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Research Article

# Beyond self-report methods: Sand tray used in resilience evaluation

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ABSTRACT

This study aims to develop a workable scoring technique for sand tray to evaluate resilience. 207 undergraduates were recruited from three public universities in China. Participants made an initial sand tray and completed a questionnaire package. First, a General Sand tray Coding Manual (GSCM) was developed to code the 207 sand trays. Then, correlation and regression analyses were conducted between all GSCM indicators along with application of a widely used resilience scale to identify the final indicators representing resilience. Results showed that three indicators - vitality, water type, and relationship - accounted for 35% of the variance of resilience and form the four-point Likert-type Sand tray Test of Resilience (STR). The inter-rater reliabilities of STR dimensions and total score range from 0.86 to 0.95. The correlations between STR and overall mental health and self-esteem are 0.78 and 0.49, respectively. This study provides an alternative approach to measure resilience and can help to guide psychotherapy and clinical social work.

With the flourishing of positive psychology, the concept of resilience has become one of the most considered qualities in the fields of psychology and social work. Resilience is a key factor to help people "bounce back" from stress and disasters and successfully cope with life's adversities (Luthar, 2006). It has been well studied that resilience is correlated with many mental health outcomes (Davydov, Stewart, Ritchie, & Chaudieu, 2010). Resilience has recently been receiving increased attention from those that shape both practice and policy. Regardless of the source of interest, research on resilience or practice and policies designed to promote resilience require reliable and valid measures (Windle, Bennett, & Noyes, 2011). At least nineteen self-report measurements of resilience have been developed (Windle et al., 2011), such as the Ego-Resilience Scale (the ER 89) (Klohnen, 1996), the Connor-Davidson Resilience Scale (CD-RISC) (Campbell-Sills & Stein, 2007), and the Resilience Scale for Adults (RSA) (Friborg, Barlaug, Martinussen, Rosenvinge, & Hjemdal, 2005). Due to the level of interest in resilience, there is still interest in developing additional methods for measurement. One valuable direction could be seeking other methods to evaluate resilience beyond the widely used self-report methods.

Sandplay is a Jungian psychological therapy developed by Dora Kalff in 1956 (D. M. Kalff, 2003) which has the characteristics of both play therapy and art therapy (Cao, Shan, Xu, & Xu, 2013). It is a very popular psychological therapeutic method in China. The historical backdrop started in 1965 when the famous Japanese Jungian analytical psychologist Kawai Hayao introduced sandplay to Japan and named it "Hakoniwa Ryoho" (R. S. Zhang, 2006). It was subsequently introduced into China from Japan in 1998 (R. S. Zhang, 1998, 2006). Sandplay is distinguished with its special therapeutic mediums - a sand tray and a number of small miniatures representing all kinds of life or non-life images (e.g., humans, animals, plants, buildings, vehicles, furniture, food, and religious images). The process of sandplay begins when the therapist invites the client to "make a sand tray" by freely selecting miniatures and placing them into the sand tray (R. S. Zhang, 2006). "Sandplay illuminates the client's internal symbolic world and provides a place for its expression within a safe container, the sand tray" (D. M. Kalff, 1991, p. 3). Because of the special setting, sandplay has been used not only for intervention purposes, but also for assessment (Ebersöhn, Nel, & Loots, 2017). Traditionally, sandplay is only for therapeutic use of sand, water and miniatures as Kalff developed it, for other uses, the term "sandtray" or sand tray is used (Bradway, 2006).

The assessment value of sand tray has gained great attention (Dale & Lyddon, 2000; Nelson, 2011; Van Dyk & Wiedis, 2001). Since developed, Bowyer (1956), 1958, 1959) discovered the diagnostic function of sand tray. She analyzed numerous trays made by clinical cases and "normal" cases from children to adults and finally got five evaluating indicators: (1) area of tray used; (2) themes of aggression; (3) control and coherence of tray; (4) use of sand; and (5) content. She also

