)	NS
Nobody one can confide in	*N* (%)	3	(5%)	45	(16%)	0.042
Use of mobile phones after lights out	*N* (%)	13	(21%)	104	(37%)	0.017

†t-test for length of sleep and Fisher's exact test for others.
SD, standard deviation; NS, not significant.

was conducted regarding these values, considering the limited sample size.

Table 2 summarizes the variables on lifestyle and social environment, including sleep related variables (such as length, irregularity and use of mobile phones after lights out), victimizations (by domestic violence and bullying), alcohol use and human resource for help-seeking (or number of people one can confide in). Since no gender difference was observed in these variables, comparisons between twins and singletons were conducted without separating males and females. Significant difference was found in 'number of people one can confide in' and 'use of mobile phones after lights out' (P = 0.042 and P = 0.017, respectively).

Table 3 summarizes the results of univariate and multivariate logistic regression analyses of the association between PLEs and other variables. Univariate analyses showed that risk of experiencing PLEs was associated with being non-twins (P = 0.009), shorter sleep (P = 0.004), being bullied (P = 0.042) and use of mobile phones after lights out (P = 0.003). Multivariate analysis showed significant associations between PLEs and being singletons (OR = 0.293, 95%CI = 0.101–0.847, P = 0.024) and shorter sleep (OR = 0.685, 95%CI = 0.519–0.903, P = 0.007). P-value of Hosmer-Lemeshow test was 0.516 that indicated a goodness of fit of the model. Predictive accuracy was 82.0%.

Results of the logistic regressions for the association between frequency of GHQ-12 scores >4 and the other variables are summarized in Table 4. Univariate analyses showed significant associations between GHQ-12 scores >4 and most of the variables (P < 0.05); the exceptions were 'alcohol' use and 'domestic violence from adults'. Multivariate analysis showed significant associations between GHQ-12 scores >4 and 'sex' (OR = 3.292, 95%CI = 1.941–5.582, P < 0.001), 'school grade' (P < 0.001), 'irregular sleep schedule' (OR = 3.042, 95%CI =

TABLE 3. Factors associated with PLEs in Japanese high school students (n = 327), analyzed by logistic regression†

Variable	Parameter	Unadjusted odds ratios			Adjusted odds ratios‡		
		OR	95% CI	P value	OR	95% CI	P value
Sex	Female/male	1.615	0.921–2.831	NS			
School grade				NS			
	9th/7th	0.851	0.414–1.750				
	11th/7th	1.632	0.844–3.157				
Twin	Yes/no	0.269	0.094–0.771	0.009	0.293	0.101–0.847	0.024
Length of sleep	(hours)	0.675	0.516–0.884	0.004	0.685	0.519–0.903	0.007
Irregular sleep schedule	Possibly, yes/no, probably not	1.571	0.901–2.741	NS			
Alcohol	Once or more/not at all	1.277	0.554–2.944	NS			
Domestic violence from adults	Yes/no	1.445	0.508–4.109	NS			
Being bullied	Yes/no	2.472	1.006–6.071	0.042			
Number of people one can confide in	None/one or more	1.052	0.480–2.305	NS			
Use of mobile phones after lights out	Once or more/none	2.331	1.328–4.091	0.003			

†Subjects with missing data were excluded from the analysis.
‡Stepwise logistic regression model.
OR, odds ratio; PLEs, Psychotic-like experiences; 95%CI, 95% confidence interval; NS, not significant.

TABLE 4. Factors associated with GHQ-12 score of >4 in Japanese high school students (n = 327), analyzed by logistic regression†

Variable	Parameter	Unadjusted odds ratios			Adjusted odds ratios‡		
		OR	95% CI	P value	OR	95% CI	P value
Sex	Female/male	2.525	1.602–3.980	<0.001	3.292	1.941–5.582	<0.001
School grade				<0.001			<0.001
	9th/7th	3.525	1.974–6.294		4.446	2.281–8.667	
	11th/7th	2.860	1.589–5.147		3.433	1.748–6.743	
Twin	yes/no	0.498	0.265–0.934	0.028			
Length of sleep	(Hours)	0.645	0.515–0.808	<0.001			
Irregular sleep schedule	Possibly, yes/no, probably not	3.210	2.028–5.082	<0.001	3.042	1.818–5.090	<0.001
Alcohol	Once or more/not at all	1.656	0.839–3.266	NS			
Domestic violence from adults	Yes/no	1.056	0.425–2.623	NS			
Being bullied	Yes/no	3.194	1.354–7.538	0.006	3.677	1.317–10.266	0.013
Number of people one can confide in	None/one or more	2.303	1.242–4.272	0.007	2.615	1.249–5.475	0.011
Use of mobile phones after lights out	Once or more/none	2.353	1.482–3.737	<0.001			

†Subjects with missing data were excluded from the analysis.
‡Stepwise logistic regression model.
GHQ-12, 12-items General Health Questionnaire; OR, odds ratio; 95%CI: 95% confidence interval; NS, not significant.

1.818–5.090, $P < 0.001$), 'being bullied' (OR = 3.677, 95%CI = 1.317–10.266, $P = 0.013$) and 'number of people one can confide in' (OR = 2.615, 95%CI = 1.249–5.475, $P = 0.011$). P-value of Hosmer-Lemeshow test was 0.450 that indicated a goodness of fit of the model. Predictive accuracy was 74.0%.

