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Elementary Schoolchildren's Perspectives in the Draw-a-Person-in-the-Rain Test: Open-Ended Items and Self-Assessment of Stress among Japanese Children

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Abstract

The purpose of this study is to investigate the relevance of self-evaluated stress levels, depict shielding elements against rain, and identify the developmental differences of features in the *Draw-a-Person-in-the-Rain* (DAPR) test. The study recruited Japanese elementary school children from the third to sixth grades (N = 202). After completing the DAPR test, the participants completed a 10-point self-rating stress scale and answered two open-ended question items about recently experienced stress, and the subsequent narratives of scenarios in their drawings. In this study, the contents of children's perceived stress were classified into 10 categories, and their relationships with the features of drawings were examined, including correspondence analysis. The results of correspondence analysis indicated relationships without protective shields (e.g., soaking wet conditions and without an umbrella) correspond to stress from family members or the environment and dissatisfaction with friends. In DAPR, a self-figure might project capacities of self-regulation, ego strength, and decreased self-centered sense with development. However, taking cultural differences into account in assessment is important, because the rate of rain gear drawing was higher than that of American elementary school students.

Keywords

Draw-a-Person-in-the-Rain Test, Drawing Rain Gear Items, Elementary School Children

1. Introduction

1.1. Mental Health Issues in Schools for Japanese Children

According to Japan's latest data, approximately 81,498 elementary school students had absenteeism of more than 30 days a year (Ministry of Education, Culture, Sports, Science and Technology, 2022). Moreover, more than 400,000 elementary students more than junior and senior high school students experienced bullying at school. In other words, elementary school students experienced difficulty in coping with daily stress effectively (Sotardi, 2016), such that adults around them should be aware of their stress and provide effective support.

Several previous studies have investigated stress factors and coping in Japanese children (Smith & Brodzinsky, 1994). For instance, Jose & Kilberg (2007) found that educational stressors increased with age and that female students experienced more stress related to peer relationships and physical and health issues than male students; however, it mentioned no gender differences in education or family issues.

In a study on effects of COVID-19 restrictions, Takeuchi et al. (2022) reported that children and older students became increasingly violently argumentative with siblings and prone to insomnia. In all countries, in fact, physical health problems (e.g., hyperactivity, overeating, game addiction) and mental health effects (e.g., fear of infection, decreased peer interaction, decreased outdoor play, buildup of frustration) have been reported in children exposed to stress due to significant changes in their daily lives (Hagihara et al., 2022; Shorer & Leibovich, 2022; Wang et al., 2020). Scholars suggest that examining important issues in school counseling, psychology, and thinking is necessary for early detection and intervention for such children and for connecting them with clinical psychological assistance.

Children's stress responses, often not easily expressed in words, should be detected as early as possible. Especially in school counseling for elementary school children, simple, easy-to-use and minimally burdensome assessment tools are crucial. Therefore, if the drawing test can be used to identify children's stress, then school counselors and teachers may be able to implement early, preventive intervention.

1.2. Draw-a-Person-in-the-Rain (DAPR) Test to Assess Stressors and Stress Coping

Human figure drawing (e.g., Draw-a-Person-test and human figure drawing), which is considered to project a self-image, depicts the self in the environment and the layers of personality covered by the self-image (Machover, 1953). Scholars have also reported that the **Draw-a-Person-test (DAP)** is useful for screening children's emotional disturbance and learning disabilities, as well as for other mental disorders in children (Garb et al., 2002; Matto et al., 2005). However, Laak et al. (2005) mentioned that the validity of Draw-a-Person-test for estimating self-image and impulsivity was insufficient. Thus, creating new version

Draw-a-Person-test test that express self-image and the coping of students with stress is considered appropriate.

To revise Draw-a-Person-test and to assess the dynamic interaction among the artist, the environment, and intellectual maturity, Fay (1924) proposed the "woman walking in the rain" test. Afterward, a person called Arnold Abram modified it into **Draw-a-Person-in-the-Rain (DAPR) test** to promote drawing without specifying gender or activity (Lichtenberg, 2014) and Hammer (1958) established it as projective test. It is usually conducted with the instruction "draw-a-person-in the rain" or "draw me in the rain" to elicit more of the self-image of the drawer. The rain depicted in the DAPR denotes stress, which cannot be appeared, and the rain gear or shelter is said to indicate coping ability. Validated for assessment of children aged 6 - 12 years, the DAPR uses rain to reflect stress and rain gear to reflect coping style (Hinz, 1994; Lichtenberg, 2014). As most children enjoy drawing, they do not resist the DAPR assessment technique, which relatively helps them express negative emotions easily (Falk, 1981; Yama, 1990; Lack, 1996). However, Lichtenberg (2014) points out the test's appropriateness for children older than seven, because younger children whose visuomotor coordination skills are not yet developed have difficulty drawing an umbrella. After examining the relationship between depression and the DAPR in adolescents, Carney (1992) argued that enhanced feelings of depression lead to a breakdown in coping with stress appropriately, as indicated by inadequate shielding against rain in DAPR. Moreover, Lack (1996)'s study involved a clinical group of children raised in severely abusive or dysfunctional families, with moderately low IQs. The study found no significant difference between stress and the Lack-SRC stress scale, although a relationship with depressive tendencies has been suggested.

1.3. Overview of Some Scoring Systems Related to the DAPR

Willis et al. (2010) used the scoring system by Krom (2002). This scale created by Krom featured the coping resource scale (measures protection through rain gear items, such as a hat and an umbrella), the stressor scale (measures about large raindrops, diagonal rain), and the Coping Balance Index, which indicates ability to cope with stress, (calculated by subtracting the stress index from the number of protective indicators). Willis et al. (2010) recruited clinical patients to examine the relationship between the Perceived Stress Scale (PSS) and Coping Resource Inventory Scale (CRIS) and DAPR. Willis et al. (2010) reported a correlation Krom's protection scale and PSS, CRIS's self-directedness scale; Krom's stressors scale and CRIS's physical health scale; and Krom's Balance scale and Krom's self-directedness. As drawing a self-figure with raingear items may indicate that the clear awareness of participants about stress, one can infer that the perception of actual stress is related to the rain shield index than with the rainfall or shape of the rain. In addition, Kravits et al. (2010) used the DAPR scoring criteria formulated by Carney (1992) to assess the effectiveness of rain shielding,

which were useful for detecting the risk of burnout for nurses. However, several researchers have pointed out the difficulties in determining the scoring criteria of the DAPR (Graves et al., 2013; Krom, 2002; Proto, 2007; Russo, 2007). For example, scholars questioned whether rain protection can be assessed if rain gear is present but not used. Further, Graves et al. (2013) collected samples of third-grade public school children in three climates in the United States and found that DAPR drawings would reflect the personality functioning. They calculated three scales of the Lack-Stress, Resource, and Coping Scoring System (Lack-SRC) (Lack, 1996), namely, stress, resource, and coping capacity, which were scored by the amount and shape of rain, among others, in the Great Plains having higher mean scored than the Pacific West Coast and Rocky Mountain regions on the stress scale. This was despite the fact that Grate Plains has dry climate with low rainfall. An additional challenge is that the DAPR scoring system varies across research studies, making comparing results difficult.

