

## Psychotic-like experiences and poor mental health status among Japanese early teens

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Epidemiological studies of psychotic-like experiences (PLEs) have reported that people who had PLEs during childhood or adolescence have higher incidences of schizophrenia spectrum disorders or other psychiatric disorders later in life than people who have not had PLEs. Previous work has shown that approximately 15% of children in the city of Tsu had PLEs. In this study, we sought to confirm the prevalence of PLEs in early teens living in Nagasaki and to elucidate the associations between PLEs and other psychopathological items. To this end, we used a self-report questionnaire to sample approximately 5,000 students (aged 12-15 years) in public junior high schools. Similar to the results of previous studies, the prevalence of PLEs was 16.4%. There was a significant association between PLEs and poor mental health status, which was estimated using a 12-item General Health Questionnaire. Moreover, after controlling for confounding factors, we found a significant association between PLEs and a lack of satisfaction with family relationships and several other psychosocial problems. These results suggest that a relatively large proportion of children with PLEs have behavioral, social, or familial problems, which may facilitate future schizophrenic symptoms.

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### Introduction

Preventive interventions for schizophrenia and other psychotic disorders have become increasingly important.<sup>1,2,3</sup> It has been reported that early identification of and intervention for the prodromal symptoms of schizophrenia and other psychotic disorders may prevent the onset of these disorders or lessen their symptoms.<sup>4,5</sup> Psychotic-like experiences (PLEs) occur in the early phases of psychotic symptoms, and they are considered to represent a non-clinical psychosis phenotype or a risk factor for psychosis.<sup>6-8</sup> Therefore, they are regarded as a critical factor for determining the prognosis of

prodromal-stage psychosis.

Large-scale epidemiological studies on PLEs have been conducted in the United Kingdom, Australia, New Zealand, the Netherlands, Japan, and other countries.<sup>9-14</sup> It was reported in a birth cohort study in New Zealand that approximately 15% of 11-year-olds have had PLEs.<sup>13</sup> Furthermore, those subjects who reported having had PLEs were more likely to be at risk for the onset of the schizophreniform disorder than age-matched subjects who did not report having had PLEs.<sup>13</sup> Other epidemiological studies have reported that PLEs in adolescents are associated with high rates of schizophreniform disorder or other mental disorders.<sup>9,13,15-17</sup>

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As such, adolescents with PLEs can be considered to represent a population with a high propensity for psychopathology and the onset of psychosis.

In Japan, Nishida et al.<sup>12</sup> conducted a large-scale epidemiological study that examined the prevalence of PLEs and the relationship between PLEs and psychopathologies in approximately 5,200 children (aged 12-15 years) in Tsu (ESPAT: Epidemiological Study of Psychopathology of Adolescents in Tsu). The results showed that approximately 15% of these children have had PLEs. Moreover, these PLEs were significantly related to poor mental health status and other psychopathological problems, including impulsive violent behavior, impulsive self-mutilation, suicidal ideation, alcohol use, bulimia, and strong anxiety in classrooms.

With the exception of the ESPAT, a cross-sectional survey of PLEs in junior high schools has not been conducted anywhere in Japan. The aims of this study were to: (1) confirm the prevalence of PLEs among junior high school students in Nagasaki, Japan and (2) explore the relationship between PLEs and other psychopathologies. In this regard, we added items to the ESPAT that are related to the lack of a feeling of satisfaction, because several researchers have reported the relationship between PLEs and depressive symptoms or loss of social/school functioning.<sup>6,18-20</sup>

## Methods

### *Subjects and survey procedures*

The subjects of this study were students (aged 12-15 years) attending a public junior high school in Nagasaki. The survey was conducted from the middle to late January 2008 using an anonymous self-report questionnaire of 5,374 students at nine public junior high schools in Nagasaki. Students participated in the survey during their homeroom classes. This study was approved by the ethics committee of Nagasaki University and conducted according to approved implementation procedures. Ethical considerations included having the survey sheets submitted anonymously (individuals were not specified), having students who did not wish to participate submit blank sheets, and having the survey sheets put in envelopes before submission (school personnel could not see them). Requests were made to each individual school to conduct the surveys, and written consent for the study was obtained from each school principal. Written explanations of the study were also distributed to students and their guardians.

Every classroom teacher received the instructions and read them to each class. Accordingly, all of the students

received the same instructions before participating in the survey. Using the instruction sheet, the teachers told their classes that: (1) anonymity would be preserved, (2) students who did not wish to participate could put the blank questionnaire form into the envelope and submit it, and (3) no one at the school would see the responses of the students. The questionnaires were returned to the researchers promptly following completion at each school.