DISCUSSION

Mental health status of the present subjects, measured by GHQ-12 and PLEs, may be comparable with the previous studies in high school students. The mean GHQ-12 score was 3.1 and the frequency of the subjects with GHQ-12 score ≥ 4 was 36.4% in this study. Previous studies in Japanese high school students observed similar levels of the GHQ-12 score (mean = 3.2)[21,22] and the frequency (39.8%).[21] PLEs were experienced in 17.9% of the present subjects (mean age = 14.2). In the previous studies, prevalence of PLEs was 15.2% in Japanese students of junior-high schools (or grades 13–15, mean age = 13.3 years),[21] and 14.7% at the age 11 years[11] and 19.1% in teenagers (mean age = 14 years)[23] from

other populations. Regarding the gender difference, females tended to have PLEs more frequently and higher GHQ-12 score, although the difference in the frequency of PLEs did not reach statistical significance. This may also be consistent with previous studies.[21,24,25]

We hypothesized that twins may have poorer mental health than singletons, due to less favourable environment during embryonic neurodevelopment. Previous studies observed that adult twins were more vulnerable to mental disorders than singletons[13,14] or observed no difference in the vulnerability between twins and singletons.[15,16] In contrast to the hypothesis, twins appeared to be in better mental health status than singletons. GHQ-12 was significantly lower in twins than in singletons, in males. PLEs were less frequent in twins than in singletons in females. Weak but similar tendencies were also observed in females for GHQ-12 and in males for PLEs, while the differences were not statistically significant. A possible explanation for the discrepancy is that twinship may form a positive developmental environment for teenagers. A recent study observed that, according to peers' assessment, twins of early teenage years might be better in socioemotional behaviours including social interaction and obtain more popularity and leadership at school.[26] Twins less frequently had behavioural/emotional disturbance, also according to the teachers' assessment, although parents tended to observe slightly more problems in twin boys than in singleton boys.[27] Another recent study observed that 50% of monozygotic twins and 25% of same-sex-dizygotic twins shared their friends with co-twins.[28] It was also reported that rate of receiving psychiatric treatment is lower (approximately a half) in twins in childhood than expected from the rate in general population, which might be related with availability of psychological support by co-twins.[29] In the present subjects, all pairs of the co-twins were enrolled in the same high school. As shown in Table 2, those who had nobody to confide in were significantly less in twins than in singletons. This might have a favourable effect on forming positive developmental environment and having good mental health status. In conclusion, the present result suggests that teenage twins might be less vulnerable to poor mental health status at the subclinical level, which is measured by GHQ-12 or questions on PLEs, when the co-twins are together grown up and attending the same high school.

It may however be acknowledged that the entrance examination could have an effect on the unexpected result in the comparison between twins versus singletons. Twins in the present study took the same entrance examination for admission to the high school as the singletons did. This might have prior excluded twins with developmental problems or poor mental health from the present sample. Another possibility is that twins with substantially poor mental health status were among those who were not studied. Out of the 66 twins, 3 did not participate in the study and another one was excluded from the analysis due to the missing data. The rate of those who were not studied was 6% in the twins, which may be higher than the rate in the singletons (8 out of 287, 3%).

It might also be noted that frequency of subjects who experienced two or more PLEs was 3% in twins and 5% in singletons (not shown in tables or results). The difference between twins and singletons may not be as large as in the frequencies of those with one or more PLEs or GHQ-12 score of >4. Those with severe mental health, who are really susceptible to mental disorders including psychoses, might not remarkably be infrequent in twins than in singletons. Further studies in larger samples may be recommended for detailed statistical comparison, because the present sample size is limited. In addition, it may be acknowledged that the present result might not be adequate to discuss about the risk for mental disorders of clinical level. For the discussion, what portion of the students with high PLEs or GHQ-12 develops psychoses and other mental disorders should be studied in the follow-up.

We found the association of several variables on lifestyle and social environment, with PLEs and GHQ-12, as summarized in Tables 3 and 4. Those variables include length or irregularity of sleep, being bullied, having people to confide in and school grade, in addition to being twin/singleton and sex, which we discussed above.

Sleep-related variables were associated with both PLEs and GHQs, after adjustment for other variables by multivariate logistic regression analysis; length of sleep (or shorter sleep) with PLEs and irregularity of sleep time with GHQ-12. During the past decades, length of sleep was decreasing by later in the general populations of Japan.[20] The issue may be serious in children and adolescents in the developmental stage.[20] A study in 100 000 Japanese high school students reported that 23.5% of them complained of insomnia.[30] Watching television, playing computer games and use of the Internet at night may be related with the unfavourable sleep behaviours.[31] Poor status of sleep may cause several behavioural and mental health problems. Daytime sleepiness, fatigue and poor concentration might be caused by shortage of sleep in school children.[32,33] Association of anxiety/depression with sleep disturbances was

also observed in children.[34] Attention, injuries and emotional upset may be caused by irregular sleep schedule in adolescents.[35] Consistent with these previous findings, the present study clearly observed the association of shorter sleep and irregular sleep schedule with poor mental health including subclinical experiences of psychosis-like symptoms. Which of these variables is the cause in the association should be investigated in further studies. However, the present result suggests that improvement of sleep and its related behaviours by psychological education or other methods may have a favourable effect on the mental health status in teenagers. Use of mobile phones after lights out may be one of good focus in such education, although the association was not significant in the multivariate logistic regression and further studies are requested.[36]

Being bullied was significantly associated with GHQ-12 in multivariate logistic regression. The variable was also associated with PLEs in univariate logistic regression, while the association was not observed in the multivariate analysis. The association between PLEs and being bullied was observed in previous studies in teenagers.[21,23] Having nobody to confide in was another variable that was significantly associated with GHQ-12 in multivariate logistic regression. While the variable was associated with PLEs in our previous study,[21] the association was not observed in the present study. This might be due to the limited sample size in the present study. Having few people to confide in might be a cause of the poor mental status, but also could be a result of poor mental health. Adolescents may be more reluctant to seek help due to poorer mental status. A previous study investigated adolescents and young adults (aged 16–24) using GHQ and found that a very small portion (<10%) of the subjects with poor mental health consulted their general practitioners.[37] The association of the variable, being bullied and having nobody to confide in, with poor mental health suggests that education and other measures for the improvement of human environment in schools may be a key to good status of mental health in students. Early identification programmes for mental health problems are substantially important for the same reason, as discussed in a previous study.[38]

Limitations and future research

The following limitations may be acknowledged in the present study. First, we used a self-report questionnaire. The information could be less accurate or reliable than in studies by interview-based survey. Second, a portion of the students did not participate in the study. Some of these students could be in bad mental states and the exclusion of these students might have affected the study, as discussed above. Third, the sample size may not be large enough for some of the variables where proportion of the minor answer was very small. Especially, the number of the twins was limited and we did not conduct statistical analyses by zygosity of the twins. This may be further studied in the future. Fourth, this is a cross-sectional study, and therefore causal relationship is not clear when a significant association was observed. Longitudinal studies by follow-up may be required.