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validated sand tray's assessment function by comparing it with a well-recognized projective test - the Village Test, and found the two tests can substitute for each other when the presence or absence of a disturbance is being diagnosed (Bowyer & Huggan, 1965). Similarly, sand tray has been used to differentiate people with ADHD, obsessive-compulsive disorder (OCD), or autism from people without these conditions (Green, Drewes, & Kominski, 2013; W. Zhang, Zhang, & Jiang, 2011; Zhou & Fang, 2012). These studies identified the assessment potential of sand tray. Devising a workable scoring method for sand tray assessment is also possible (Bowyer, 1970). Caproni (1988) developed a sand tray test to assess young children's object relations through five indicators - organization, boundaries, feelings, relationships, and sense of self. Each indicator was rated on a five-point Likert scale. A relatively high inter-rater reliability of each indicator was reported in Caproni's study, ranging from 0.81 to 0.96. Segal (1990) subsequently validated Caproni's test with a well-recognized object relation test - Mutuality of Autonomy Scale (MOA) (Urist & Shill, 1982), and found a moderate correlation between the two tests.

In addition, some experienced researchers summarized a number of empirical assessment indicators of sand tray based on practice and research. Grubbs (1997); Grubbs, 2005 put forward a sand tray categorical checklist (SCC), including all recognized sand tray analytical indicators, which contains two major categories (direct observation and objective analysis & subjective impressions and implied meanings) and 19 secondary indicators. Martin Kalff (2007) proposed 21 points to interpret sandplay, which contain all the meaningful aspects of a sandplay process, rather than the finished sandtray. Besides, Mitchell and Friedman proposed themes of wounding and themes of healing (Friedman & Mitchell, 2002; Mitchell & Friedman, 1994) which are often used in sandplay analysis. With the accumulation of knowledge on sand tray assessment, researchers increasingly posit sand tray can be a reliable and workable projective instrument (Dale & Malinda, 2000; Lv, Zhang, Wu, & Ma, 2015; Mattson & Veldorale-Brogan, 2010; Tanji, 2011; Van Dyk & Wiedis, 2001).

The connection of sand tray assessment with resilience originates from the basic therapeutic hypothesis of sandplay - the "self-healing power" (R. S. Zhang, 1998, Zhang, 2006) which contains the essential meaning of resilience. Sandplay does not aim at specific symptoms or disorders, it obtains effectiveness through activating the client's self-healing power (R. S. Zhang, 2006). Under such basic therapeutic hypothesis, sandplay has demonstrated different degrees of effects on various mental health problems, such as psychological trauma (Carey, 1990; Doyle & Magor-Blatch, 2017; Kang, 2017; Lacroix et al., 2007; Miller & Boe, 1990; Toscani, 1998; D. Wang & Zhang, 2013), emotional problems (Endo, 2012; Ferreira, Eloff, Kukard, & Kriegler, 2014; Jang & Kim, 2012; Lin, Zhang, Wang, & Jin, 2011; Maree, Ebersohn, & de Villiers, 2012; Nasab & Alipour, 2015; No & Kim, 2013; Taki-Reece, 2004), and behavioral problems in children (Han, Lee, & Suh, 2017). A recent study supports that sandplay can improve resilience of college students (Dan Wang, Nan, & Zhang, 2017). Another study used the first sand tray of rural school youth in South Africa to analyze their resilience (Ebersöhn et al., 2017), which supports that sand tray can be an effective way to assess resilience, but this study adopts a subjective analysis method and a small sample size ($N = 25$). Increasing the sample size and developing a workable scoring method of sand tray in resilience assessment is a promising direction addressing a practical need.

In summary, it is worthwhile and possible to develop sand tray into an alternative measurement for resilience. As for the method, current knowledge on sand tray assessment seldom assesses resilience directly, but indicators for resilience should be contained in the numerous sand tray or sandplay indicators. An existing widely accepted self-report instrument could be a way to identify these resilience indicators. Besides, a quantitative method is required to develop the sand tray instrument for resilience into a workable assessment tool.

## Method

### *Participants and procedures*

Participants were undergraduates recruited from three comprehensive universities in China either through course enrollment (n = 54) or through posters (n = 153). The inclusion criterion is having no previous use of sand tray. Students who are receiving psychological assistance or reported suffering some psychological disturbance and hoping to get help from this study were agreed to participate in the study, but their data were excluded. Altogether 207 participants were included, among them, 139 were female (67.15%) and 68 (32.85) were male; 47 were first-year students (22.71%), 59 were second-year students (28.50%), 64 were third-year students (30.92%), and 37 were senior students (17.87%); 98 majored in science (47.34%) and 109 majored in liberal arts (52.66%); 115 (55.56%) were from urban areas and 92 (44.44%) were from rural areas; 11 (5.31%) have religious beliefs and 196 have no religious beliefs (94.69%). The average age of participants was 20.56 ($SD = 1.09$).