1.4. Overview of DAPR Research in Asian Countries

In Japan, it is almost universally agreed that rain measures significantly indicate an artist's ability to cope with stress. Though, in a review of DAPR studies in Japan, Hirota et al. (2022) noted that the test's interpretive indices are not unified. They also noted that some researchers consider rain to represent hypersensitivity to stress or a stress response (Ogata, 2017), and that the amount and intensity of rain may indicate assertiveness or aggression. Most studies have focused on college students or juvenile delinquents, and not enough developmental research has been conducted to determine the age at which the test is valid. In South Korea, a study investigated the relationship between the cohesiveness of army soldiers and the DAPR index, by examining the Lack-SRC score (Lack, 1996), resiliency, and adjustment to military life and soldiers' unit cohesion (Jue & Ha, 2019; Jue et al., 2020). As to scoring metrics for stress cognition, in the People's Republic of China, Li et al. (2021) developed software to capture DAPR drawings in an image and then accurately read the amount of rain, distance between raindrops, length of the raindrops and the area covered by rain. Thus, scholars demonstrated moderate correlations with the stress response scale developed in China in amount of rain, distance between raindrops and area of rain.

Recently, La Voy et al. (2001) compared cultural differences of figure drawings' characteristics between Japanese and American children. Compared to American children, Japanese children drew more large-bodied, detailed, and fewer smiling figures. Due to differences in drawing techniques, possibly, development of DAPR drawing characteristics in Japanese children differs from previous research on DAPR in America and Asia. Therefore, using A4 paper for DAPR and the Lack-SRC scoring system is appropriate for comparative study, because they were used as a scoring system in Asian and American research. Additionally, for considering development of the technical ability to draw imaginary content (Lichtenberg, 2014), investigating correlation between children's

development stages and the DAPR's validity is important.

1.5. Objectives and Hypotheses of the Present Study

De Los Reyes & Kazdin (2005) and Gresham et al. (2018) found a discrepancy between informant (e.g., teachers, and parents) and child self-assessment when assessing mental health problems and social-emotional skills. Stress information obtained from open-ended question, which is qualitative data, instead of being obtained from rating scales that provide limited information, can be said to genuinely reflect the actual situation. In brief, however, using a simplified stress scale is advantageous for children's self-assessment. Here, we focus on the relationship between the children's self-rating of their stress, data from open-ended questions, and post-drawing questions.

The DAPR should be necessary not only for the detection and treatment of mental disorders in children and adolescents, but also for the assessment of the mental health, stress status, and coping skills of children. Moreover, testing the validity of a common scoring systems in drawing studies is necessary for producing generate additional reliable evidence (Flanagan & Motta, 2007). Lack (1996)'s research targeted children who had experienced severe abuse (e.g. sexual abuse, physical abuse). Among these children from severe environments, no difference was detected in drawing scores depending on the presence or absence of specific stressful life events. Therefore, it is necessary to examine whether nonclinical children's awareness of daily stress is reflected in their drawings.

The objectives of the current study are to compare the drawing characteristics of the DAPR of Japanese elementary school children by grade level and to examine corresponding relationships between the types of perceived, and self-assessed stress and drawing characteristics. In addition, we use the same scoring system as that in previous studies and examine differences using overseas data. Hence, we used the Lack-SRC and the Japanese version of the rain shelter effectiveness scoring sheet. Metin & Aral (2020) stated that drawing reflects developmental changes in elementary school children, regardless of the inverse of intellectual ability, which indicates that characterizing developmental changes in the DAPR would be interpretively useful.

The study put forward the following hypotheses.

H_1 Development differences exist in the occurrence of drawing variables in the DAPR.

H_2 A relationship exist between the content of the story after the rain scene in the DAPR (e.g., the rain gets heavier and a typhoon comes) and the scores of the self-assessed stress levels of students.

H_3 The drawn rain shielding method and effective rain-shielding, raining area in the paper correspond to the perceived stress content of drawer.

In addition, we discuss whether the scores of the Lack-SRC, which is a scoring system common to previous studies, tend to be similar to those in other countries.

2. Methods

2.1. Participants

The study recruited 202 Japanese elementary school children from third to sixth graders in a school nearby Kanto region, with ages ranging from 8 to 12 years (M_{age} = 10.30, SD = 1.20). The area's average annual precipitation in Japan made it a suitable selection for the study. This school area was selected because of increasing household over years and no extreme decline in the number of children. The students and two researchers were unknown to each other, as were the classroom teacher and researchers. The participants included 107 males (M_{age} = 10.27, SD = 1.19) and 95 females (M_{age} = 10.34, SD = 1.21). In terms of grade level, 50, 42, 58, and 52 of the students are in third, fourth, fifth, and sixth graders, respectively.

2.2. Procedure

An elementary school was selected from an area in Japan with average and not extreme rainfall. It is an average public school in an urban equilibrium with a large number of children in the area. Two researchers, a male and a female, explained the purpose of the survey and its methodology to the vice-principal and principal to obtain their consent. At that time, one of the researchers held Ph D and the other held a BA in each clinical projective drawing test research degrees. Subsequently, children in the homeroom class, who provided their consent to be the part of the survey through the principal, were included in the study. The researchers discussed the ethical considerations of the method in close consultation with the principal and vice-principal. After notifying parents about the implementation of the study, parents and children who gave their consent for the survey participated in the study. On the day of the study, we obtained children's consent through their class teachers, and students from the third to sixth grades who consented (N = 204) were gathered in the lunchroom during common homeroom time. The homeroom teacher led the children to the lunchroom and also stayed at short distance from them until the end of the survey. One of the researchers distributed an A4-size Kent paper (210 mm × 297 mm) and pencils. The students were then given the following instruction from the other researcher: "The purpose of this survey is to find out how we can help you have a better school and daily experience. Would you please draw me in the rain, then please depict not stick or cartoon-like figure." The researchers also explained that evaluation of the drawing of this investigation is not related to the skills of a painter. After drawing the DAPR, the participants completed a separate questionnaire, which involved the open-ended question items for post-drawing question, recent experiences of stress, and the Self-Rating-Stress-Scales (SRSS). The survey took forty-five minutes from the start to finish. Ethical considerations were thoroughly discussed with the principals and vice-principals of the school before the survey was conducted. The survey methodology did not contravene the Declara-

tion of Helsinki. After the survey, the researchers applied for approval to the ethics committee of the affiliated university, and the study was approved (Research Ethics Board of the Human Sciences Research Section of Bunkyo University, Recognition No. 04. 08/26/22.).