ACKNOWLEDGEMENTS

This study was partly supported by a grant from the Ministry of Health, Labor and Welfare of Japan (#H19-kokoro-ippan-012).

REFERENCES

1. Killackey E, Yung AR. Effectiveness of early intervention in psychosis. *Curr Opin Psychiatry* 2007; **20**: 121–5.
2. Cuijpers P, van Straten A, Smits N, Smit F. Screening and early psychological intervention for depression in schools: systematic review and meta-analysis. *Eur Child Adolesc Psychiatry* 2006; **15**: 300–7.
3. Mihalopoulos C, Harris M, Henry L, Harrigan S, McGorry P. Is early intervention in psychosis cost-effective over the long term? *Schizophr Bull* 2009; **35**: 909–18.
4. Valmaggia LR, McCrone P, Knapp M *et al*. Economic impact of early intervention in people at high risk of psychosis. *Psychol Med* 2009; **39**: 1617–26.
5. van Os J. Is there a continuum of psychotic experiences in the general population? *Epidemiol Psichiatr Soc* 2003; **12**: 242–52.
6. van Os J, Linscott RJ, Myin-Germeys I, Delespaul P, Krabbendam L. A systematic review and meta-analysis of the psychosis continuum: evidence for a psychosis proneness-persistence-impairment model of psychotic disorder. *Psychol Med* 2009; **39**: 179–95.
7. Kendler KS, Gallagher TJ, Abelson JM. Lifetime prevalence, demographic risk factors, and diagnostic validity of nonaffective psychosis as assessed in a US community sample. The National Comorbidity Survey. *Arch Gen Psychiatry* 1996; **53**: 1022–31.
8. Yung AR, Phillips LJ, Yuen HP *et al*. Psychosis prediction: 12-month follow up of a high-risk ('prodromal') group. *Schizophr Res* 2003; **60**: 21–32.
9. Yung AR, Stanford C, Cosgrave E *et al*. Testing the Ultra High Risk (prodromal) criteria for the prediction of psychosis in a clinical sample of young people. *Schizophr Res* 2006; **84**: 57–66.
10. Hanssen M, Bak M, Bijl R, Vollebergh W, van Os J. The incidence and outcome of subclinical psychotic experiences in the general population. *Br J Clin Psychol* 2005; **44**: 181–91.
11. Poulton R, Caspi A, Moffitt TE, Cannon M, Murray R, Harrington H. Children's self-reported psychotic symptoms

and adult schizophreniform disorder: a 15-year longitudinal study. *Arch Gen Psychiatry* 2000; **57**: 1053–8.
12. Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters EE. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Arch Gen Psychiatry* 2005; **62**: 593–602.
13. Kläning U, Mortensen PB, Kyvik KO. Increased occurrence of schizophrenia and other psychiatric illnesses among twins. *Br J Psychiatry* 1996; **168**: 688–92.
14. Kläning U. Greater occurrence of schizophrenia in dizygotic but not monozygotic twins. Register-based study. *Br J Psychiatry* 1999; **175**: 407–9.
15. Kendler KS, Pedersen NL, Farahmand BY, Persson PG. The treated incidence of psychotic and affective illness in twins compared with population expectation: a study in the Swedish twin and psychiatric registries. *Psychol Med* 1996; **26**: 1135–44.
16. Kläning U, Laursen TM, Licht RW, Kyvik KO, Skytthe A, Mortensen PB. Is the risk of bipolar disorder in twins equal to the risk in singletons? A nationwide register-based study. *J Affect Disord* 2004; **81**: 141–5.
17. Nishida A, Sasaki T, Nishimura Y *et al*. Psychotic-like experiences are associated with suicidal feelings and deliberate self-harm behaviors in adolescents aged 12–15 years. *Acta Psychiatr Scand* 2010; **121**: 301–7.
18. Hides L, Lubman DI, Buckby J *et al*. The association between early cannabis use and psychotic-like experiences in a community adolescent sample. *Schizophr Res* 2009; **112**: 130–5.
19. Campbell ML, Morrison AP. The relationship between bullying, psychotic-like experiences and appraisals in 14–16-year olds. *Behav Res Ther* 2007; **45**: 1579–91.
20. National Women's Education Center. *Time Spent on Sleep by Sex and Age Group*. [Cited 30 June 2010] Available from URL: http://winet.nwec.jp/toukei/save/xls/L112020.xls
21. Nishida A, Tanii H, Nishimura Y *et al*. Associations between psychotic-like experiences and mental health status and other psychopathologies among Japanese early teens. *Schizophr Res* 2008; **99**: 125–33.
22. Kaneita Y, Ohida T, Osaki Y *et al*. Association between mental health status and sleep status among adolescents in Japan: a nationwide cross-sectional survey. *J Clin Psychiatry* 2007; **68**: 1426–35.
23. Lataster T, van Os J, Drukker M *et al*. Childhood victimisation and developmental expression of non-clinical delusional ideation and hallucinatory experiences: victimisation and non-clinical psychotic experiences. *Soc Psychiatry Psychiatr Epidemiol* 2006; **41**: 423–8.
24. Tait RJ, French DJ, Hulse GK. Validity and psychometric properties of the General Health Questionnaire-12 in young Australian adolescents. *Aust N Z J Psychiatry* 2003; **37**: 374–81.
25. Scott J, Welham J, Martin G *et al*. Demographic correlates of psychotic-like experiences in young Australian adults. *Acta Psychiatr Scand* 2008; **118**: 230–7.
26. Pulkkinen L, Vaalamo I, Hietala R, Kaprio J, Rose RJ. Peer reports of adaptive behavior in twins and singletons: is twinship a risk or an advantage? *Twin Res* 2003; **6**: 106–18.
27. Moilanen I, Linna SL, Ebeling H *et al*. Are twins' behavioural/emotional problems different from singletons. *Eur Child Adolesc Psychiatry* 1999; **8** (Suppl. 4): 62–7.
28. Thorpe K, Gardner K. Twins and their friendships: differences between monozygotic, dizygotic same-sex and dizygotic mixed-sex pairs. *Twin Res Hum Genet* 2006; **9**: 155–64.
29. Paluzny M, Abelson AG. Twins and child psychiatry. *Am J Psychiatry* 1975; **13**: 434–6.
30. Kaneita Y, Ohida T, Osaki Y *et al*. Insomnia among Japanese adolescents: a nationwide representative survey. *Sleep* 2006; **29**: 1543–50.
31. Van den Bulck J. Television viewing, computer game playing, and Internet use and self-reported time to bed and time out of bed in secondary-school children. *Sleep* 2004; **27**: 101–4.
32. Gaina A, Sekine M, Hamanishi S *et al*. Daytime sleepiness and associated factors in Japanese school children. *J Pediatr* 2007; **151**: 518–22.
33. Noland H, Price JH, Dake J, Telljohann SK. Adolescents' sleep behaviors and perceptions of sleep. *J Sch Health* 2009; **79**: 224–30.
34. Chorney DB, Detweiler MF, Morris TL, Kuhn BR. The interplay of sleep disturbance, anxiety, and depression in children. *J Pediatr Psychol* 2008; **33**: 339–48.
35. Giannotti F, Cortesi F, Sebastiani T, Ottaviano S. Circadian preference, sleep and daytime behaviour in adolescence. *J Sleep Res* 2002; **11**: 191–9.
36. Van den Bulck J. Adolescent use of mobile phones for calling and for sending text messages after lights out: results from a prospective cohort study with a one-year follow-up. *Sleep* 2007; **30**: 1220–3.
37. Biddle L, Gunnell D, Sharp D, Donovan JL. Factors influencing help seeking in mentally distressed young adults: a cross-sectional survey. *Br J Gen Pract* 2004; **54**: 248–53.
38. Nemeroff R, Levitt JM, Faul L *et al*. Establishing ongoing, early identification programs for mental health problems in our schools: a feasibility study. *J Am Acad Child Adolesc Psychiatry* 2008; **47**: 328–38.

