

# Validity and Reliability of Thai Version of Missouri Assessment of Genetics Interview for Children [Th-MAGIC] for Diagnosis of Substance Use Disorder in Children Aged 13 to 17 Years

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**Objective:** The present study aims to examine the validity and reliability of the Thai version of the Missouri Assessment of Genetics Interview for Children [Th-MAGIC] for diagnosis of substance use disorder (alcohol use and abuse/dependence and street drugs sections) in children aged 13 to 17 years.

**Materials and Methods:** The English version of the MAGIC for diagnosing substance use disorder in adolescent was translated into the Thai language and back-translated. The Th-MAGIC's content validity was tested. Thirty participants diagnosed with substance use disorders by the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision and 30 controls participants were interviewed with Th-MAGIC by a trained interviewer. Afterwards, the concurrent validity and inter-rater reliability were analyzed.

**Results:** To test the internal consistency, Cronbach's alpha coefficient for the alcohol-use section and the street drugs section were 0.93 and 0.55, respectively. The sensitivity and specificity of alcohol use section were 86.7% and 100%, respectively. The sensitivity and specificity of street drugs section were 96.7% and 100%, respectively. The kappa coefficient of inter-rater reliability of alcohol use section was 0.93 and of the street drugs section was 0.94.

**Conclusion:** The Th-MAGIC for diagnosis of substance use disorder in children age 13 to 17 has a good content and concurrent validity and inter-rater reliability. The results indicated that the Th-MAGIC can be used as a semi-structured interview for identifying substance use problems in adolescence.

**Keywords:** Validity, Reliability, Th-MAGIC, Substance use disorder

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A reliable and valid diagnostic instrument for alcohol and amphetamine use disorder in Thai children, who are vulnerable to the widespread substance problems, is needed<sup>(1-3)</sup>. The ideal instrument should be valid for assessing psychiatric information in children and adolescents, which can use in both clinical and research settings<sup>(4)</sup>. The Missouri Assessment of Genetics Interview for Children

[MAGIC] is a validated semi-structured, glossary-based diagnostic interview instrument of mental disorders for children and adolescents<sup>(5,6)</sup>. The MAGIC is used extensively for clinical and research purposes. The alcohol and street drugs sections of the MAGIC contained 34 and 21 main symptom questions, respectively. In addition, it provides probe questions to evaluate symptom severity, cluster of possible symptoms, episode-related questions, and questions on impairment of psychosocial function<sup>(5)</sup>.

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## Objective

The present study aims to test the validity and reliability of the Thai version of MAGIC

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[Th-MAGIC] for the purpose of diagnose alcohol and amphetamine-use disorder in adolescents aged 13 to 17 years.

## **Materials and Methods**

### ***Participants***

The 30 participants diagnosed with substance-use disorder (alcohol and amphetamine dependence) by psychiatrists according to the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision [DSM-IV-TR]<sup>(7)</sup> were recruited from Tulakarn Chalermprakit Hospital. In the control group, where age and gender-matched participants were recruited from Chinorotwittayalai School, all of the participants had to be between 13 to 17 years old. Individuals with communication deficit, mental retardation, and active psychotic symptoms were excluded. All participants provided their assent as well as written consent from their legally authorized representatives.

### ***Instruments and procedures***

The English version of the MAGIC for diagnosing alcohol-use and abuse/dependence section and the street drugs section in children 13 to 17 years of age was translated into Thai language by the authors and back-translated to English by a translator. The Th-MAGIC was permitted to use for evaluation of substance use problems in adolescents. The Th-MAGIC's content validity was tested by three child and adolescent psychiatrists and an expert in Humanities and Social Science. The participants were interviewed using the Th-MAGIC by trained interviewers. The trained interviewers included four clinical psychologists who trained to be skillful in examining alcohol-use and abuse/dependence sections and the street drugs section of Th-MAGIC by child and adolescent psychiatrists. The trained interviewers had practiced interviewing in a pilot group prior to the process of data collection. The trained interviewers had been blinded from the participants' diagnoses. The participants were requested not to discuss their history of substance use until interviewed by the trained interviewers. The interview contents were recorded by audio-digital recorder for another interviewer to rate the Th-MAGIC's reliability.

### ***Data analysis***

The characteristics of participants were reported as frequency. The content validity was analyzed by the average of index of content validity

(IC) among three child and adolescent psychiatrists and one expert in humanities and social science.

For the concurrent validity, a 2x2 table for each psychiatric diagnosis was constructed based on a clinical diagnosis from the Th-MAGIC and a psychiatric diagnosis as the gold standard. Sensitivity and specificity were calculated to determine the Th-MAGIC's concurrent validity. The kappa ( $\kappa$ ) statistic was used to measure agreement diagnosis between raters (inter-rater reliability).

### ***Ethical consideration***

The study was conducted with the approval of the Siriraj Institutional Review Board [SIRB], Faculty of Medicine Siriraj Hospital, Mahidol University; CoA Si. 421/2010.

## **Results**

A total number of 30 participants with substance-use disorders (25 males [83.3%] and 5 females [16.7%]) and 30 age- and gender-matched controls were recruited. The mean age was  $15.6 \pm 1.4$  years old (range 13 to 17 years). The participants with substance-use disorder had academic problems (13/30; 43.3%) and relationship problems with school instructors (6/30; 20%), while none of the control participants reported such problems (Table 1).

### ***Content validity and internal consistency***

The content validity was calculated by item coefficient (IC) from four experts. Most of the items obtained  $IC \geq 0.5$  except for three items; 1/34 item of the alcohol-use and abuse/dependence section, and 2/21 items of the street drugs section. Cronbach's alpha coefficient for the alcohol-use section and the street drugs section was 0.93 and 0.55, respectively.