2.3. Open-Ended Items and the Self-Rating Stress Scale (SRSS)

As the part of the DAPR, open-ended question items were used to describe the story after the depicted rain scenario in the DAPR, which equivalent to post-drawing questions (PDQ). It was used to assess the outlook of the respondents about the stress situation projected in the rain picture about the rain and weather (the question posed was "What happens to the rain after?"). Another open-ended question item is about recent daily stress or problems. This item consists of open-ended question items to identify the stressors of the subjects (the instructions were: "Please tell me what has been difficult or hard and painful recently"). The third item intends to measure self-assessed stress level using the 10-point SRSS to rate the degree of distress from 0 to 10 (0 = not at all painful; 10 = very painful).

2.4. Scoring

2.4.1. Japanese Rain Effect Scoring (JRES) Sheet and Self-Figure Size

Two clinical psychologists who is national license holders and three graduate students in clinical psychology rated the DAPR data by using JRES sheet and categorized textile answers of describing the story after raining in DAPR and experiencing stress by using KJ method (Kawakita, 1995). JRES sheet presented Appendix A. The scoring sheet (JRES) for the DAPR was developed on the basis of the rating items of Kida & Kato (2011), especially the criteria for rainfall protection strategies, with reference to Kravits et al. (2010), which have been suggested related to coping strategy resources. The scoring items include three elements. The first was rain clouds, the area and amount of rain in the paper, and shapes of the rain. The second was related to defense and coping, effective shielding against rain, and rain protection items. The last one pertained to the condition of puddles and the existence of blacking by pencil (Appendix A). The length and width of the largest puddle in each paper was also measured. The size of the drawn self-image was measured from foot to head height.

2.4.2. Lack-SRC (Lack, 1996)

The study also used the Lack-SRC scoring sheet (Lack, 1996) to compare the data with those of previous studies. The scoring of the Lack-SRC (Lack, 1996) stress scale is based on the presence or absence; intensity and density; and shape of rain, whether or not the figure becomes wet and standing in a puddle, and the presence or absence of clouds or lightning in the DAPR. The Lack-SRC resource scale is scored based on the drawing and appropriate use of rain gear, the drawing of rain hats and boots, whether or not the figure is smiling or not, the size of

the figure on the paper, and the drawing of the whole body of the figure. The coping capacity scale is then converted to scores on the resource scale minus the scores for the stress scale. However, similar to Graves et al. (2013), the current study decided to eliminate items R17 - R19 from the scoring system. In the case of the original scoring system of Lack (1996), we deducted points are from resource scale if the collar or sleeves of the figure are inadequately drawn (item R17), if parts of the body, such as the head, nose, mouth, eyes, neck, or hands are missing (item R18), or if the teeth are drawn (item R19). Therefore, as this study assumes that drawing an umbrella hides the head and that the drawing skills of elementary school students are underdeveloped, we omitted items R17 - 19 from the scoring.

Two researchers who were familiar with the drawing tests translated the Lack-SRC; afterward, the score ratings were conducted according to these guidelines. The rating and scoring values were adopted when those 100% agreed by all raters. To ensure inter-rater reliability, a Cohen's Kappa coefficients was used (κ = 0.99 for daily stress, κ = 0.94 - 1.00 for the JRES; κ = 0.97 for the organization of the story after the depicted rain categories). For the Lack-SRC, the Kappa coefficients reached 0.96, 0.93, and coping capacity scales, respectively. Inter-rater rank difference correlations in JRES were very high: therefore, the results indicated that inter-rater reliability is adequate. **Table 1** presents the results and the mean values of the Lack-SRC.

3. Results

3.1. Self-Assessed Stress Level and Content

Two students whose disability prevented them from responding to free-text questions in special support class were excluded from the analysis. Analysis was performed using SPSS ver.27 and SPSS Exact Tests. Cramer's V, η^2, and Cohens' d were calculated as effect sizes. Only one child resisted in drawing the picture and responding to the SRSS. The means of the SRSS were 3.77 (n = 47 SD = 3.55), 5.43 (n = 40, SD = 3.49), 4.88 (n = 57, SD = 3.10), and 5.42 (n = 52, SD = 3.08) for third, fourth, fifth, and sixth graders, respectively. The mean of all SRSS data was M = 4.87 (SD = 3.33, n = 196), and the main effect of grade was non-significant (F = 2.64, df = 3, $p < 0.051$).

Table 2 provides the responses to the PDQ and the categories of recently experienced stress (daily stress and problems) and their occurrence rates. The highest frequencies of the categories about recently experienced was "No major stress or problems" (n = 56, 27.7%), followed by "Poor academic performance and achievement" (n = 39, 19.3%) and "disease and illness injury" (n = 25, 12.4%). The categories with the highest frequencies in the responses to the open-ended question item about stories after the depicted scene as PDQ were "It will stop raining" (n = 45, 22.3%), followed by "The rain gets stronger" (n = 41, 20.3%), and "The sky will Clear, or the rainbow or sun will appear" (n = 36, 17.8%).

Table 1. DAPR inter-rater reliability analysis.

Scoring DAPR Drawing	Cohen's Kappa		
JRES	0.94 - 1.00		
PDQ categories	0.97		
Daily stress categories	0.99		
Quantitative variables DAPR	**Inter-rater rank difference correlation**		
Human figure size	1.00		
Horizontal length of the puddle	0.99		
Vertical length of the puddle	1.00		
Lack-SRC	**Cohens' Kappa**	**Mean**	**SD**
Stress scale	0.96	7.42	1.59
Resource scale	0.93	8.71	2.45
Coping capacity scale	0.93	1.29	3.05

Table 2. The response categories of free-text item to explain daily stress and each SRSS means.