Acta Psychiatr Scand 2010: 121: 301–307

DOI: 10.1111/j.1600-0447.2009.01439.x

ACTA PSYCHIATRICA SCANDINAVICA

Psychotic-like experiences are associated with suicidal feelings and deliberate self-harm behaviors in adolescents aged 12–15 years

Nishida A, Sasaki T, Nishimura Y, Tanii H, Hara N, Inoue K, Yamada T, Takami T, Shimodera S, Itokawa M, Asukai N, Okazaki Y. Psychotic-like experiences are associated with suicidal feelings and deliberate self-harm behaviors in adolescents aged 12–15 years.

Objective: Psychotic disorders are a significant risk factor for suicide, especially among young people. Psychotic-like experiences (PLEs) in the general population may share an etiological background with psychotic disorders. Therefore, the present study examined the association between PLEs and risk of suicide in a community sample of adolescents.
Method: Psychotic-like experiences, suicidal feelings, and self-harm behaviors were studied using a self-report questionnaire administered to 5073 Japanese adolescents. Depression and anxiety were evaluated using the 12-item General Health Questionnaire (GHQ).
Results: The presence of PLEs was significantly associated with suicidal feelings (OR = 3.1, 95% CI = 2.2–4.5) and deliberate self-harm behaviors (OR = 3.1, 95% CI = 2.0–4.8) after controlling for the effects of age, gender, GHQ-12 score, victimization, and substance use. Suicidal feelings and behaviors were more prevalent in subjects with a greater number of PLEs.
Conclusion: Psychotic-like experiences may increase the risk of suicidal problems among adolescents.

A. Nishida[1,2], T. Sasaki[3], Y. Nishimura[2], H. Tanii[2], N. Hara[2], K. Inoue[4], T. Yamada[5], T. Takami[2], S. Shimodera[6], M. Itokawa[1], N. Asukai[7], Y. Okazaki[8]

[1]Department of Schizophrenia Research, Tokyo Institute of Psychiatry, Setagaya, Tokyo, [2]Department of Psychiatry, Mie University Graduate School of Medicine, Tsu, Mie, [3]Health Service Center, University of Tokyo, Bunkyo, Tokyo, [4]Department of Public Health, Fujita Health University of Medicine, Nagoya, Aichi, [5]Clinical Research Support Center, Mie University Hospital, Tsu, Mie, [6]Department of Neuropsychiatry, Kochi Medical School, Nakanoku, Kochi, [7]Department of Social Psychiatry, Tokyo Institute of Psychiatry, Setagaya, Tokyo and [8]Department of Psychiatry, Tokyo Metropolitan Matsuzawa Hospital, Setagaya, Tokyo, Japan

Key words: psychotic-like experiences; adolescents; community sample; suicide; self-harm behaviors

Atsushi Nishida, PhD, Department of Schizophrenia Research, Tokyo Institute of Psychiatry, 2-1-8 Kamikitazawa, Setagaya, 156-8585 Tokyo, Japan.
E-mail: nishidaa@prit.go.jp

Accepted for publication June 10, 2009

Significant outcomes

- Psychotic-like experiences are associated with suicidal feelings and deliberate self-harm behaviors among adolescents aged 12–15 years.
- Suicidal feelings and deliberate self-harm behaviors are more prevalent in subjects with a greater number of psychotic-like experiences.

Limitations

- This is a cross-sectional study and subjects were recruited from public schools.
- A self-report questionnaire was used to assess the psychotic-like experiences, suicidal feelings, and self-harm behaviors.
- There was a lack of data about confounding factors, such as individual personality and family circumstances.

Introduction

Risk of suicide is significantly higher for subjects with psychotic disorders when compared to the general population (1, 2). The risk is even more pronounced during the early phase of the disorders (2, 3), with two-thirds of suicides occurring during the first 5 years after diagnosis (4, 5). As the onset of first episode of psychosis usually occurs in young people (6), the risk of suicide may be especially remarkable in young people with the disorders (7, 8).