A one-to-one data collecting procedure lasting 60–90 min was administrated in the universities' three sandplay rooms. Seven university counselors who used sandplay were responsible for data collection. The participant was first guided to complete a questionnaire package, including Ego-Resiliency Scale (ER89) (Block & Kremen, 1996), University Personality Inventory (UPI) (J. Z. Wang, 1995), Rosenberg Self-Esteem Scale (Rosenberg, 2015), and background information, then had an initial experience of sandplay accompanied by a counselor. The process is the same to a formal sandplay. The finished sand tray was photographed and the sandplay process was recorded. The specific procedures of sandplay is presented in Table 1.

### *Instruments*

#### *Ego-resiliency scale (ER89)*

The 14-item scale developed by Block and Kremen (1996) is an established and validated scale. Participants in Block and Kreman' study were almost the same age and education background with those in this study. It is rated on a scale of 1–4. The total score of ER89 is from 0 to 56 and a higher score means a higher level of resilience. Block and Kremen reported that the internal consistency reliability of the scale was 0.76 (Block & Kremen, 1996). In this study, a sample of 107 Chinese college students was used to examine the reliability and validity of the scale before formal use, which showed the split-half reliability was 0.86 and criterion-related validity was 0.64 (criterion was self-esteem

**Table 1**
Procedures of Sandplay.

| Procedure | Descriptions |
|---|---|
| Making a sand tray | The participant made a sand tray freely. The researcher accompanied the participant and recorded the process, but kept silent. |
| Experiencing the sand tray | The participant experienced his or her work; the researcher kept silent. |
| Communication and Discussion | The researcher communicated and discussed with the participant based on the sand tray with a client-centered approach, to know the story and theme of the sand tray as well as the feelings and thoughts of the participant. |
| Photographing the sand tray | The researcher took photos of the finished sand tray, so could the participant. |
| Removing the sand tray | The researcher invited the participant to remove his or her sand tray. |

measured with Chinese version of Rosenberg Self-Esteem Scale (M. Wang, Cai, Wu, & Dai, 2010). Self-esteem was chosen as the criterion because it is generally regarded as one the most important components of resilience (Konrad & Bronson, 1997; Polk, 1997; Wagnild & Young, 1993). The result suggested this scale can equally apply in Chinese culture. In this study, ER89 was used as a criterion for the development of Sand tray Test of Resilience (STR) and to provide validity evidence for the new test.

*University personality inventory (UPI)*

UPI is a comprehensive measurement of overall mental health. It was established in Japan and widely used in China (Su & Zhang, 2015; J. Z. Wang, 1995). The inventory contains 60 true or false items; 4 of these are deceptive items. The total score is from 0 to 56; a higher score means a better mental health condition. UPI was included as a criterion validity indicator of STR.

*Rosenberg self-esteem scale (SES)*

The 10-item, widely used SES (Cheng & Hamid, 1995; Rosenberg, 2015) was also included as a validity criterion. It is rated on a 4 point Likert-type scale, from strongly agree to strongly disagree. The total score ranges from 10 to 40, higher score means higher self-esteem.

*Sand tray equipment*

Six sets of sand tray equipment in the three universities were used in this study. Each of them included a 50 cm (width) × 72 cm (depth) × 7 cm (height) sand tray with its inner wall painted blue and filled half full with clean and soft sand. In addition, around 2000 miniatures of all kinds were placed on two shelves by type, including figures, animals, plants, buildings, furniture and supplies, means of transportation, food and fruits, stone and shellfish, and others (R. S. Zhang, 2006), as were a digital camera and some record sheets.

*Procedures to develop STR*

The method to develop the sand tray test of resilience is to develop workable comprehensive scoring system for existing sand tray evaluation indicators (i.e., a General Sand tray Coding Manual (GSCM)) first, and then identify the specific indicators representing resilience with the help of an existing resilience scale.