Categories of stress objects	Examples of answers	n (%) of participants	SRSS Mean (SD)	Lack-SRC Mean (SD)
1) No major stress or problems, all right.	"Nothing" "All right"	56 (27.7)	1.63 (2.47)	1.39 (2.90)
2) Poor academic performance and achievement.	"It was very hard to practice Japanese Kanji." "I was very difficult to do homework."	39 (19.3)	5.56 (2.28)	1.10 (3.33)
3) Disease and illness or injury.	"Caught a cold." "I fell off my bicycle."	25 (12.4)	6.16 (2.86)	1.24 (3.18)
4) Family members or family environments.	"Family quarrels." "Being angry with elder brother."	24 (11.9)	6.46 (2.86)	0.00 (3.32)
5) Dissatisfaction with friends/classroom.	"Friends do cruel things to me." "I have been left out of the group."	16 (7.9)	6.38 (3.61)	1.13 (3.36)
6) Inferiority complex and forgetfulness or difficulty with things.	"Inability to do physical exercise." "Losing things often."	10 (5.0)	6.10 (3.14)	1.80 (1.93)
7) Temperature and Daily life.	"Fewer days off." "It is hard to tolerate because of outside cold."	10 (5.0)	5.90 (3.04)	2.30 (3.02)
8) Attending school, "I don't want to go to school."	"I don't want to go to school after the winter break." "Unable to get out of bed in the morning."	8 (4.0)	5.63 (2.77)	0.88 (2.36)
9) Stress from Lessons or club teams.	"I lost a series of games in football." "Practicing the piano."	7 (3.5)	7.14 (3.24)	2.29 (2.43)
10) Low Pocket money.	"New Year's money was low." "I'm shocking few New Year's money."	6 (3.0)	4.67 (3.27)	3.50 (2.07)
11) No response.	No response none.	1 (0.5)	-	-

We then, examined the main effect of categories of stress objects on SRSS scores. The main effect was significant ($F = 11.20$, *Kruskal-Wallis' H* = 69.72, $p < 0.000$, $\eta^2 = 0.35$). The SRSS scores were highest on "Stress from lessons or club teams", followed by "family members or environments", and "dissatisfaction with friends/classroom" (Table 2). Alternatively, the main effect of PDQ categories on SRSS was non-significant.

3.2. Facial Expression of the Figure in the DAPR and Differentiation between Grades

The students produced seven backward-facing portraits; thus, the study analyzed 194 drawings via the chi-square test. The association between the frequencies of each of the four categories of facial expression of the human figure (i.e., negative, neutral, positive, and very positive) and grade group level was significant with a large effect size ($\chi^2 = 30.32$, $df = 9$, $p < 0.01$, Cramer's $V = 0.40$). Residual analysis showed that negative ($n = 2$, grade % = 4.2%) and neutral ($n = 10$, grade % = 20.8%) expressions occurred less frequently ($p < 0.05$) and very positive was more frequent ($n = 18$, grade % = 37.5%, $p < 0.01$) for third graders compared with the other grades. For fifth graders, neutral and very positive expressions more frequently ($n = 25$, grade % = 44.6%, $p < 0.05$) and less frequently ($n = 3$, grade % = 5.4%, $p < 0.01$), respectively, compared with those of the other grades. Frequencies of under lining at the feet of the figure and upper lining above the head of the figure were non-significant by grade level.

3.3. JRES Variables of the DAPR and Differentiation between Grades

The study conducted a chi-square test to examine the frequencies of scoring drawing items depicted in the DAPR and their linkage by grade levels. The association between the frequencies of two categories (presence/absence) of rain clouds and grade levels was significant with a small effect size (in Table 3). Residual analysis demonstrated that the presence of rain had a higher than the expected rate of occurrence for the fifth graders, and the absence of rain had a higher than the expected rate of occurrence for the sixth graders. The association between the frequencies of the occurrence of the five categories of area of rain in the paper and grade level was significant. Residual analysis showed that drawings "without rain and rain drops" were more frequent for the fourth graders than those for other grades. However, only one drawing ($n = 1$, grade % = 2.4%, $p < 0.05$), and "around the human figure" was more frequent for the sixth graders, which exceeded the expected values. The association between the frequency of the occurrence of the depicted amount of rainfall category and grade level was non-significant. After excluding one drawing in which the rain was not depicted, the study conducted a chi-square analysis. The results demonstrated that the association between the frequencies of the four categories of the shapes of the rain and grade levels was significant with a median effect size. For the fourth graders,

Table 3. Frequencies JRES categories for DAPR and each grade.

Variable Categories for rain and puddles	Total n (%)	Residual analysis n (each grade %)						Upper is χ^2 under is exact test Chi-Square and Fisher's exact test		*p*-value	Cramer's V
		3th-grade		4th-grade		5th-grade					
Rain clouds								18.04	***	0.000	
Presence	90 (44.8)	25 (50.0)		16 (39.0)		36 (62.1)	**	12 (23.08)		18.32 ***	0.000	0.285
Absence	111 (55.2)	25 (50.0)		25 (61.0)		22 (37.9)	**	40 (76.92)	**			
Rain of area in the paper								24.10	*	0.015	
Without rain and rain drop	1 (0.5)	0 (0.0)		1 (2.4)	*	0 (0.0)		0 (0.0)		19.78 *	0.024	0.203
All area in the paper	129 (64.2)	32 (64.0)		30 (73.2)		36 (62.1)		31 (60.0)				
Top half area (the top of paper)	55 (27.4)	17 (34.0)		9 (22.0)		18 (31.0)		11 (19.0)				
Around the human figure	10 (5.0)	0 (0.0)		1 (2.4)		1 (1.7)		8 (13.8)	**			
Distant location from the human figure	6 (3.0)	1 (2.0)		0 (0.0)		3 (5.2)		2 (3.4)				
Amount of rain fall								14.95		0.092	
None rain and rain drop in the picture	1 (0.5)	0 (0.0)		1 (2.4)		0 (0.0)		0 (0.0)		14.74	0.061	0.157
Low	95 (47.3)	24 (48.0)		18 (43.9)		23 (39.7)		30 (57.7)				
Normal amount	77 (38.3)	18 (36.0)		20 (48.8)		27 (46.6)		12 (23.1)				
Heavy rainfall	28 (13.9)	8 (8.0)		2 (4.9)		8 (13.8)		10 (19.2)				
Shapes of rain								26.42	**	0.002	
Rain drops	60 (30.0)	19 (38.0)		21 (52.5)	**	10 (17.2)	*	10 (19.2)	*	25.27 ***	0.000	0.210
Line and dotted line	119 (59.5)	25 (50.0)		18 (45.0)	*	44 (75.9)	**	32 (61.5)				
Line and drop mixture	20 (10.0)	6 (12.0)		1 (2.5)		4 (6.9)		9 (17.3)	*			
Black coating rain	1 (0.5)	0 (0.0)		0 (0.0)		0 (0.0)		1 (1.9)				