### *Measures*

The questionnaire was prepared by adding new items to the questionnaire used by Nishida et al.<sup>12</sup> We structured the questionnaire to include the following:

(a) PLEs; four items from the schizophrenia section of the Diagnostic Interview Schedule for Children (DISC-C) were used for PLEs.<sup>21</sup> (1) "Some people believe in mind reading or being psychic. Have other people ever read your mind?"; (2) "Have you ever had messages sent just to you through the television or radio?"; (3) "Have you ever thought that people are following you or spying on you?"; (4) "Have you ever heard voices other people cannot hear?". Students responded to these four items by selecting one of the following: "no," "yes, likely," and "yes, definitely." We defined "no," as no PLEs, "yes, likely," as probable PLEs, and "yes, definitely," as definite PLEs. One point was given for each response of "yes, definitely."

(b) Mental health status; Mental health status as measured by the Japanese version of the 12-item General Health Questionnaire (GHQ-12).<sup>22,23</sup> The GHQ-12 is a self-report questionnaire consisting of 12 items.<sup>22</sup> It is a screening tool used to assess mental health. The validity and reliability of the Japanese version have been fully established.<sup>23</sup> Subjects answered all 12 items using a 4-point scale, with higher scores indicating poorer mental health. The score range was 0-12, and based on previous studies those with GHQ-12 scores  $\geq 4$  were placed in the poor mental health group.<sup>12,24-26</sup>

(c) Subjective ratings of the sense of satisfaction with school and family life; In addition to the ESPAT items, we adopted the following items: "satisfaction with school life (Do you enjoy your school life?)", "satisfaction with friendships (Do you enjoy spending time with your friends?)", "satisfaction with family relationships (Do you have good family relationships?)", "satisfaction with studying (Do you enjoy studying?)". Students responded to these four items by selecting one of the following: "always", "often", "rarely", and "never".

(d) Other items; including lifestyle (alcohol consumption, smoking, and hours of watching television or using a

personal computer), victimization (being bullied or violence from adults in the home), interpersonal attitudes, attitudes towards seeking help and demographic characteristics (sex, age, grade, family structure, weight and height).

Details regarding these items have been previously described.<sup>12</sup> All new items included in this current study were described in subsection (c).

### Statistical analysis

The relationships between the prevalence of PLEs and poor mental health status were assessed by dividing the PLEs into three groups. The "no symptom" group included individuals with no definite PLEs, the "1 symptom group" included individuals with one definite PLE, and the "2 or more symptoms" group included individuals with two or more definite PLEs. Although the format for responding to each item differed, all responses within the four-point scale were converted to a binary scoring system (0011) for the analyses. Statistical analyses of the association between PLEs and each of the (c) or (d) items were individually conducted using logistic regression analysis. Subsequently, stepwise logistic regression analyses (backward selection, the P-value for a variable removal > 0.10, the P-value for variable entry < 0.05) were carried out and adjusted for all variables except GHQ-12. All statistical analyses were performed using SPSS (Statistical Package for Social Sciences) version 16.0J for Windows (SPSS Japan Inc., Tokyo). A two-tailed P-value < 0.05 was considered statistically significant.

## Results

### Demographic and clinical characteristics of the sample

The survey was conducted at all nine public junior high schools (5,374 students) to which a request to conduct the study was made. On the day of the survey, 397 (7.4%) students were absent, including 71 that had been absent for more than one month. Thirty-two students (0.6%) declined

to participate, 81 students who reported inappropriate answers were excluded, and 4864 students (90.5%) participated in the survey. The students who participated in the survey made up 35.3% of all public junior high school students in Nagasaki. Table 1 shows the mean age, sex, and family structure of each grade. The mean GHQ-12 score was 3.4, and 42.6% of respondents (2070) had a poor mental health status (GHQ-12 scores  $\geq 4$ ). The mean GHQ-12 score increased in respondents in the higher grades. The prevalence of poor mental health also increased in respondents in the higher grades (7th grade: 38.4%, 8th grade: 43.9%, 9th grade: 47.8%). In female respondents, the prevalence of poor mental health was higher in the higher grades.

### Prevalence of PLEs and association with poor mental health status

Of the four PLE items, 16.4% of students (797) responded "yes, definitely" to one or more items, which included 386 male and 435 female respondents. In addition, 4.5% (217) students responded "yes, definitely" to two or more items. Of the four PLE items, 37.7% of students (1832) responded "yes, definitely" or "yes, likely" to one or more items. The prevalence for each PLE item in order from highest to lowest was hearing voices (10.3%), being spied on (8.9%), reading thoughts (1.8%), and receiving messages (1.4%). A significant association was found between PLEs and poor mental health status (Table 2).