Psychotic-like experiences (PLEs) are subclinical hallucinatory and delusional experiences. PLEs occur not only in persons with psychotic disorders but also in people in the community who may not have been clinically diagnosed with psychoses (9–11). It may be reasonable to suspect that PLEs might share an etiological background with psychotic disorders (9, 10, 12, 13). Previous epidemiologic studies have reported that PLEs were observed in more than 10% of the general population of adults (10, 11, 13). Although PLEs were originally studied in adult populations (10, 11), recent investigations suggest that PLEs may also frequently occur in children and adolescents (14–17). In longitudinal studies, PLEs in childhood and adolescence were identified as a risk factor for later psychiatric disorders and poor psychosocial outcomes (18, 19). There are few studies that have investigated the relationship of PLEs and the risk for suicide among young people in the community.

Aims of the study

The present study thus aimed to examine the associations of psychotic-like experiences (PLEs) with suicidal feelings and deliberate self-harm behaviors in a large community sample of adolescents.

Material and methods

Sample and survey procedures

In 2006, we recruited subjects (ages 12–15 years) from public junior high schools (7th–9th grade) and conducted a cross-sectional survey of psychopathologies among younger adolescents in Tsu-city, Mie Prefecture, Japan (16). Mie Prefecture is located in the central region of Japan, and Tsu-city is the prefectural capital. The total population of Tsu-city is approximately 280 000. There are 20 public junior high schools (with a total of 7127 students at the time of the survey) and attendance is compulsory, in accordance with Japanese law.

After the study was approved by the ethics committee of Mie University School of Medicine, the principal investigators (A.N. & Y.O.) approached the school principals about participation in the study. The principals then consulted with teachers and parents.

In the participating schools, the teachers were instructed on the guidelines for distribution and collection of questionnaires; then the teachers distributed the questionnaires and the envelopes to the students. The teachers also explained: i) that participation in the study was anonymous and voluntary, and ii) that strict confidentiality would be maintained. In addition, the students were asked to seal the completed questionnaire in the provided envelope. Each teacher also reported the total number of present and absent students (including those students who had been absent for more than a month) on the day of the survey. Research staff collected the sealed questionnaires at each school.

Measures

The questionnaires included items regarding the following: i) psychopathological and behavioral problems including PLEs, suicidal feelings and deliberate self-harm behaviors; ii) the Japanese version of the 12-item General Health Questionnaire (GHQ-12); and iii) other variables, including demographic characteristics. An expert in child and adolescent psychologist (N.K) and three schoolteachers (including a Japanese language teacher) from the participating schools examined the questions for age appropriate language and reading comprehension.

Psychotic-like experiences

Psychotic-like experiences were assessed using four items adopted from the schizophrenia section of the Diagnostic Interview Schedule for Children (DISC-C) (20). These items were previously used in a birth cohort study and were good predictors of schizophreniform disorder in adulthood (18). The items were as follows: i) 'Some people believe that their thoughts can be read. Have other people ever read your thoughts?' (thoughts read); ii) 'Have you ever had messages sent especially to you through the television or radio?' (special messages); iii) 'Have you ever thought that people are following you or spying on you?' (spied-upon); and iv) 'Have you ever heard voices that other people cannot hear?' (heard voices). Possible responses included: 'no', 'yes, likely' and 'yes, definitely'. We defined 'yes, definitely' as the presence of a hallucinatory and delusional experience and 'no' or 'yes, likely' as

no experience. The number of present experiences was designated as the 'total PLEs score', with a range of 0–4.

Suicidal feelings and deliberate self-harm behaviors

Questions about lifetime experiences of suicidal feelings and deliberate self-harm behaviors in the previous year were included in the questionnaire. The item I – 'Have you ever had thoughts that your life is no longer worth living?', included four possible responses ('no', 'probably no', 'possibly yes' and 'yes') (21), and the item II – 'Have you intentionally hurt yourself within the past year?', included two possible responses ('yes' or 'no').

The GHQ-12

The GHQ-12 is one of the most widely used self-report screening tools for non-psychotic psychiatric symptoms, particularly symptoms of anxiety or depression (22). The validity and reliability of the Japanese version of the GHQ-12 have been confirmed (23, 24). The GHQ was originally applied to adult populations and subsequently used and validated for younger populations (25–28). A 4-point scale with binary scoring (0011), which is known as the GHQ method, was used for each of the questions. Responses of '1' were then added together to form the total score, with a range from 0 (best possible) to 12 (worst possible).

Other variables

Suicidal problems among young populations might be affected by other confounding factors, such as victimization and substance use, as reported in previous studies (29–32). In our questionnaire, we asked the participants about the experiences of being bullied (within the past year), violence from adults in the home (within the past month), alcohol use (within the past month), and use of recreational drugs (lifetime). The items on victimization ('being bullied' and 'violence from adults in the home') were answered as 'yes' or 'no'. The items on alcohol use and use of recreational drugs were answered as 'not at all' or 'once or more than once'.

Statistical analysis

Associations between PLEs and the lifetime experience of suicidal feelings or deliberate self-harm behaviors in the previous year were analyzed using logistic regression analysis adjusted for age, sex, GHQ-12 total score, victimization ('being bullied' and 'violence from adults in the home') and substance use (alcohol use and use of recreational drugs). 'Suicidal feelings' or 'deliberate self-harm behaviors' were the dependent variables.

Associations between each of the four PLEs (thoughts read, special messages, spied-upon, heard voices), and suicidal feelings or self-harm behaviors were tested by comparing individuals with each PLE to those without that type of PLEs. In addition, the effect of the total PLEs score was tested. Regarding the total PLEs score, scores of 3 and 4 were merged, and the subjects were classified into three subgroups according to Lataster et al. (33): 'no PLEs', '1 PLE' and '2 or more PLEs' groups. For the item about suicidal feelings, the responses on a 4-point scale, were converted into binary scoring (0001) when employed as a dependent variable in logistic regression.

All statistical analyzes were conducted using the Statistical Package for Social Sciences (SPSS), version 15.0 for Windows (SPSS Japan Inc., Tokyo, Japan). A P-value < 0.05 was considered statistically significant.