Continued

Effectiveness of rain shielding											30.65	***	0.000		
unprotected	66 (33.2)	15 (30.0)		17 (42.5)		12 (21.1)	*	22 (42.3)			29.72	***	0.000	0.278	
low protected	62 (31.2)	28 (56.0)	**	8 (20.0)		14 (24.6)		12 (23.1)							
high protected	71 (35.7)	7 (14.0)	*	15 (37.5)		31 (54.4)	**	18 (34.6)							
Rain shielding methods for the figure															
no item	55 (27.4)	9 (18.0)		17 (41.5)	*	9 (15.5)	*	20 (38.5)	*		35.95	**	0.007	0.423	
using umbrella only	129 (64.2)	38 (76.0)	*	20 (48.8)	*	45 (77.6)	*	26 (50.0)	*		31.22	***	0.000		
umbrella and raincoat	3 (1.5)	0 (0.0)		1 (2.4)		0 (0.0)		2 (3.8)							
umbrella and raincoat and other item	3 (1.5)	0 (0.0)		1 (2.4)		0 (0.0)		2 (3.8)							
inside the room	1 (0.5)	0 (0.0)		0 (0.0)		1 (1.7)		0 (0.0)							
under the roof	2 (1.0)	0 (0.0)		2 (4.9)	*	0 (0.0)		0 (0.0)							
using raincoat only	8 (4.0)	3 (6.0)		0 (0.0)		3 (5.2)		2 (3.8)							
Puddle presence											3.42		0.945		
absence	77 (38.3)	21 (42.0)		16 (39.0)		18 (31.0)		22 (42.3)			3.54		0.948	0.130	
one	64 (31.8)	16 (32.0)		12 (29.3)		21 (36.2)		15 (28.8)							
two	31 (15.4)	7 (14.0)		7 (17.1)		11 (19.0)		6 (11.5)							
more three	29 (14.4)	6 (12.0)		6 (14.6)		8 (13.8)		9 (17.3)							
Black coating puddles by pencil											5.45		0.488		
with coating	8 (6.5)	0 (0.0)		1 (4.0)		4 (10.0)		3 (10.0)			5.42		0.487	0.148	
without coating	75 (60.5)	17 (58.6)		16 (64.0)		26 (65.0)		16 (53.3)							
puddle with rippling	41 (33.1)	12 (41.4)		8 (32.0)		10 (25.0)		11 (36.7)							

$p < 0.001$***, $p < 0.01$**, $p < 0.05$*.

the frequencies of "rain drops" were significantly higher than the other expected values, while the frequencies of "lines and dotted lines" were significantly lower than those of the expected values. For the fifth graders, the frequencies of "rain drops" were significantly lower than the expected value, the frequencies of "lines and dotted lines" were higher. Furthermore, for the sixth graders, the frequencies of "rain drops" were significantly lower than expected values, and the frequencies of "lines and drop mixture" were higher than expected values.

The association between the frequency of the occurrence of the three categories of the effectiveness of rain shielding and grade level was also significant (Table 3). In this connection, the study conducted a chi-square test except for two drawings in which no rain was present and raining down bombs look like a digital game. Residual analysis demonstrated that the frequencies "low protection" were higher than expected values for the third graders, and the frequencies of "high protection" were lower than the expected values. For the fifth graders, the frequencies of "unprotected" were lower than the expected values, and those for "high protection" were higher than the expected values.

The association between the frequency of occurrence of the seven categories for rain shielding methods for the figure and grade level was significant (Table 3), with a large effect size. Moreover, the study observed a variation in the frequency of occurrence per grade. Residual analysis illustrated that the frequency of "no item" was higher than the expected value for the fourth and sixth graders and lower than those for the fifth graders. The frequencies of "using an umbrella only" were higher than the expected values for the third and fifth grades. For the fourth and sixth grades, these frequencies were lower than the expected values. The frequencies of presence "under a roof" were higher than the expected values for fourth graders, although this occurrence was noted only two drawings.

The association between the frequencies of categories for "puddle presence" and "black coating puddles by pencil" and grade level were non-significant (Table 3). "Cloth with coating" and "Umbrella with coating" were also non-significant.

3.4. Size of Self-Figure and Differentiation between Grades of Lack-SRC

The mean of the size of the human figure in DAPR was $M = 118.29$ ($SD = 46.96$, $n = 201$), and the main effect of grade level on the size of the figure was significant ($F = 6.70$, $df = 3$, $p < 0.000$, $\eta^2 = 0.09$). Multiple comparisons indicated that the third graders produced larger figure sizes than did the fifth and sixth graders (third graders > fifth graders, $p < 0.000$; third graders > sixth graders, $p < 0.05$). The main effects of grade level on the length and width of puddles and area of puddles were non-significant. The means of the Lack-SRC scales did not indicate mean difference according to grade.

3.5. Relationship between SRSS and Drawing Categories

For each grade, we examined whether or not a difference exists in the frequency

of drawing scoring between the top 25% (high scored SRSS group) and bottom 25% (low scored SRSS group) in SRSS scores. The results revealed that no significant association exists among all frequencies of JRES drawing categories and between the high and low groups of SRSS for the third, fourth, and fifth graders. A significant association was found between the high and low score groups for SRSS and the frequency of a few drawing category variables for the sixth grades only (Table 4). The differentiation of frequencies between high and low group of SRSS for each category appeared in "shapes of rain" ($\chi^2 = 8.12$, $df = 2$, $p < 0.05$, Cramer's $V = 0.54$), "effectiveness of rain shielding" ($\chi^2 = 8.11$, $df = 2$, $p < 0.05$, Cramer's $V = 0.54$), "rain shielding method for the figure" ($\chi^2 = 8.16$, $df = 3$, $p < 0.05$, Cramer's $V = 0.54$), "puddle presence" ($\chi^2 = 12.16$, $df = 3$, $p < 0.01$, Cramer's $V = 0.66$) with large effect size. Residual analysis depicted that the 25% high score group obtained higher than occurrence rates that the expected rates for "rain drop" (shapes of rain), "unprotected" (rain shielding effectiveness)", no item" (rain shielding method), and one "puddle presence". The 25% low score group produced higher than expected occurrence rates for "lines and dotted lines" (shapes of the rain), "high protection" (rain shielding effect), "using an umbrella only" (rain shielding method), and "absence" (puddle presence).

As shown Table 4, for the sixth grader, significant differences were noted between the 25% high score and 25% low score groups for SRSS for the horizontal length of the puddle ($t = -2.38$, $p < 0.05$, Low < Hi*gh*), and three scales of the Lack-SRC, namely stress ($t = -2.19$, $p < 0.05$, Low < High), resource ($t = 2.53$, $p < 0.05$, Low > High), and coping capacity ($t = 2.77$, $p < 0.01$, Low > High). For effect size, Cohen's $d = -0.90$ for the Horizontal length of the puddle, $d = -0.80$ for the stress scale, $d = 0.96$ for the resource scale, and $d = 1.05$ for the coping capacity scale. For the third graders to fifth graders, no significant difference was found between the high and low score groups for SRSS.