### Associations between PLEs and the other psychopathologies

Logistic regression analyses, unadjusted, were conducted for all items except GHQ-12 with PLEs, revealing significant associations between PLEs and most of the variables with the exception of "school grade", "family structure", "number of people one can confide in". Stepwise logistic regression analyses revealed a significant association between PLEs and several items including a lack of "satisfaction with family relationships" and other psychopathologies (Table 3).

**Table 1.** Demographic characteristics of the sample

	Number	Male	Female	Mean age	Family structure		
					With both parents	With one parent	Separated from both parents
7th grade	1610	838(52.0%)	772(48.0%)	12.81	80.40%	17.80%	1.80%
8th grade	1588	787(49.6%)	801(50.4%)	13.82	79.30%	18.60%	2.00%
9th grade	1666	804(48.3%)	862(51.7%)	14.80	78.80%	18.80%	2.40%
Overall	4864	2429(49.9%)	2435(50.1%)	13.82	79.50%	18.40%	2.10%

**Table 2.** Associations between the severity of PLEs and poor mental health status

	Prevalence of poor mental health (GHQ12 >=4)		OR	95% CI		p-value
	N	%				
<b>PLEs</b>						
No symptom group (N=3029 )	1023	33.80	1.00			
1 symptom group (N=1084)	608	56.10	2.48	2.14	2.86	<0.001
2 or more symptom group (N=751)	481	64.00	3.50	2.95	4.15	<0.001

Regression analyses were adjusted for sex and school grade

**Table 3.** Factors associated with PLEs on logistic regression analysis<sup>a,b</sup>

Variables	Parameter	Unadjusted odds ratios			Adjusted odds ratios <sup>c</sup>				
		OR	95% CI	p-value	OR	95% CI	p-value		
Sex	female / male	1.22	1.05	1.42					
School grade									
7									
8	8/ 7	0.74	0.61	0.89			0.002		
9	9/ 7	0.94	0.78	1.12			0.496		
Family structure									
Apart from parents									
With one parent	with one parent / apart from parents	0.99	0.57	1.70					
With both parent	with both parents / apart from parents	1.16	0.96	1.40					
Psychopathologies									
Strong anxiety in class	often, always / never, rarely	1.74	1.48	2.05			<0.001		
Difficulty falling a sleep	often, always / never, rarely	1.96	1.61	2.39	1.32	1.04	1.67	0.020	
Difficulty concentrating due to hypersensitivity to noises	often, always / never, rarely	2.03	1.73	2.37	0.69	0.57	0.82	<0.001	
Suicide ideation	possibly, yes / no, probably not	2.97	2.54	3.47	1.91	1.58	2.30	<0.001	
Self-harming behaviors	yes / no	2.37	1.75	3.20				<0.001	
Dieting practices	yes / no	2.46	1.99	3.05	1.65	1.29	2.13	<0.001	
Self-induced vomiting for the purpose of dieting	yes / no	2.18	1.39	3.42				0.001	
Others									
Alcohol	once or more / not at all	2.48	2.05	2.99	1.90	1.52	2.37	<0.001	
Smoking	once or more / not at all	2.42	1.53	3.85				<0.001	
Drug	once or more / not at all	1.38	1.15	1.65				0.001	
Number of people one can confide in	one or more / none	0.97	0.83	1.13				0.689	
Violence from adults in the home	yes / no	3.14	2.37	4.16	1.73	1.24	2.42	0.001	
Being bullied	yes / no	2.70	2.25	3.25	<0.001	1.89	1.52	2.35	<0.001
Bullying others	yes / no	1.81	1.51	2.18	<0.001	1.29	1.04	1.59	0.019
Being alone or with others	with others / alone	1.65	1.40	1.96	<0.001	1.28	1.06	1.55	0.012
Physically assaulting others	yes / no	1.27	1.02	1.57				0.030	
Length / day of watching TV and/or using PC (h)								<0.001	
0									
About 1 hour	about 1 hour / 0	0.86	0.70	1.07					
About 2 hours	about 2 hours / 0	1.01	0.80	1.27					
About 3 hours	about 3 hours / 0	1.10	0.85	1.44					
4 hours<	4hours< / 0	1.71	1.31	2.22				<0.001	
Irritability when exchanging e-mails	yes / no	2.78	2.20	3.51	<0.001	1.81	1.37	2.38	<0.001
Current contact with medical services	yes / no	1.69	1.40	2.05	<0.001	1.34	1.08	1.68	0.009
Satisfaction with school life	never, rarely / often, always	1.97	1.63	2.37				<0.001	
Satisfaction with studying	never, rarely / often, always	1.28	1.09	1.50				0.002	
Satisfaction with friendships	never, rarely / often, always	2.93	2.04	4.20				<0.001	
Satisfaction with family relationships	never, rarely / often, always	1.99	1.63	2.44	<0.001	1.29	1.02	1.65	0.036

<sup>a</sup> Students with PLEs, 1; Students without PLEs, 0.

