Article title:

Developing a new scale to assess alexithymia-like features in Japanese youth:

Investigation of the factor structure and psychometric properties

Running Title:

Assessing alexithymia in Japanese youth

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Abstract

Background: Studies on alexithymia have been primarily targeted at adult populations. Although some recent studies on alexithymia have focused on children and young adolescents, the literature is not entirely sufficient to develop an assessment tool. The aim of this study was to develop a new scale to measure alexithymia-like features in young adolescents and to evaluate its psychometric properties. Methods: A total of 1,444 Japanese junior high school students (701 males, 743 females, aged 12-15, mean age = 13.37 years, SD = 0.98) participated in two surveys conducted at their own schools. Results: First, exploratory factor analysis (EFA) with the first survey data (n=981) demonstrated that this new scale had a unifactor structure as a result of the MAP analysis and parallel analysis. Second, confirmatory factor analysis (CFA) with the second survey data (n=463) also verified the unifactor structure of this new scale with acceptable goodness of model fit. The new scale also demonstrated modest internal consistency. Conclusions: As the correlations between this new alexithymia scale and the related variables were significantly small in accordance with our hypothesis, we could demonstrate that this new scale had acceptable reliability and construct validity and could be useful for measuring alexithymic tendency in young adolescents.

Keywords
alexithymia, children/adolescents, scale development, reliability, validity
Introduction

Alexithymia is a complex of features that refer to severe reductions in both cognitive and affective components of emotional experience\(^1\). Five features of alexithymia have been described\(^1,2\): reduced capacities for emotionalizing, fantasizing, identifying emotions, verbalizing emotions, and pensé opératoire\(^3\) or analyzing emotions. As alexithymia-like features are assumed to be common in psychosomatic patients, much of the previous research has demonstrated the relationship between alexithymia and physical and mental health problems. For example, previous research has focused on psychosomatic disorders\(^4\) and somatoform disorders\(^5\), depressive symptoms\(^6\), the link between alexithymia and childhood trauma\(^7,8\), conduct disorders\(^9\), substance use disorders\(^10\), and self-harming behaviors\(^11\). Although alexithymia can be viewed as a personality trait\(^1,6\) or state\(^13,14\), or both a state and trait phenomenon\(^10\), no firm conclusion has been reached to date. Most studies on alexithymia have focused on adults and thus it is difficult to apply the extant findings to children and adolescents.

In recent years, however, a number of studies on alexithymia have been reported with youth populations. For example, the prevalence of alexithymia in children and adolescents has been found to range from 7.3% to 29.9\(^{\%}\)\(^{15-18}\), while it is 10% in adult
populations\textsuperscript{19,20}. According to some previous studies, the younger the person, the higher the alexithymia score\textsuperscript{16,21}, while other studies have found that scores remain stable despite aging\textsuperscript{22} or increase with grade in junior high school\textsuperscript{23}. Säkkinen et al.\textsuperscript{16} claimed that the ratio of alexithymia decreased from early adolescence to middle adolescence, as the ability for emotional recognition in children and adolescents increased with age. The findings on alexithymia in the youth population are limited but, in children as in adults, alexithymia has been reported to be associated with various physical and mental health problems, such as migraines, depression, anxiety, and eating disorders\textsuperscript{24-28}.

Regarding the measurement of alexithymia, various methods have been used, including the interview-based approach, observer-based evaluation, and self-rating, with self-reported measures the most widely used assessment\textsuperscript{29}. The Toronto Alexithymia Scale (TAS-20)\textsuperscript{30,31} has been widely used with many cultures and languages and consists of three factors: difficulty identifying feelings, difficulty describing feelings, and externally-oriented thinking. Meanwhile, the Bermond-Vorst Alexithymia Questionnaire (BVAQ)\textsuperscript{32} was developed because the TAS-20 could only measure the cognitive facet of alexithymia. The BVAQ consists of two high-order factors and five sub-factors: cognitive components (verbalizing: the degree to which one is able to or inclined to describe or communicate one’s emotional reactions; identifying: the degree
to which one can identify one’s own emotions or arousal sates; and analyzing: the
degree to which one seeks cognitive explanations of one’s own emotional reactions) and
affective components (fantasizing: the degree to which one is inclined to fantasize,
imagine, and daydream; and emotionalizing: the degree to which one can be mentally
and emotionally aroused by emotion-inducing events). The BVAQ can measure both
fantasizing (lack of fantasy) and experiencing (lack of emotional experiences), which
are important aspects of alexithymia\textsuperscript{33-35}, while the TAS-20 does not measure affective
components. Both measures have been popularly used with the adult population.