### ***Inter-rater reliability***

The inter-rater reliability was analyzed from the interpretation between the blind interviewer and the data rated from the recorder. The inter-rater reliability's kappa coefficient was 0.93 for the alcohol-use section and 0.94 for the street drugs section.

### ***Concurrent validity***

When compared the Th-MAGIC's diagnosis with the diagnosis from referred psychiatrists as a gold standard, the sensitivity and specificity of the alcohol-use section were 86.7% (95% CI; 69.28 to 96.24) and 100% (95% CI; 88.43 to 100.00), respectively. The sensitivity and specificity of the street drugs section

**Table 1.** Characteristics of the participants

Characteristics	Total, n (%)	Substance use disorder, n (%)	Control, n (%)
Age (years): mean (SD)	15.58 (1.4)	16.17 (1.2)	15.00 (1.4)
Gender			
Male	50 (83.3)	25 (83.3)	25 (83.3)
Female	10 (16.7)	5 (16.7)	5 (16.7)
Nationality			
Thai	60 (100)	60 (100)	60 (100)
Current education			
Primary school (grade 1 to 6)	12 (20.0)	12 (40.0)	0 (0)
Middle school (grade 7 to 9)	34 (56.7)	17 (56.7)	17 (56.7)
High school (grade 10 to 12)	14 (23.3)	1 (3.3)	13 (43.3)
Educational problem			
Yes	13 (21.7)	13 (43.3)	0 (0)
No	47 (78.3)	17 (56.7)	30 (100.0)
Relationship problem with school instructor			
Yes	6 (10.0)	6 (20.0)	0 (0)
No	54 (90.0)	24 (80.0)	30 (100.0)
Living with			
Parents/brothers or sisters	54 (90.0)	26 (86.7)	28 (93.3)
Relative or living alone	6 (10.0)	4 (13.3)	2 (6.7)
Number of family member, n (SD)	4.9 (1.8)	4.8 (1.6)	5.1 (2.0)

**Table 2.** The validity and reliability of the Thai version of MAGIC [Th-MAGIC] for the diagnosis of alcohol and amphetamine-use disorder (street drugs session) in adolescents age 13 to 17 years

Th-MAGIC sections	Internal consistency (Cronbach's alpha coefficient)	Sensitivity	Specificity	Inter-rater reliability (Kappa coefficient)
Alcohol-use and abuse/dependence	0.93	86.7%	100%	0.93
Street drugs	0.55	96.7%	100%	0.94

were 96.7% (95% CI; 82.78 to 99.92) and 100% (95% CI; 88.43 to 100.00), respectively.

## Discussion

The results from the present study demonstrated that the Th-MAGIC showed both good content validity and an inter-rater reliability, but not in the street drugs section where the internal consistency in the Thai version was questionable (as shown in Table 2). The kappa scores of the alcohol and street drugs sections had excellent results. According to the present study, the sample sizes in the positive (substance use disorders) and the negative (normal control) groups do not reflect the actual prevalence of the substance use disorders, so the positive and

negative predicted values cannot be estimated<sup>(8)</sup>.

Substance use in adolescent is common in clinical settings and is associated with serious physical and psychosocial problems. It is important for physicians and healthcare providers to enhance their skills in early detection and brief intervention including administration of validated instruments to identify the substance use problems. The instrument selected should be valid for assessing both substance use and co-morbid psychiatric information in adolescents, which can be used in both clinical and research settings<sup>(9-12)</sup>. The Th-MAGIC have good psychometric properties that can be used for assessing the substance use problems in adolescents.

The present study had some limitations. First,

the results might not be representative of all the sections of substance use. The other sections, which included tobacco use and dependence, inhalant dependence such as glue sniffing, and marijuana, need to be validated and tested for their psychometric properties. In addition, this semi-structured interview demonstrated that the interviewers need to be trained and tested for reliability before using the instrument. Collecting data from the MAGIC should be helpful in the process of screening, diagnosing, and data collection both in epidemiological surveys to investigate the magnitude of problems and genetic studies for acquiring phenotypes<sup>(6)</sup>. To increase the accuracy of the data on substance use, obtaining data from the parents should be helpful in clinical practice and research<sup>(9)</sup>. The semi-structured interview for parents of children and adolescents is available in the MAGIC<sup>(5)</sup>.

### Conclusion

The Thai version of the MAGIC for the diagnosis of substance-use disorder in children aged 13 to 17 has good content validity and good concurrent validity when compared to DSM-IV clinical diagnosis. This instrument can be used as an important tool to identify substance-use problems in adolescents.

### What is already known on this topic?

Substance-related problems are common in adolescents. A valid and reliable diagnostic instrument for substance use disorder is needed. The Missouri Assessment of Genetics Interview for Children [MAGIC] is a semi-structured, diagnostic interview instrument of mental disorders for children and adolescents that is used for clinical and research purposes.

### What this study adds?

The Thai version of the Missouri Assessment of Genetics Interview for Children [Th-MAGIC] for diagnosis of substance-use disorder (alcohol-use and abuse/dependence and street drugs sections) in children age 13 to 17 years has good validity and reliability. The Th-MAGIC can be used as an instrument to identify substance-use problems in adolescents.

### Abbreviations

MAGIC = Missouri Assessment of Genetics Interview for children.

Th-MAGIC = Thai version of Missouri Assessment of Genetics Interview for children.

### Acknowledgements

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### Potential conflicts of interest

None.

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