3.6. Multiple Correspondence Analyses for the Categories of Stressors, Effectiveness of Shielding against Rain, and Area of Rain in Paper

Appendix B presents the cross table of the 10 reported categories about stressors

Table 4. 6th grader's difference and mean in low and high SRSS groups.

Quantitative Variable DAPR and Lack-SRC	6th graders		*t*-value	*p*-value	
	n = 15 25% Low	*n* = 13 25% High			
Human figure size	117.93 (35.35)	129.85 (30.93)	−0.94	0.355	
Vertical length of the puddle	11.87 (15.39)	21.15 (11.66)	−1.78	0.082	
Horizontal length of the puddle	19.33 (26.15)	43.62 (27.71)	−2.38	0.025	*
Stress scale	6.93 (1.17)	8.00 (1.42)	−2.19	0.038	*
Resource scale	8.73 (2.12)	6.38 (2.79)	2.53	0.018	*
Coping capacity scale	1.80 (2.70)	−1.62 (3.80)	2.77	0.010	*

$p < 0.05$*.

(except no response; $n = 2$) × three categories of effectiveness of rain shielding (except difficult to evaluate; $n = 1$: total $n = 199$), which demonstrated significance (Fisher's exact test = 35.45, $\chi^2 = 38.31$, $p < 0.004$, Cramer's $V = 0.31$). The table also presents the further multiple correspondence analyses conducted to reveal proximity between the categories and groups of variables for the clarity of the categories. The multiple correspondence analyses extracted the first and second dimensions. The first and the second dimensions have the following features: eigenvalues: 1.33 and 1.29; inertia values: 0.66 and 0.65. However, Cronbach's α was relatively small ($\alpha = 0.49$ and 0.45). The variance explanations of the first and second dimensions were 66.40% and 64.57%, respectively.

Figure 1 depicts the joint plot of the categories in which the first dimension was considered to be weak versus strong defense and the second dimension was personal versus interpersonal worries. A major group was observed near the second quadrant, which revealed drawings with low protection against rain and was related to difficulties in various aspects such as lessons or club teams, poor academic performance, and inferiority complex. One group was found in the third and fourth quadrants, which indicated relationships without protective shields (e.g., soaking wet conditions and without umbrella), which corresponded to stress from family members or environments, and dissatisfaction with friends. One group attached was observed in the first quadrant, which revealed that drawings with high protection against rain, which denotes proximity to stress from outside temperatures and daily hassles.

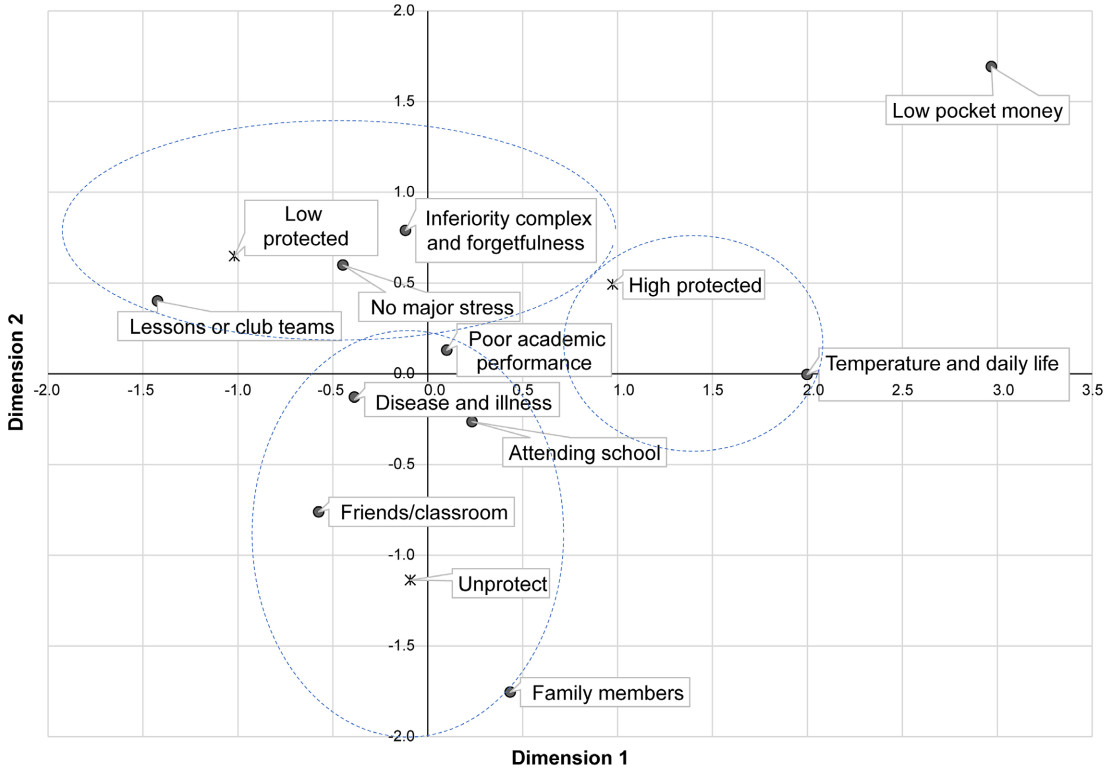

Figure 1. Joint plot of category points (effectiveness Rain shielding × stress).

In the same manner, Appendix B demonstrated the cross table of the 10 reported categories about stressors × four categories of area of rain in the paper except for two samples without rain (total $n = 200$). A chi-square test conducted this cross table and the results displayed significance (Fisher's exact test = 35.45, $\chi^2 = 54.60$, $p < 0.001$, Cramer's $V = 0.30$).

Moreover, the two-dimension extracted through multiple correspondence analyses reveal the proximity between the categories and groupings of the variables. The resulting eigenvalues were 1.44 and 1.24 and inertia values were 0.72 ($\alpha = 0.61$) and 0.12 ($\alpha = 0.39$) for the first and second dimensions, respectively. The variances explained by the first and second dimensions were 70.89% and 61.92%, respectively.

Figure 2 similarly shows the correspondence between stress categories and rain domain categories, in which the first dimension explains the daily and non-day-to-day stress, while the second dimension seemingly explains the upper and lower domains in the paper. In this plot, the study produced three mapping groups, in which the largest group is located in all quadrants, and the smallest group in a fourth quadrant. In addition, the third group was found in the first and fourth quadrants. This mapping revealed that nearly all stress categories were proximity to drawing rain on all area in the paper or the top of the paper. Furthermore, children who had inferiority complex were found to be prone to depict rain as distant from the human figure, while children who felt stressed about having little pocket money were prone to depict rain around the human figure.

Figure 2. Joint plot of category points (rain area in the paper × stress categories).