On the other hand, regarding the measurement of alexithymia with the youth
population, the TAS-20 can also be used for adolescent population samples\textsuperscript{16,22}, while the
Alexithymia Questionnaire for children (AQC)\textsuperscript{36} and Alexithymia Scale for Adolescents
(ASA)\textsuperscript{23} have been developed by adapting the TAS-20 for those populations. Like the
TAS-20, both AQC and ASA also consist of three factors.

However, both the TAS-20 and AQC have only three features of alexithymia-cognitive
components, while the AQC has also been reported in terms of unstable factor structures,
such as two-factor\textsuperscript{37,38} and three-factor\textsuperscript{36}. Moreover, previous studies on the TAS-20 for
adolescents and the AQC have demonstrated that the third factor, “externally-oriented
thinking,” had low factor loadings and low reliability\textsuperscript{37,38}. On the other hand, the BVAQ
consists of five features, comprising not only alexithymia-cognitive but also affective components, which the TAS-20 and AQC do not measure, although it has been developed for adults. Based on the above, we concluded that a new scale evaluating alexithymia for children and adolescents should be developed with reference to the BVAQ.

Therefore, this study aimed to develop a new scale measuring alexithymia-like features for the youth population with reference to the BVAQ items and to evaluate the factor structure, gender differences, and psychometric properties such as reliability and validity. We hypothesized that this new scale might correlate with depressive tendencies and difficulty in recognizing others’ emotions. Meanwhile, in this study, we describe alexithymia applying to children and adolescents as “alexithymia-like features,” because alexithymia could vary due to this population’s immature emotional and cognitive development and there is a possibility for future development in this respect. No conclusion has been reached to date regarding whether alexithymia is a trait or state. That being the case, those with alexithymic tendencies as evaluated by any scale would only comprise those who have alexithymia-like features at the time of measurement, and we do not know what might happen in the future. Therefore, we called the new scale developed in this study “the Alexithymia-like Features Scale for Youth (AFS-Y).”
Methods

Participants and Procedures

Two surveys were administered to 1,444 students (701 males, 743 females, aged 12–15 years, $M = 13.37 \pm 0.98$ years) in Japanese junior high schools. We invited six junior high schools in the Kanto and Chubu regions of Japan to participate in this study, and three agreed to cooperate. The set of questionnaires (see Measures below) was distributed to students by classroom teachers at the schools. Once the students had completed the questionnaires, the teachers collected the data.

To investigate descriptive statistics and gender differences, and to explore the factor structure of the AFS-Y, we administered the first survey to 981 students (467 males and 509 females, aged 12–15 years, $M = 13.15 \pm 0.92$ years). Then, to evaluate the reproducibility of the AFS-Y’s factor structure with confirmatory factor analysis, the internal consistency and construct validity of the AFS-Y, we administered the second survey to 463 students (231 males, 232 females, aged 12–15 years, $M = 13.86 \pm 0.90$ years).

Potential participants in both surveys were excluded from the subsequent statistical analysis if any administered measures were not completed. To ensure participants’ anonymity, we did not obtain their written consent. The authors provided an information
page concerning informed consent as the cover of the set of questionnaires and participants were then informed that they could refuse to answer the questionnaire if they did not agree to participate in the study. Additionally, we also asked the classroom teachers who distributed the questionnaires to help participants, providing verbal instructions about the information page. Thus, answering the questionnaires was considered informed consent to participate.

**Ethical Approval**

The Ethics Committee of the University of Tsukuba (25-146) approved this study. The study procedures were conducted in accordance with the ethical standards of the Declaration of Helsinki.  