*Procedures to develop GSCM*

*Step 1 collecting sand tray indicators*. A researcher (PI, master student majoring in clinical psychology with 5 years practical and research experience in sandplay) collected all sand tray indicators from peer-reviewed journals, books, and dissertations on sandplay and sand tray. Given the great difficulty of measuring the sandplay process, the current study focused on the final sand tray, thus excluded process indicators.

*Step 2 integrating the remaining indicators*. Some indicators, although proposed by different researchers, contain similar meaning, for example, the way space has been used (M. Kalff, 2007), use of tray (Grubbs, 1997), and fullness (Mason, 1986) all mainly refer to the use of the sand tray space. Therefore these indicators were merged into one indicator - fullness, because fullness can represent its psychological content better. Besides, there were some indicators contained a wide range of information which were empirically reclassified. For instance, animals, as a “big indicator” commonly appears in sandplay, were reclassified into domesticated animals, wild animals, and imaginary animals, because their psychological projections are quite different. The assessment value would be greatly weakened if generally took animals as one indicator.

*Step 3 coding indicators*. Remaining indicators were classified into objective indicators and subjective indicators with reference to the classification method of Grubbs (1997). The former refers to indicators which can be scored through direct observation on a sand tray, while the latter refers to indicators which cannot be scored without raters' own knowledge in related fields, such as relationships (Caproni, 1988; Segal, 1990). Coding relies on theories of attachment and interpersonal interaction. The 5-point Likert-style scoring method developed by Mason (1986) and Caproni (1988) was adopted in this study. To be specific, objective indicators were counted first, then were coded into five grades based on the data distribution. Among all, plants were coded based on the coverage area rather than the number, because miniatures of this indicator varied greatly in size and size is more meaningful in representing the symbolic meaning of plants (i.e., energy, vitality, and hope) than number (R. S. Zhang, 2006). As for subjective indicators included, most of them have already been coded on a five-point scale by previous researchers. Other subjective indicators were coded based on empirical observation on sand trays collected by this study and theoretical knowledge of sandplay and sand tray. This part of coding was completed by two coders, besides the principle researcher, a senior researcher (Ph.D. with over 10 years of experience in sandplay). First, they repeatedly observed the 207 sand trays to obtain an overall understanding respectively. Then, they worked together to code all indicators by discussion. Thereafter, an initial general sand tray coding manual (IGSCM) was formed.

*Step 4 modifying IGSCM*. To modify the possible errors of the developed coding system, two other coders (master students in clinical psychology with two-year practice in sandplay) were invited to code the 207 sand trays using IGSCM. First, the PI trained them how to use IGSCM, making sure that they were familiar with the meaning and scoring rules of every indicator. Next, they coded all 207 sand trays independently based on IGSCM and then discussed to solve inconsistencies. Results showed that score distributions of some indicators were severely unbalanced in current sample. Therefore, rating scales that too few participants chose were integrated into the adjacent scales, while those too many participants chose were narrowed and their adjacent scales were extended accordingly. In addition, indicators proved very rare in this study were removed from the manual, such as creating faces and bodies in the sand (M. Kalff, 2007). Finally, a formal General Sand tray Coding Manual (GSCM) was formed. The two coders coded the 207 sand trays again using GSCM to calculate the interrater reliability of GSCM.

*Developing the sand tray test of resilience (STR)*. To identify which indicators of GSCM can represent resilience of Chinese college students, the Pearson' correlation analysis between each GSCM indicator and ER89 were conducted and got 15 significantly correlated indicators. Next, a multiple regression analysis was conducted between the 15 indicators and ER89 to identify the final resilience indicators. Then, two coders (master students in clinical psychology with at least one-year practice in sandplay) respectively coded the 207 sand trays based on STR, then reached an agreement, which produced the interrater reliability of STR. Besides, the Pearson' correlations between STR and UPI and SES analyzed as criterion validity of STR.

## Results

*General sand tray coding manual (GSCM)*

GSCM includes 21 objective indicators and 7 subjective indicators.