Results

Descriptive statistics

Fourteen out of the 20 public junior high schools in Tsu-city, with a total of 5335 students, agreed to participate in the survey. On the day of the survey, 205 students (3.8%) were absent (57/205 were long-term absentees); 18 (0.3%) refused to participate; 16 (0.3%) submitted blank questionnaires; and 23 (0.4%) gave all 'yes' answers (apparently frivolous). There were 179 (out of 5073) questionnaires missing data for critical items (PLEs, suicidal feelings, deliberate self-harm behaviors, sex, and age). Finally, we analyzed 4894 questionnaires which represented 92.1% of all junior high school students in the 14 participating schools. The demographics included: students aged 12–15 years [2523 boys (51.6%) and 2371 girls (48.4%), age: 13.3 ± 0.9 years (mean ± SD)]. Table 1 summarizes the GHQ-12 scores for the students by grade. The mean GHQ-12 scores were higher in the upper grades (Table 1).

Prevalence of PLEs, suicidal feelings, and deliberate self-harm behaviors

The prevalence of the four PLEs was as follows: 'thoughts read' was observed in 76 subjects (1.6%), 'special messages' in 33 (0.7%), 'spied-upon' in 363 (7.4%), and 'heard voices' in 487 (10.0%). The experience of at least one type of PLE was reported by 746 (15.2%); 182 students (3.7%) experienced

two or more symptoms of PLEs. The experience of lifetime suicidal feelings was observed in 908 (18.6%; 337 boys and 571 girls), while the experience of deliberate self-harm behaviors in the previous year was reported by 250 (5.1%; 75 boys and 175 girls).

Associations between PLEs and suicidal feelings/deliberate self-harm behaviors

The effect of each of the four PLEs was analyzed by logistic regression. After controlling for age, sex, non-psychotic psychiatric symptoms (the GHQ-12 score), victimization, and substance use; suicidal feelings were significantly associated with 'thoughts read', 'spied-upon', and 'heard voices' (Table 2). Deliberate self-harm behaviors were significantly associated with 'spied-upon' and 'heard voices' (Table 3).

The total PLEs score was significantly associated with suicidal feelings and deliberate self-harm behaviors, indicating that suicidal feelings and behaviors were more prevalent in subjects with a greater number of PLEs (Tables 4 and 5).

Discussion

The current study is the first to investigate and clearly show that PLEs are significantly associated with suicide-related problems in a community sample of younger adolescents. The risk of suicidal feelings and deliberate self-harm behaviors increases when more types of PLEs are experienced. The subjects experienced two or more types

Table 1. Demographic variables, mean General Health Questionnaire (GHQ-12) scores by school grade (n = 4894: males, 2523; females, 2371)

	No. subjects			Age	GHQ-12 score	
School grade	All	Male (%)	Female (%)	Mean	Mean	SD
Grade 7	1580	831 (52.6)	749 (47.4)	12.30	2.72	2.61
Grade 8	1645	842 (51.2)	803 (48.8)	13.29	3.15	2.79
Grade 9	1669	850 (50.9)	819 (49.1)	14.31	3.70	2.93
Overall	4894	2523 (51.6)	2371 (48.4)	13.32	3.20	2.81

Table 2. Associations between suicidal feelings and psychotic-like experiences in Japanese adolescents aged 12–15 years (n = 4894)

	Lifetime prevalence of suicidal feelings*		Unadjusted odds ratio			Adjusted odds ratio‡§		
Psychotic-like experiences (PLEs)	n	%	OR†	95% CI	P-value	OR†	95% CI	P-value
Thoughts read (n = 76)	33	43.42	3.45	2.18–5.46	<0.001	2.47	1.40–4.34	0.002
Special messages (n = 33)	12	36.36	2.52	1.24–5.14	0.011	1.93	0.83–4.47	0.127
Spied-upon (n = 353)	173	47.66	4.69	3.76–5.84	<0.001	2.44	1.87–3.18	<0.001
Hearing voices (n = 487)	203	41.68	3.74	3.07–4.56	<0.001	2.26	1.79–2.87	<0.001

*The number of individuals with the lifetime experience of suicidal feelings among those with each PLE.
†Odds ratio comparing the groups with and without PLE.
‡Odds ratio adjusted forage, sex, the total score of the GHQ-12, being bullied, violence from adults in the home, alcohol use, and use of recreational drugs.
§In each section, the missing data have been excluded from the statistical analyzes.

Table 3. Associations between deliberate self-harm behaviors and psychotic-like experiences in Japanese adolescents aged 12–15 years (n = 4894)

	Prevalence of self-harm behaviors*		Unadjusted odds ratio			Adjusted odds ratio‡§		
Psychotic-like experiences (PLEs)	n	%	OR†	95% CI	P-value	OR†	95% CI	P-value
Thoughts read (n = 76)	10	13.15	2.88	1.47–5.69	0.002	1.56	0.71–3.43	0.267
Special messages (n = 33)	4	12.12	2.59	0.90–7.42	0.077	1.62	0.48–5.50	0.439
Spied-upon (n = 353)	60	16.53	4.52	3.31–6.18	<0.001	1.93	1.34–2.77	<0.001
Hearing voices (n = 487)	74	15.26	4.33	3.24 –5.78	<0.001	2.32	1.67–3.22	<0.001

*The number of individuals with the experience of deliberate self-harm behaviors in the previous year among those with each PLE.
†Odds ratio comparing the groups with and without PLE.
‡Odds ratio adjusted for age, sex, the total score of the GHQ-12, being bullied, violence from adults in the home, alcohol use, and use of recreational drugs.
§In each section, the missing data have been excluded from the statistical analyzes.

Table 4. Association between the lifetime experience of suicidal feelings and severity of psychotic-like experiences in Japanese adolescents aged 12–15 years (N = 4894)

	Lifetime prevalence of suicidal (feelings)†		Unadjusted odds ratio			Adjusted odds ratio‡§		
Psychotic-like experiences (PLEs)*	n	%	OR	95%	P-value	OR	95% CI	P-value
No symptom group (n = 4148)	602	14.51	1.00		<0.001	1.00		<0.001
1 symptom group (n = 564)	209	37.06	3.46	2.85–4.18		2.18	1.74–2.74	
2 or more –symptoms group (n = 18)	97	53.30	6.70	4.94–9.07		3.14	2.17–4.53	

*No symptom group = individuals with no PLE, 1 symptom group = individuals with one PLE, 2 or more symptoms group = individuals with two or more PLEs.
†The number of individuals with the lifetime experience of suicidal feelings.
‡Odds ratio adjusted for age, sex, the total score of the GHQ-12, being bullied, violence from adults in the home, alcohol use, and use of recreational drugs.
§In each section, the missing data have been excluded from the statistical analyses.