**Measures**

*The Alexithymia-like Features Scale for Youth (AFS-Y)*

As we developed the new scale, we referred to the BVAQ, a 40-item self-rated measurement for evaluating alexithymia that uses a five-point Likert scale. The BVAQ consists of two high-order factors and five subscales with eight items per scale: cognitive components (verbalizing, identifying, and analyzing) and affective components...
(fantasizing and experiencing). The questionnaire has been reported as having good psychometric properties\textsuperscript{32,40} and the Japanese version has already been developed\textsuperscript{41}.

When selecting items for the AFS-Y, we discussed which items of the scale were appropriate for Japanese junior high school students (aged 12 to 15 years), which items fit the study purpose, and how we should consider participants’ burden in terms of answering questionnaire items. We consulted several practicing junior high school teachers regarding the simplicity, expression, and understandability of the items until consensus had been reached. Finally, while taking some account of factor loadings demonstrated as the Japanese version of the BVAQ, we adopted 15 items (6 normal items and 9 reversed items) consisting of five subscales with 3 items per subscale.

Like the BVAQ, the five subscales of the AFS-Y are: verbalization, fantasizing, identifying, experiencing, and analyzing. Each subscale has three self-rated items that measure alexithymia-like features, which are evaluated on a four-point scale ranging from 0 (it never applies to me) to 3 (it applies to me very often). The general instruction was provided (“Please read each of the following 15 items carefully. For each item, circle the answer that applies to you the most: 3 = applies very much; 2 = mostly applies; 1 = somewhat applies; 0 = does not apply”). The sum of the items constitutes the total score, with higher scores corresponding to a higher tendency of alexithymia-like features.
Additionally, an English version of the items and instructions were prepared for this publication and were accurately translated by a Japanese translation agency with careful consideration of age-appropriate readability and simplicity.

*The Depression Self-Rating Scale for Children (DSRS-C)*

The DSRS-C comprises 18 self-rated items that measure the depressive tendencies of elementary and junior high school students for one week, with items scored on a three-point scale ranging from 0–2. The Japanese version of the DSRS-C was developed by Murata et al. and the Cronbach’s alpha coefficient has been shown as .77. In this study, two items about bullying and suicide were excluded from the surveys because the teachers who helped us were worried about any negative influence that may be caused to students by including such items. Therefore, we used 16 items of the DSRS-C, excluding the abovementioned two items. The 16-item version of the DSRS-C has been reported and included two subfactors: 1) diminished activity and enjoyment, and 2) depressive mood. We calculated the sum score of the two subfactors items separately. The higher the sum scores of each subfactor item, the higher the diminished activity and enjoyment and depressive mood.
Emotional Skills & Competence Questionnaire for Japanese junior school students (ESCQ)

The ESCQ\textsuperscript{45} is a self-rated 45-item questionnaire for assessing emotional intelligence, including three subscales: perceive and understand emotions (e.g., When I see how someone feels, I usually know what has happened to him), express and label emotions (e.g., I am able to express my emotions well), and manage and regulate emotions (e.g., When I am in a good mood, every problem seems soluble). The Japanese version of the ESCQ (J-ESCQ)\textsuperscript{46} as well as the 28-item version of the J-ESCQ for junior high school students\textsuperscript{47} have already been developed. We only used the subscale “perceiving and understanding others’ emotions (PUOE)” of the J-ESCQ for junior high school students. This subscale evaluates the tendency to perceive and understand others, such as friends, and the Cronbach’s alpha coefficient was shown as .84\textsuperscript{47}. The subscale has eight items scored on a four-point scale ranging from 1 to 4. The sum of all items constitutes the total score, with higher scores corresponding to higher perceiving and understanding of others’ emotions.

Statistical Analysis

Descriptive Statistics
We calculated the mean scores, standard deviations, and skewness/kurtosis statistics for each item of this new scale with the first survey data.