<sup>b</sup> In each section, the missing data have been excluded from the statistical analyses.

<sup>c</sup> Stepwise logistic regression model.

## Discussion

### *The scope of this study*

The present report describes a self-report survey of psychological and behavioral problems in approximately 5000 students attending public junior high schools in Nagasaki. This sample size is equivalent to that of the ESPAT (2008),<sup>12</sup> and this study is one of largest junior high school-based studies related to PLEs in the world.

### *Prevalence of PLEs*

In another report that was assessed as a part of the DISC-C, Nishida et al. (2008)<sup>12</sup> reported a similar percentage (15.2%) of PLEs to this study. Poulton et al. (2000)<sup>13</sup> reported that of 761 11-year-old children 14.7% had PLEs. Lataster et al. (2006)<sup>16</sup> reported that 19.1% of children with a mean age of 14 years had PLEs. Accordingly, it seems to be a common global finding that PLEs occur in approximately 15-20% of children around the time of adolescence.

An investigation of the relationship between gender and PLEs revealed that their prevalence was higher in girls (17.7%) than in boys (15.0%), and other studies have corroborated this finding<sup>12</sup>. The underlying reasons for the higher rates of PLEs in girls are unknown, but it has been reported that girls experience hallucinations with a higher frequency than boys.<sup>9,27</sup>

### *Association between PLEs and other psychopathologies*

There was a significant correlation between poor mental health as measured by GHQ-12 and PLEs (Table 2). The subjects that had experienced two or more types of PLEs were more likely to have a poor mental health status. These results suggest that children with PLEs have emotional distress and their quality of life is worse than their peers.

We also found a significant association between PLEs and a lack of satisfaction with family relationships, which was one of the four additional items related to satisfaction. A lack of satisfaction with social activity may be related to loss of pleasure, which is one of the two most important symptoms of DSM-IV-TR Major Depressive Disorder.<sup>28</sup> Several researchers have reported that subjects who have had both depressive symptoms and PLEs are at an extremely high risk of psychosis.<sup>9,19</sup> As children may sometimes not completely recognize their depressive symptoms,<sup>29</sup> we asked our subjects about the satisfaction they felt with regard to their social lives. After controlling for other psychopathologies, the association between PLEs and a lack of satisfaction

with family relationships was significant. This is the first study of a community sample of early teens to demonstrate that PLEs are significantly associated with a lack of satisfaction with family relationships.

Stepwise logistic regression analyses revealed strong relationships between PLEs and 11 items other than a lack of satisfaction with family relationships (Table 3). These items have also been shown to be associated with PLEs in previous studies.<sup>9,10,12,14,16,30</sup>

### *Comparisons with ESPAT*

In subjects with both PLEs and poor mental health, the present results are slightly higher than those of ESPAT. These differences may be because of differences in the timing of each survey or regional differences between the cities examined.

Regarding differences in the timing of the studies, the ESPAT was conducted in July, whereas the present study was conducted in January. July in Japan is a time when summer vacation is approaching, and for many children it is one of the most exciting times of the year. In contrast, January is a time when the winter vacation has ended and a new school term has just started.

Regarding regional differences, we compared the demographics of Tsu, where the ESPAT was conducted, and Nagasaki, where the present survey was conducted. In this comparison, we focused on differences in population density.<sup>32</sup> Tsu has a population of approximately 280,000 people and an area of approximately 710 square kilometers. Nagasaki has a population of approximately 440,000 people and an area of approximately 406 square kilometers. Accordingly, Nagasaki is more than twice as densely populated as Tsu. In this regard, previous work has shown that there is a relationship between urban density and the risk of onset of psychosis.<sup>33,34</sup>

### *Limitations*

The main limitation of this study was that the survey was based on a self-report questionnaire rather than a direct interview. However, some researchers have suggested that self-reports are the most important information source for investigating behavioral and emotional problems.<sup>35,36</sup> This is because self-reports are associated with less resistance than direct interviews, especially regarding PLEs, which people generally resist discussing during interviews.<sup>27,35</sup> Furthermore, since the subjects only participated in this study once, outcome investigations or biological studies could not be

conducted. As such, longitudinal biological investigations are warranted. Finally, students that were absent on the day of the study with authorization and truant students did not participate in this survey, and these students could have PLEs, other mental health problems, or both.

## Conclusions

The present study demonstrates that approximately 16% of students report definitely having experienced at least one PLE. This percentage is slightly higher than that of ESPAT. PLEs in the early teen years were strongly correlated with poor mental health states and other psychiatric problems, including a lack of satisfaction with family relationships. Our findings suggest that early teens with PLEs may have a poor mental health status and maladjustment at home, and that they have a risk of suffering from psychotic or other psychiatric disorders in the future.

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