Table 5. Association between deliberate self-harm behaviors and severity of psychotic-like experiences in Japanese adolescents aged 12–15 years (N = 4894)

	Prevalence of self-harm behaviors†		Unadjusted odds ratio			Adjusted odds ratio‡§		
Psychotic-like experiences (PLEs)*	n	%	OR	95% CI	P-value	OR	95% CI	P-value
No symptom group (n = 4150)	150	3.62	1.00		<0.001	1.00		<0.001
1 symptom group (n = 562)	59	10.50	3.12	2.23–4.29		1.68	1.18–2.40	
2 or more symptoms group (n = 182)	41	22.53	7.75	5.28–11.38		3.06	1.96–4.78	

*No symptom group = individuals with no PLE, 1 symptom group = individuals with one PLE, 2 or more symptom group = individuals with two or more PLEs.
†The number of individuals with the experience of deliberate self-harm behaviors in the previous year.
‡Odds ratio adjusted for age, sex, the total score of the GHQ-12, being bullied, violence from adults in the home, alcohol use, and use of recreational drugs.
§In each section, the missing data have been excluded from the statistical analyses.

of PLEs were approximately three times more likely to experience suicidal feelings and self-harm behaviors than those who did not experience PLEs.

When each PLE was analyzed, the prevalence of 'heard voices' was the most frequent (10.0%), followed by 'spied-upon' (7.4%). Compared with these two PLEs, 'thoughts read' and 'special messages' were much less common (1.6% and 0.7%). 'Spied-upon' and 'heard voices' were significantly associated with both suicidal feelings and deliberate self-harm behaviors, after controlling for confounding factors. 'Thoughts read' was significantly associated with suicidal feelings but not with deliberate self-harm behaviors, whereas 'special messages' was not significantly associated with either the feelings or the behaviors. These results suggest that 'heard voices' and 'spied-upon' could be useful markers to identify younger adolescents who are at risk for suicide-related feelings and behaviors.

The risk of suicide behaviors is significantly higher in subjects with psychosis, including schizophrenia, during the early phase of the disease (2, 8). The risk for suicide during the early stage of psychosis may be higher for those who have greater insight about their disease (3, 34). A recent study reported that such insight might begin to significantly elevate the risk of self-harm behaviors in subjects with the first episode of psychosis in the pretreatment phase (3). Insight about the unusual nature of the PLEs could increase the risk of the suicidal feelings/behaviors even for younger teenagers, because of the fear and distress associated with PLEs. Future studies about the relationship of insight and distress are needed to understand the effects.

The association between PLEs and suicidal feelings/behaviors was significant after controlling for anxiety/depression and use of substances. Thus far, psychotic disorders may have been considered less of a contributing factor in suicide in young people compared to mood disorders and substance use disorders (35, 36). In psychological autopsy studies, the information was mostly obtained from family members and other relevant people (7, 35, 36). Subclinical psychotic symptoms or signs which do not manifest in the behaviors of the subjects would be more likely to be overlooked than depression or substance misuse. In the present study, a substantial portion of the subjects with suicidal problems were suffering from PLEs; 306 out of 908 subjects with suicidal feelings (34%) and 100 out of 250 subjects with suicidal behaviors (40%) experienced one or more types of PLEs.

More attention should be focused on subclinical psychotic signs/symptoms in future studies of suicidal problems in young people.

This study had several limitations. First, we could not obtain answers from absent students. Poor mental health status and psychopathology may be more prevalent among frequent or long-term absentees. Second, because we used a self-report questionnaire, there may be more over-reporting and/or under-reporting on certain topics than there would be in an interview-based survey. For these reasons, the estimated prevalence of psychopathology might not be totally precise. Third, we did not ask the participants to give detailed descriptions about the PLEs which they experienced. Therefore, we could not identify possible discrepancies in what subjects perceived as real PLEs. Fourth, sufficient information about confounding factors such as personality (37, 38) and family circumstances (39, 40), which might be associated with suicidal problems, was not available in the present study. Finally, we used a cross-sectional survey, and therefore, we were not able to identify cause and effect relationships between PLEs and other factors. Hence, in the future, follow-up studies will be needed to investigate the nature of the chronological relationships between PLEs and other factors including suicide-related problems.

Acknowledgements

The authors would like to thank the Board of Education of Tsu-city for its cooperation and assistance in conducting this research. We are also grateful to our research assistants, in particular Mr Yu Kakimoto and Ms Reina Hojyo of Mie University, for their cooperation with the study. This research was supported by a grant-in-aid from the Research Group for Schizophrenia in Japan (Dr Atsushi Nishida). A.N. acknowledges support from the Research Group for Schizophrenia in Japan, Award for Research Excellence.

Declaration of interest

None.