**Factor Structure, Item Response Theory, and gender/grade differences**

To evaluate the factor structure of the AFS-Y, we first performed an exploratory factor analysis (EFA) to explore the factor structure with the first survey data. We also calculated item-parameter and test information functions using item response theory (IRT), followed by a confirmatory factor analysis (CFA) to verify and reproduce the factor structure of the AFS-Y with the second survey data, using the principal axis factoring as an extraction method. Each correlation matrix for the AFS-Y was subjected to EFA and CFA. We decided on the number of factors using Minimum Average Partial (MAP) analysis and parallel analysis when performing the EFA. With respect to the benchmarks of factor loading, our intention was to be inclusive by over .35. Additionally, a two-way ANOVA was performed to investigate the gender/grade differences of the scale with the second survey data.

**Reliability**

To evaluate the reliability as the internal consistency of AFS-Y, the Cronbach’s alpha coefficients were computed with the second survey data. An alpha value of more than .70 is widely accepted as reflecting adequate reliability.
**Validity**

The Pearson's correlation coefficients between the total score of AFS-Y and the other targeted variables (the DSRS-C and PUOE) were computed. We proposed the hypothesis that the higher the AFS-Y scores, the higher the depressive tendencies and the lower the level of perceiving and understanding others’ emotions would be.

The EFA and IRT were conducted using HAD15.0, CFA was calculated by Mplus 8.1, and the other statistical analyses were conducted using IBM SPSS Statistics, version 26.

**Results**

**Descriptive Statistics and Factor Structure**

The descriptive statistics of all items of the AFS-Y are shown in Table 1, including the mean score, standard deviation, and skewness/kurtosis of each item. All items were within the recommended range (+/-2) for skewness and kurtosis.

**Insert Table 1 about here.**

From the first survey data, the AFS-Y’s item properties were investigated and some floor
effect was observed (items #11, 12, 14). Then, using the remaining items, we conducted Minimum Average Partial (MAP) analysis to determine the factor structure of the AFS-Y. The item correlation matrix was determined to be 0.028, 0.047, 0.073, and 1.097… suggesting a unifactor solution. We also executed parallel analysis, which indicated that the AFS-Y would also have a unifactor structure. Based on these analyses, EFA was conducted and some items (items #8, 9, 10) showed low communality. With the exception of these items, AFS-Y’s factor structure was determined (Table 2). Moreover, we conducted IRT, and Table 3 shows both the results of the discrimination parameters (a) and threshold (difficulty) parameters (b1, b2, b3), which means that all items in the AFS-Y were adequately discriminative and all items were neither too easy nor too difficult.

**Insert Tables 2 and 3 about here.**

We also performed CFA to confirm the unifactor structure of the AFS-Y and calculated the fit indices using the second survey data. Covariance lines were drawn between the error terms for both item 1 and item 6, and item 3 and item 13. The result demonstrated the following fit indices of the unifactor model: comparative fit index (CFI) was .89, standardized root mean square residual (SRMR) was .05, and root mean square error of
approximation (RMSEA) was .08 [95% confidence interval (CI): .07–.10]. The result of CFA is shown in Figure 1.

**Insert Figure 1 about here.**

Additionally, when we conducted a two-way ANOVA to investigate the gender and grade differences in the total of nine items of the AFS-Y (Table 4), the significant main effect of gender was only shown as boys ($M = 12.37, SD = 4.89, 95\% CI = [11.74, 13.01]$) displaying more alexithymia than girls ($M = 10.66, SD = 4.80, 95\% CI = [10.04, 11.28]$) in the AFS-Y ($F(1, 456) = 14.09, p<.001, \eta^2 = .03$).

**Insert Table 4 about here.**

**Reliability**

We calculated the alpha coefficients for evaluating the internal consistency of the AFS-Y including nine items. The alpha was .88.

**Validity**

To evaluate the construct validity of the AFS-Y, we calculated the correlations between
the AFS-Y and the targeted variables (Table 5). As we hypothesized, the AFS-Y was small but positively significantly correlated with the diminished activity and enjoyment. Furthermore, there was significant negative moderate correlation between the AFS-Y and PUOE, but no correlation with depressive mood.

**Insert Table 5 about here.**

**Discussion**

This study has demonstrated that the AFS-Y is a utilizable measurement for Japanese youth’s alexithymia-like features and has good or acceptable psychometric properties. There was no distortion of each item of the AFS-Y; however, this new scale has a single factor structure and six items were excluded as a result of the EFA. The BVAQ consists of two high-order factors and five subfactors, but not all studies have replicated the factor structure\(^{51,52}\). Regarding the factor structure, several previous studies have reported the structure of the AQC, but the structure has not been stable in all studies\(^ {38}\).