4. Discussion

4.1. Developmental Aspects of the DAPR

The present study's results partially supported H_1. It has been suggested that some of the DAPR drawing items vary in content and rate of occurrence depending on development and age. For example, the upper graders depicted not only rain drops but also a mixture of dots and lines (**Table 3**). This result was seemingly related to the improvement of the objective perception of elementary school children of the environment and reality testing. Particularly, the fact that the size of the human figure did not increase or elongate with age was noteworthy. In the current study, the size of self-figure of the third graders was the largest despite being the lowest grade. In the Kinetic School Drawing and DAP, the size of the self-figure tended to be larger with the increased in grade and age (Tanaka, 2007; Dey & Ghosh, 2016). Saneei et al. (2011) reported that the differentiation of sizes of human figure on the DAP expressions of low self-esteem and energy part of their personality. One possibility is to assume that the increase in the average value is related to field-independent scores instead of field-dependent cognition. Another possibility is that self-figure on the DAPR seemed to be a projected aspect of one's capacity for self-regulation and an adjusted self-centered sense with development. Furthermore, it suggests that the self-image in the DAPR is more related to ego strength and resilience than developmental state (Oster & Gould, 1987). In this study, the youngest group, that is, the third graders, had depicted more smiling self-images, which was similar to Kinetic School Drawings (Tanaka, 2007). This result may be due to childish positive self-expressions, and the study presumed that the elementary school children were not consciously aware of rain as a symbol of unpleasant situations or stressful environments. Previous studies on adult drawing on the DAPR, considered a smiling self-image in the DAPR to represent denial and defensive response formation to severe environmental stress (Lichtenberg, 2014). In children's drawings, it would be more appropriate to view them as expressions of infantile optimism or animism rather than as a denial of serious stress. Moreover, the appearance of high protection for the self-figure against rain was more frequent for the fifth than the third graders. The reason is that as students move up through the grades, they would not only be able to cope with stress and utilize external resources but also improve their drawing skills.

4.2. Important Indicators of the DAPR Related to Stress Perception and Coping

This study showed no significant relationship between SRSS and PDQ categories of the drawing's subsequent narratives (e.g., "It will be a storm", "A rainbow will appear"). Thus, H_2 was not supported. We expected that the narrative of a change in weather from rainy to sunny would imply that the artist trusts to the recovery of his/her own feelings. However, the elementary school students did not seem to connect their mental narratives with the changes in weather in their

drawings. Bat Or et al. (2022) examined "Person Picking an Apple from a Tree" drawings for children aged 5 - 6 years and requested them to make stories about their drawings. That result revealed that the stories of the children (e.g., "he took one leaf and an apple and then ate the apple") did not match the depicted contents (e.g., depicted person not touching any apple). Similar to this previous study, in the current study, certain degree of developmental status is seemingly required. That is, a certain need for ability to make stories that rain is an unpleasant stimulus and that it is comparable to perceived stress. The ability to tell a story of weather recovery after a depicted rainfall could be directly related to their level of resilience. Therefore, a study of middle school students and older is warranted.

Previous studies in the United States, and Asia reported that the depiction of the amount and density of rainfall and the method of rain shielding were important indicators for assessing stressors and coping with stress (Kravits et al., 2010; Li et al., 2021; Willis et al., 2010). Hirota & Hirano (2018), which conducted a study on university students, also suggested the relationship between self-rated stress, resilience, and DAPR's indicators, such as rain clouds and face of figure. The current study found that correspondences were noted between the two scoring variables, namely, areas of rain and effects of rain protection, and categories of stress object, which supported H_3 and confirmed previous studies (Carney, 1992; Jue et al., 2020; Li et al., 2021). The relationship between perceived stress, which was evaluated using SRSS and Lack-SRC scores and found only for sixth graders. From this study, using the DAPR to assess stress and stress coping for children would be more reliable for children aged 12 years and up.

We believe that it was important to divide raindrops into dot-type and teardrop-type raindrops. If elementary school students are dissatisfied with the home environment and friendship in school, then they will experience more difficulty, which leads to cope with severe stress. Since children who drew tear-shaped raindrops showed a higher level of stress awareness, it may be that raindrops in children's drawings project the tears in their hearts. As to our expectations, children who were stressed about school, friendship, and the home environment were not protected from the rain in the DAPR or depicted rain gear that were ineffective in protecting the self-figure from the rain. Moreover, likewise adult, highly self-confident children able to control their tension may be able to draw rain protection appropriately. Additionally, children who depicted rain away from the self-figure on the paper, responded that their stressor was their inferiority complex or personality. The results may be due to a few children too concentrating on their perception of their personality in their self-figure in the DAPR and drew rain at a distance from their self-image.

In addition, such as the serious worries about the family environment or school attendance, which produced high scores in the SRSS, corresponded to the fact that the depicted rain was only above the head of the self-figure or all areas in the paper. As reported by Li et al. (2021) and Hirota et al. (2022), these drawings seemed to indicate the severity of stress directly represented by the drawing

of falling rain in all areas on the paper, which may symbolize the wide and various troubles bothering these children. Then, in this study, the survey was conducted at school. Therefore, it may have influenced the children who did not like attending school to draw more wider area of raindrops. Furthermore, when stress was due to external factors (e.g., temperature and daily lifestyle), the drawings tended to depict many rain gears apart from umbrellas. Therefore, it is important to ensure children's own assessment with respect to whether they are projecting a realistic image of the outside temperature or a feeling of loneliness and coldness in their hearts. Moreover, examining the validity of rain protection, including its type, is also urgent not only because rain protection in sturdy buildings implies the flexibility to imagine rain protection other than umbrellas, but also because it might indicate a passivity that cannot cope with stress (Hirota et al., 2022). Nevertheless, it is necessary to consider that very few self-images show sheltering from the rain inside the building.

4.3. Lack-SRC and Cross-Cultural Comparison

The current study revealed that the limited variables of rain shielding effectiveness, method of rain shielding, shape of rain, and number of puddles were more sensitive to the stress and coping ability of the children than did the three scales of Lack-SRC. In this research, the existence of cultural differences displayed in three scales of Lack-SRC. Lack (1996) conducted research on children aged 7 to 11 years and revealed the means were 7.1 (SD = 3.0), 2.0 (SD = 4.0) and −5.1 (SD = 5.0) for the stress, resource, and coping capacity scales, respectively, of Lack-SRC. In a Korean study on military personnel aged 19 to 25 years, Jue et al. (2020) reported that the means of the stress, resource, and coping capacity scales of Lack-SRC were 5.06 (SD = 1.92), 2.94 (SD = 4.64), and −2.12 (SD = 5.39), respectively. In addition, Graves et al. (2013) examined the focus of elementary school students on precipitation and climate in several regions of the United States and reported that the means of the stress, resource, and coping capacity scales ranged from 8.40 to 13.05, from 7.33 to 7.81, and from −5.32 to −1.73, respectively. In the current study, the mean of the resource scale was considerably higher, and the value of the coping capacity scale was also higher compares with the results of previous studies, although the current study used the same scoring system as that of Graves et al. (2013). The values for the stress scale in the current study were close to those of the Pacific Northwest, United States (Graves et al., 2013). The cultural differences, which assumed that were existed in the details of items for rain shielding, the size of the human figure, and the drawing of the face. By the way, this survey was conducted shortly after New Year. For three days in New Year, many Japanese school children will receive allowance money from adults as a New Year's gift as per the Japanese culture. Therefore, a possibility exists that a certain amount of frequency occurred in responses of the children, including "Low pocket money" and "it is cold outside" in the open-ended question items on stress.