References

1. Radomsky ED, Haas GL, Mann JJ, Sweeney JA. Suicidal behavior in patients with schizophrenia and other psychotic disorders. Am J Psychiatry 1999;156:1590–1595.
2. Palmer BA, Pankratz VS, Bostwick JM. The lifetime risk of suicide in schizophrenia: a reexamination. Arch Gen Psychiatry 2005;62:247–253.
3. Harvey SB, Dean K, Morgan C et al. Self-harm in first-episode psychosis. Br J Psychiatry 2008;192:178–184.
4. Copas JB, Robin A. Suicide in psychiatric in-patients. Br J Psychiatry 1982;141:503–511.
5. Harris EC, Barraclough B. Suicide as an outcome for mental disorders. A meta-analysis. Br J Psychiatry 1997;170:205–228.
6. Häfner H, An der Heiden W. Epidemiology of schizophrenia. Can J Psychiatry 1997;42:139–151.
7. Akiskal N. Suicide and mental disorders. Psychiatry Clin Neurosci (Suppl.) 1995;49:S91–S97.
8. Bertelsen M, Jeppesen P, Petersen L et al. Suicide behavior and mortality in first-episode psychosis: the OPUS trial. Br J Psychiatry (Suppl.) 2007;191:S140–S146.
9. van Os J. Is there a continuum of psychotic experiences in the general population? Epidemiol Psichiatria Soc 2003; 12:242–252.
10. Van Os J, Linscott RJ, Myin-Germeys I, Delespaul P, Krabbendam L. A systematic review and meta-analysis of the psychosis continuum: evidence for a psychosis proneness–persistence–impairment model of psychotic disorder. Psychol Med 2009;39:179–195.
11. Kendler KS, Gallagher TJ, Abelson JM. Lifetime prevalence, demographic risk factors, and diagnostic validity of nonaffective psychosis as assessed in a US community sample. The National Comorbidity Survey. Arch Gen Psychiatry 1996;53:1022–1031.
12. Johns LC, Cannon M, Singleton N et al. Prevalence and correlates of self-reported psychotic symptoms in the British population. Br J Psychiatry 2004;185:298–305.
13. Scott J, Welham J, Martin G et al. Demographic correlates of psychotic-like experiences in young Australian adults. Acta Psychiatr Scand 2008;118:230–237.
14. Laurens KR, Hodgins S, Maughan B, Murray RM, Rutter ML, Taylor EA. Community screening for psychotic-like experiences and other putative antecedents of schizophrenia in children aged 9–12 years. Schizophr Res 2007;90:130–146.
15. Laurens KR, West SA, Murray R, Hodgins S. Psychotic-like experiences and other antecedents of schizophrenia in children aged 9–12 years: a comparison of ethnic and migrant groups in the United Kingdom. Psychol Med 2008;38:1103–1111.
16. Nishida A, Tani H, Nishimura Y et al. Association between psychotic-like experiences and mental health status and other psychopathologies among Japanese early teens. Schizophr Res 2008;99:125–133.
17. Horwood J, Salvi G, Thomas K et al. IQ and non-clinical psychotic symptoms in 12-year-olds: results from the ALSPAC birth cohort. Br J Psychiatry 2008;193:185–191.
18. Poulton R, Caspi A, Moffitt TE, Cannon M, Murray R, Harrington H. Children's self-reported psychotic symptoms and adult schizophreniform disorder: a 15-year longitudinal study. Arch Gen Psychiatry 2000;57:1053–1058.
19. Dhossche D, Ferdinand R, Van der Ende J, Hofstra MB, Verhulst F. Diagnostic outcome of self-reported hallucinations in a community sample of adolescents. Psychol Med 2002;32:619–627.
20. Costello A, Edelbrock C, Kalas R, Kessler M, Klaric S. NIMH diagnostic interview schedule for children: child version. Rockville, MD: National Institute of Mental Health, 1982.
21. Paykel ES, Myers JK, Lindenthal JJ, Tanner J. Suicidal feelings in the general population: a prevalence study. Br J Psychiatry 1974;124:460–469.
22. Goldberg DP, Rickels K, Downing R, Hesbacher P. A comparison of two psychiatric screening tests. Br J Psychiatry 1976;129:61–67.
23. Fukunishi I. The assessment of the cut-off point of the General Health Questionnaire (GHQ) in the Japanese version (in Japanese). Clin Psychol 1990;3:228–234.

24. Doi Y, Minowa M. Factor structure of the 12-item General Health Questionnaire in the Japanese general adult population. Psychiatry Clin Neurosci 2003;57:379–383.
25. Radovanovic Z, Eric L. Validity of the General Health Questionnaire in a Yogoslav student population. Psychol Med 1983;13:205–207.
26. D'Arcy C, Siddique CM. Psychological distress among Canadian adolescents. Psychol Med 1984;14:615–628.
27. Arakida M, Takahashi S, Aoyagi M, Kanamori M. Examination of mental health status and related factors in junior high school students: a three-year longitudinal investigation (in Japanese). Shouni Hoken Kenkyu 2003;62:667–679.
28. Kaneita Y, Ohida T, Osaki Y et al. Association between mental health status and sleep status among adolescents in Japan: a nationwide cross-sectional survey. J Clin Psychiatry 2007;68:1426–1435.
29. Pedersen W. Does cannabis use lead to depression and suicidal behaviors? A population-based longitudinal study. Acta Psychiatr Scand 2008;118:395–403.
30. King CA, Merchant CR. Social and interpersonal factors relating to adolescent suicidality: a review of the literature. Arch Suicide Res 2008;12:181–196.
31. Swahn MH, Bossarte RM, Sullivent EE. Age of alcohol use initiation, suicidal behavior, and peer and dating violence victimization and perpetration among high-risk, seventh grade adolescents. Pediatrics 2008;121:297–305.
32. O'Connor RC, Rasmussen S, Miles J, Hawton K. Self-harm in adolescents: self-report survey in school in Scotland. Br J Psychiatry 2009;194:68–72.
33. Lataster T, van Os J, Drukker M et al. Childhood victimisation and developmental expression of non-clinical delusional ideation and hallucinatory experiences. Soc Psychiatry Psychiatr Epidemiol 2006;41:423–428.
34. Crumlish N, Whitty P, Kamali M et al. Early insight predicts depression and attempted suicide after 4 years in first-episode schizophrenia and schizophreniform disorder. Acta Psychiatr Scand 2005;112:449–455.
35. Houston K, Hawton K, Shepperd R. Suicide in young people aged 15–24: a psychological autopsy study. J Affect Disord 2001;63:159–170.
36. Shaffer D, Gould M, Fisher P et al. Psychiatric diagnosis in child and adolescent suicide. Arch Gen Psychiatry 1996;53:339–348.
37. Blasco-Fontecilla H, Baca-Garcia E, Dervic K et al. Severity of personality disorders and suicide attempt. Acta Psychiatr Scand 2009;119:149–155.
38. Portzky G, Audenaert K, Van Heeringen K. Suicide among adolescents; a psychological autopsy study of psychiatric, psychosocial and personality-related risk factors. Soc Psychiatry Psychiatr Epidemiol 2005;40:922–930.
39. Fergusson DM, Woodward LJ, Horwood LJ. Risk factors and life processes associated with the onset of suicidal behavior during adolescence and early adulthood. Psychol Med 2000;30:23–39.
40. Agerbo E, Nordentoft M, Mortensen PB. Familial, psychiatric, and socioeconomic risk factors for suicide in young people: nested case-control study. BMJ 2002;325:74.