All six excluded items comprised normal items, which means alexithymic, while nine adopted items of the AFS-Y comprised reversed items, meaning non-alexithymic.

Recent research has reported that a self-reported scale with reversed-scored items is
problematic because it tends to increase the cognitive burden on the examinee, produces a method factor within the scale’s factor structure, and decreases internal consistency. This means that reversed items should not be used in the scale and as a result, the AFS-Y does not include such items. Additionally, though six items were excluded throughout the abovementioned process, we confirmed that the IRT demonstrated adequate psychometric properties of the AFS-Y. However, the nine items adopted, which were non-alexithymic, were originally intended to be reversed-scored items and thus the user must now reverse the item score, which might be slightly burdensome.

Regarding gender differences of the AFS-Y, in this study, boys demonstrated more alexithymia than girls, which is consistent with the finding for the adult population. On the other hand, another finding with junior high school students reported that girls had greater difficulty than boys identifying feelings (i.e., identifying on the BVAQ) and describing feelings (i.e., verbalizing on the BVAQ), while boys showed higher externally-oriented thinking (i.e., analyzing on the BVAQ). A previous study reports that the differences in alexithymia in the young population had mixed results.

In terms of reliability, the AFS-Y has modest internal consistency. In this study, however, we did not investigate the test-retest reliability. Although research regarding
whether alexithymia is a trait or state is at present unclear, we cannot currently
demonstrate whether the alexithymic features measured by the AFS-Y comprise a trait or
state scale. Some previous studies have demonstrated that alexithymia reflects as a stable
trait, not only with adult populations but also late adolescents\textsuperscript{54}. Previous research has
also reported that the teenage population had higher alexithymia scores than other
generations\textsuperscript{21}. Additionally, Säkkinen et al.\textsuperscript{16} mentioned that adolescence is a significant
developmental period emotionally, psychologically, and socially, and the alexithymia
tendency could decrease between early and late adolescence due to increasing recognition
of emotions. Thus, we avoided calling young adolescents in this study alexithymic and
instead referred to “alexithymia-like features” due to the possibility that they are in a
process of emotional development. Although no difference was found among the grades
in this study, further studies are necessary to evaluate the test-retest reliability and whether
alexithymia-like features measured by this new scale comprise a trait or state.

Considering the validity of the AFS-Y, the AFS-Y scores demonstrated a correlation
with the targeted variables, depressive tendencies and perceiving and understanding
other’s emotions, as we hypothesized. Therefore, we concluded that the construct validity
of the AFS-Y is partially supported by these findings. An interesting point is that the AFS-
Y scores positively correlated with the diminished activity and enjoyment of the DSRS-
C, but not the depressive mood. Jellesma et al. mentioned that a potential problem is that self-reports provide information about an individual’s subjective perception, but fail to provide information about actual abilities. Alexithymic individuals are believed to have difficulties in describing and identifying their own emotions. There is a possibility that young adolescents, who could be alexithymic, could misread the items of depressive mood (for example, “I feel so sad I can hardly stand it” or “I feel very bored”) or fail to recognize whether they match the content of each item. Additionally, Saarni explained that the seven emotion management skills and awareness of own emotions, which is the ability to identify and label internal emotional experiences, comprise a fundamental first skill for processing and handling emotions. To initiate effective emotion regulation strategies, people must first recognize the presence of a distinct aversive emotional state that needs to be regulated. Saarni also demonstrated that people can obtain the second skill of understanding others’ emotions after first obtaining an awareness of own emotions or simultaneously. This means that people who do not recognize their own emotions are unlikely to discern and understand others’ emotions, as we hypothesized. Based on our study results, the construct validity of the AFS-Y is partially supported, but we only evaluated the correlations between the AFS-Y and two variables. Further studies concerning the correlations with external criteria are required in order to further evaluate
the validity of the scale.