Typically, Japanese elementary school children own and use umbrellas and

rain boots to protect them from the rain, when going to school during the rainy as well as other seasons. A total of 64.2% of the children drew umbrella as a protection against the rain, which may reflect this tendency (**Table 3**). On the contrary, Lack (1996) reported on the frequency of presence of umbrellas (38.3%). In a study in Korea conducted on adult (Jue & Ha, 2019), the presence of umbrellas is indicative of good adjustment and resilience (34% and 37%, respectively). This large difference among nations would be crucial for establishing assessment criteria. In the United States, arts and crafts are not required for elementary school classes, whereas they are compulsory subjects in schooling in Japan. Therefore, another possibility is that the result of the study demonstrated the drawing knowledge and skills of Japanese children (Toku, 1997). Thus, conducting comparative research is necessary for determining whether or not the DAPR reflects the prevalence of rain gear ownership and familiarity with rain in other countries as well.

5. Conclusion

This study demonstrated that the wide depiction of rain on paper and effective rain gear are valid for stress assessment in elementary school children. The validity of the assessment using the DAPR could be further improved if it was applied to children in the sixth grade and above, as they may understand that acting in the presence of rain implies the uncontrollable stresses of nature. When utilizing the DAPR in educational consultation situations, changing the elements being focused on according to grade level would be desirable. For example, when conducting the DAPR in sixth graders and above, focusing on the number of "puddles" and the presence of umbrellas and other rain gear and "shapes of drop rain" would be important. By paying attention to these points, preventive intervention would be available in school counseling for children experiencing stress. Moreover, school social workers and teachers could be able to quickly find and adjust their environment.

A limitation of this study is that was unable to conduct a third-party stress assessment. Because this study was conducted with only one elementary school, its results might not correctly represent all Japanese elementary school children. Thus, examining the relationship between perceived stress and the drawing features of the DAPR using standardized stress and coping scales is evidently important. It is necessary to investigate the correspondence between the high level of aggression in the minds of the drawers and strong rainfalls (Tanji et al., 1993; Hirota et al., 2022). Furthermore, as in a previous study (Kravits et al., 2010), it remains to be investigated whether burnout and mental exhaustion in children lead to the drawing of fragile rain shelters awaits investigation. In this study, children who recognized themselves with forgetfulness and difficulty with things tended to depict insufficient protection with an umbrella. It would be worthwhile to research the relation of narrow attention, executive function and insufficient protection by using rain gears. Another major issue is to identify why a large number of children do not attend school, although umbrellas are often de-

picted in the Japanese children's DAPR.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this research and paper.

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Appendix A: JRES (Japanese Rain Effect Scoring Sheet)

Facial expression	1 negative 2 neutral 3 positive 4 much positive	Puddle	1 absence 2 one 3 two 4 more three
Size of figure	mm	Coating puddles by pencil	1 with coating 2 without coating 3 Ripple puddle 4 puddle with rippling
Rain cloud	1 presence 2 absence		
Rain depiction range	1 without rain and rain drop 2 all area in paper 3 top half area (the top of paper) 4 around the personal figure 5 distant location from the personal figure	Vertical length of puddle Horizontal length of puddle	mm mm
Amount of rain fall depicted	1 without rain and rain drop 2 low 3 normal amounts 4 heavy rainfalls	Clothing with coating	1 presence 2 absence
Shape of rain	1 rain drop 2 line and dotted line 3 line and drop mixture 4 coating black rain	Umbrella with coating	1 absence 2 presence
Effectiveness of rain shelters	1 unprotected 2 low protected 3 high protected 4 difficult to evaluate	NO Grade and class Age	
Rain sheltering methods	1 no item 2 using umbrella 3 umbrella and raincoat 4 umbrella and raincoat and other item (rain boots) 5 inside the rooms 6 under the roof 7 other or difficult to evaluate	Self-identifiable sex	1 male 2 female

Appendix B: Presents the Cross Table of the 10 Reported Categories

					(%)	residual analysis				
	Poor academic	Disease & illness	Family member	Attending SC	Friends/ class	Inferiority complex	Lesson & club	Pocket money	Temperature	All right/ no stress
Effectiveness Rain shielding × Stress categories										
Unprotected	12 (30.8)	9 (36.0)	15 (62.5)***	3 (37.5)	7 (46.7)	2 (20.0)	2 (28.6)	0 (0.0)	3 (30.0)	13 (23.6)
Low protected	12 (30.8)	9 (36.0)	2 (8.3)**	2 (25.0)	5 (33.3)	4 (40.0)	4 (57.1)	0 (0.0)	0 (0.0)*	24 (43.6)*
High protected	15 (38.5)	7 (28.0)	7 (29.2)	3 (37.5)	3 (20.0)	4 (40.0)	1 (4.3)	6 (100.0)***	7 (70.0)*	18 (32.7)
Total	39	25	24	8	15	10	7	6	10	56
Rain area in the paper × Stress categories										
All area in the paper	30 (76.9)	12 (48.0)	18 (75.0)	7 (87.5)	8 (53.3)	8 (80.0)	4 (57.1)	0 (0.0)*	5 (50.0)	37 (66.1)
Top half area (the top of paper)	9 (23.1)	11 (44.0)*	4 (16.8)	1 (12.5)	4 (26.7)	0 (0.0)*	3 (42.9)	3 (50.0)	3 (30.0)	17 (30.4)
Around the human figure	0 (0.0)	1 (4.0)	1 (4.2)	0 (0.0)	2 (13.3)	1 (10.0)	0 (0.0)	3 (50.0)*	1 (10.0)	1 (1.8)
Distant location from the human figure	0 (0.0)	1 (4.0)	1 (4.2)	0 (0.0)	1 (6.7)	1 (10.0)	0 (0.0)	0 (0.0)	1 (10.0)	1 (1.8)
Total	39	25	24	8	15	10	7	6	10	56

$p < 0.05$*, $p < 0.01$**, $p < 0.001$***.