The results above demonstrate that the AFS-Y reflects young adolescents’ alexithymia-like features and also demonstrates that these findings targeted at youths are consistent with the results from previous studies, although almost all previous studies on alexithymia targeted adults (over 18 years old). To be sure, a self-reported scale is limited in terms of the gap between an individual’s subjective perception and actual abilities (e.g., Jellesma et al.55), while the higher the AFS-Y scores are, the more diminished the activity and the lower the perceiving and understanding of others’ emotions. This might mean that young adolescents who have alexithymia-like features could develop mental health problems and interpersonal conflicts due to difficulties in understanding others’ emotions. This easy-to-use scale for evaluating alexithymia-like features with few items is expected to be useful for screening young adolescents with potential health risks.

Limitations

Firstly, this study only targeted normal junior high school students, not children in clinical care, and the surveys were conducted in a fairly limited area of Japan. Therefore, we cannot avoid or deny the possibility of selection bias, and the suitability of the scale for use with clinical samples remains unknown. Additionally, we did not evaluate the test-
retest reliability and thus cannot discuss the time stability of the scale. Finally, we did not investigate the relationship between the AFS-Y and other existing alexithymia scales for young adolescents in this study, as a criteria-related validity. Further studies concerning this scale are required for the future.

Conclusion

This study aimed to develop a new scale for assessing alexithymia-like features of junior high school students with a Japanese sample, and to evaluate the factor structure, reliability, and validity. The results indicate that this new scale has a nine-item validated single-factor structure and somewhat acceptable validity and reliability. However, the scale requires further investigation with another psychometric property, such as a clinical sample.

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Declaration of Conflicting Interests

The authors report no conflicts of interest.

Data availability statement

Not applicable because no datasets were generated or analyzed during the current study.

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Figure 1  CFA model for the ASF-Y and its standardized parameters.

Note: CFA = Confirmatory Factor Analysis; AFS-Y = the Alexithymia-like Features Scale for Youth.
Table 1. Descriptive statistics of the AFS-Y items

| No. | Item                                                                 | Mean | SD  | Skewness | Kurtosis |
|-----|----------------------------------------------------------------------|------|-----|----------|----------|
| 1   | I like to talk to everyone about my feelings.                        | 1.32 | 1.03| 0.19     | -1.11    |
| 6   | I am good at expressing my feeling in words.                         | 1.11 | 1.01| 0.52     | -0.85    |
| 11  | I have been told by people around me that I should talk about my feelings more. | 0.67 | 0.94| 1.23     | 0.41     |
| 2   | I like to imagine various things.                                     | 1.76 | 1.08| -0.31    | -1.19    |
| 7   | Before going to sleep at night, I often reflect on the day's accomplishments. | 1.03 | 1.06| 0.60     | -0.95    |
| 12  | I would rather do something else than imagining something.            | 0.89 | 0.96| 0.79     | -0.45    |
| 3   | During unpleasant times, I understand whether I am angry, sad, or scared. | 1.87 | 1.07| -0.47    | -1.06    |
| 8   | Sometimes I do not know how I am feeling.                            | 1.01 | 1.01| 0.62     | -0.77    |
| 13  | When I am irritated, I usually know why.                             | 1.80 | 1.04| -0.41    | -1.02    |
| 4   | When I see someone crying, I become sad.                             | 1.61 | 1.06| -0.18    | -1.20    |
| 9   | No matter how difficult something is, I remain calm.                 | 1.09 | 0.95| 0.49     | -0.71    |
| 14  | Even if everyone around me is happy, I remain calm.                  | 0.90 | 0.93| 0.78     | -0.30    |
| 5   | I often think about my feelings.                                      | 1.52 | 1.05| -0.03    | -1.19    |
| 10  | If something unpleasant happens, I try not to think about it as much as possible. | 1.32 | 1.06| 0.18     | -1.20    |
| 15  | If I am worried about something, I try to find the reason why.       | 1.42 | 1.09| 0.04     | -1.29    |

*Note: SD = standard deviation.*

*Note: AFS-Y = the Alexithymia-like Features Scale for Youth.*
Table 2. Factor structure of the AFS-Y

| item                                                                 | Factor | communality |
|----------------------------------------------------------------------|--------|-------------|
| 5 I often think about my feelings.                                   | .774   | .599        |
| 1 I like to talk to everyone about my feelings.                      | .723   | .522        |
| 6 I am good at expressing my feeling in words.                       | .691   | .478        |
| 3 During unpleasant times, I understand whether I am angry, sad, or scared. | .691   | .478        |
| 2 I like to imagine various things.                                  | .657   | .432        |
| 7 Before going to sleep at night, I often reflect on the day's accomplishments. | .651   | .423        |
| 4 When I see someone crying, I become sad.                           | .650   | .422        |
| 15 If I am worried about something, I try to find the reason why.    | .647   | .418        |
| 13 When I am irritated, I usually know why.                          | .567   | .322        |
| contribution                                                         | 4.095  |             |

Note: AFS-Y = the Alexithymia-like Features Scale for Youth.
| item                                                                 | discrimination | b1  | b2  | b3  |
|---------------------------------------------------------------------|----------------|-----|-----|-----|
| 1 I like to talk to everyone about my feelings.                     | 1.32           | -0.81 | 0.23 | 1.25 |
| 2 I like to imagine various things.                                 | 1.04           | -1.35 | -0.36 | 0.64 |
| 3 During unpleasant times, I understand whether I am angry, sad, or scared. | 1.17           | -1.37 | -0.52 | 0.45 |
| 4 When I see someone crying, I become sad.                         | 0.99           | -1.19 | -0.24 | 0.98 |
| 5 I often think about my feelings.                                 | 1.44           | -1.00 | -0.05 | 0.91 |
| 6 I am good at expressing my feeling in words.                      | 1.24           | -0.55 | 0.60  | 1.45 |
| 7 Before going to sleep at night, I often reflect on the day's accomplishments. | 1.06           | -0.30 | 0.65  | 1.51 |
| 13 When I am irritated, I usually know why.                        | 0.83           | -1.58 | -0.59 | 0.77 |
| 15 If I am worried about something, I try to find the reason why.   | 1.01           | -0.87 | 0.03  | 1.17 |

*Note*: b1-b3 = threshold.

*Note*: AFS-Y = the Alexithymia-like Features Scale for Youth.
Table 4. Gender and grade differences of mean scores and standard deviations of the AFS-Y

| Grade    | Mean | SD   | N  |
|----------|------|------|----|
| Male     |      |      |    |
| 1st grade| 12.11| 4.591| 71 |
| 2nd grade| 12.69| 4.919| 80 |
| 3rd grade| 12.29| 5.144| 79 |
| Total    | 12.37| 4.885| 230|
| Female   |      |      |    |
| 1st grade| 10.79| 4.911| 78 |
| 2nd grade| 10.6 | 4.802| 67 |
| 3rd grade| 10.59| 4.761| 87 |
| Total    | 10.66| 4.804| 232|
| Total    |      |      |    |
| 1st grade| 11.42| 4.79 | 149|
| 2nd grade| 11.73| 4.961| 147|
| 3rd grade| 11.4 | 5.005| 166|
| Total    | 11.51| 4.914| 462|

Note: AFS-Y = Alexithymia-like Features Scale for
Note: SD = standard deviation.
Table 5. Correlations between the subscales of the AFS-Y and the other variables

|                   | AFS-Y total | Diminished | Mood   | DSRS Total | PUOE |
|-------------------|-------------|------------|--------|------------|------|
| Diminished        | 0.354**     |            | -      |            | -    |
| Mood              | -0.084      | 0.294**    | -      |            | -    |
| Total             | 0.197**     | 0.851**    | 0.753**|            | -    |
| PUOE              | -0.527**    | -0.174**   | 0.148**| -0.037     | -    |

Note: AFS-Y = the Alexithymia-like Features Scale for Youth; DSRS-C = Depression Self-Rating Scale for Children; Diminished = the subscale for diminished activity and enjoyment of DSRS-C; Mood = the subscale for Depressive Mood of DSRS-C; Total = the total score of DSRS-C; PUOE = Perceiving and Understanding Others' Emotion.

Note: ** p < .01, * p < .05