Objective indicators include: (1) realistic figures (e.g. children and adults), (2) imaginary figures (e.g. Jesus and Buddha), (3) domesticated animals (e.g. pigs, dog, and cows), (4) wild animals (e.g. lions, birds, and insects), (5) imaginary animals (e.g. dragon), (6) plants (e.g. grass, trees, and flowers), (7) living buildings (e.g. residences and stores), (8) spiritual buildings (e.g. towers and temples), (9) connections (e.g. gates and bridges), (10) obstacles (e.g. fences and walls), (11) vehicles (e.g.

**Table 2**
General Sand tray Coding Manual-Objective Indicators (GSCM-OI).

| Objective Indicators | Coding Rules | Objective Indicator | Coding Rules |
|---|---|---|---|
| 1. Realistic figures | 1: None or a few (1–2);<br>2: Some (3–5);<br>3: Many (6 or more). | 12. Mineral | 1: None;<br>2: Yes, one or more. |
| 2. Imaginary figures | 1: None;<br>2: Yes, one or more. | 13. Foods | 1: None;<br>2: Yes, one or more. |
| 3. Domesticated animals | 1: None;<br>2: Yes, one or more. | 14. Articles for daily use | 1: None;<br>2: A few (1–2);<br>3: Many (3 or more). |
| 4. Wild animals | 1: None;<br>2: A few (1–2);<br>3: Many (3 or more). | 15. Sports | 1: None;<br>2: Yes, one or more. |
| 5. Imaginary animals | 1: None;<br>2: Yes, one or more. | 16. Particularity | 1: None;<br>2: Yes, one or more. |
| 6. Plants | 1: None or sporadically distributed;<br>2: Evidently distributed, but not everywhere;<br>3: Widely distributed and conspicuous. | 17. Total number of miniatures | 1: Very few (less than 20);<br>2: A few (20–30);<br>3: Some (30–40);<br>4: Many (40 or more). |
| 7. Living buildings | 1: None;<br>2: Only one;<br>3: Two;<br>4: Three or more. | 18. Kinds of miniatures | 1: A few (5 or less);<br>2: Some (6–7);<br>3: Many (8–9). |
| 8. Spiritual buildings | 1: None;<br>2: Yes, one or more. | 19. Use of sand | 1: No sand touch or slightly moved sand;<br>2: A small range of sand was used (no more than 1/4 of the sand tray);<br>3: A wide range of sand was used (more than 1/4 of the sand tray). |
| 9. Connections | 1: None;<br>2: Yes, one or more. | 20. Fullness | 1: The sand tray is empty or of limited use, and conveys sense of emptiness and monotony;<br>2: The sand tray was moderately used (no less than 1/2), and no sense of emptiness and monotony;<br>3: The sand tray was fully used (no less than 2/3), and scenes are very rich or occupied. |
| 10. Obstacles | 1: None;<br>2: Yes, one or more. | 21. Type of water | 1: None;<br>2: A stream, a pond, or a well;<br>3: A river or a lake;<br>4: A sea. |
| 11. Vehicles | 1: None;<br>2: Only one;<br>3: Two or more. | | |

cars, buses, bicycles, and ships), (12) mineral (e.g. stones, rocks, shells, metals, jewelries, and crystals), (13) foods, (14) articles for daily use (e.g. tables, televisions, and cups), (15) sports (e.g. basketballs, badminton, or a jogging people), (16) particularity (miniatures with special meaning, such as tombs, skeletons, castles, cross, and handcuffs), (17) total number of miniatures, (18) total number of types of miniatures, (19) use of sand (i.e., the scope and intensity of the use of sand), (20) fullness (i.e., the degree of use of the sand tray), (21) type of water (i.e., whether water scenes were created or not, if yes, what kind of water is it in realistic world). The specific coding rules of objective indicators are presented in Table 2.

Subjective indicators included:

(1) relationship - attachment relationship, interpersonal interaction, and social support implied in a sand tray;
(2) overall feeling tone - the overall feelings expressed by a sand tray, is the sand tray negative, barren, or positive and active;
(3) uniqueness - the degree of personal involvement in a sand tray;
(4) vitality - the types and quantities of lifeforms (humans, animals, and plants) presented in a sand tray;
(5) openness - the degree the sand tray links to the external world, or it is a closed or an open scene;
(6) dynamic property - presentation of dynamic themes or scenes in a sand tray, such as a downstream boat;
(7) themes of healing – how many healing themes are contained in a sand tray among the 10 healing themes of sandplay proposed by Mitchell and Friedman (1994), including:
(8) link - connections between elements, for example, a bridge links the two sides of a river;
(9) travel – moving along a path or the center of the sand tray, for example, an indigenous American is paddling a canoe down a river;
(10) energizing – active and strong energy presented in a sand tray, for example, organism begins to grow, or an aircraft is taking off;
(11) deep-going - exploration and discovery of a deeper level, for example, digging a well or a lake;
(12) fostering - providing nourishments and help for growth and development, for example, a mother is feeding her baby, or nurses are taking care of patients;
(13) birth - the emergence of new things or developments, for example, a baby is born, or flowers bloom;
(14) change - creative use of sand and miniatures, for example, building a bridge with sand, or building a house with branches;
(15) holiness - the emergence of religious or spiritual symbolism, for example, the Buddha is watching a child;
(16) centralization - all elements are well balanced or opposite elements are integrated in the center of the sand tray, for example, Mandala occupies the center of the sand tray;
(17) integration - properly organized structures appear in the sand tray, for example, a fable, or a consistent style of architecture;

The specific coding rules of subjective indicators are presented in Table 3.

*Interrater reliability of GSCM*

Spearman rank correlation was used to calculate the interrater reliability of GSCM. As shown in Table 4, GSCM had fine interrater

**Table 3**
General Sand tray Coding Manual-Subjective Indicators (GSCM-SI).

| Subjective Indicators | Coding Rules |
|---|---|
| 1. Relationship | 1: No evident relationship appears among miniatures or antagonistic relations are presented in the sand tray;<br>2: A bilateral good relationship appears in the sand tray, for example, a couple is having dinner, or a man is playing with his pet;<br>3: More than one bilateral good relationship or a family appears in the sand tray;<br>4: Relationships are rich, bilateral relationships and families both appear, in a cooperative, constructive, and secure way. |
| 2. Overall feeling tone | 1: The sand tray is heavy, contains serious and negative themes (such as wars), or conveys feelings of quiet and barren;<br>2: The sand tray is generally peaceful, warm, and positive, but not lively or vigorous;<br>3: The sand tray is more rich and active, a few of dynamic themes contained in the overall static scene;<br>4: The sand tray is generally lively and joyous;<br>5: The scene is quite rich, lively, and harmony, joyous themes are everywhere in the sand tray. |
| 3. Uniqueness | 1: Ordinary sand tray with little personal involvement, such as a city, a beach scene, or a daily life scene;<br>2: Ordinary scene with some personal involvement, for example, a Buddha appears in a daily life scene;<br>3: Generally personal involvement, but not deep, scenes are ordinary, such as themes of personal dream or future life;<br>4: Very deep personal involvement, scenes are abstract and exotic, understanding the sand tray must have individuals' own explanation. |
| 4. Vitality | 1: Only two or fewer life forms appear in the sand tray and few in quantity;<br>2: All three life forms appear, but few in quantity, or two life forms but large in quantity;<br>3: All three life forms appear, and large in quantity;<br>4: All three life forms appear in various ways, and large in quantity. |
| 5. Openness | 1: The sand tray links little with external worlds, such as description of a home or a remote mountain, conveying feelings of closed and evasive;<br>2: The sand tray is half open, for example, a house with a road in front of it, or an island with a bridge connecting it to the external world, cars, ships, bridges, and mailboxes are indicators linking with the outside world.<br>3: The sand tray is mainly a description of external life, such as scenes of urban life, work, outdoor group activities, etc. |
| 6. Dynamic property | 1: No dynamic elements (e.g. a car or a horse) or themes exist;<br>2: There are slightly dynamic themes, for example, a boat floating on a river, small animals are playing;<br>3: There are significant dynamic themes exist in parts of the sand tray, for example, a vehicle or a windmill is working, large animals' movements, or human activities;<br>4: The sand tray is mainly dynamic, elements are almost dynamic, such as a big party, a lively beach life. |
| 7. Themes of healing | 1: There are no more than three themes of healing;<br>2: There are four themes of healing;<br>3: There are five themes of healing;<br>4: There are six or more themes of healing. |

**Table 4**
Interrater reliability of GSCM.

| Indicators | ρ | Indicators | ρ |
|---|---|---|---|
| 1. Realistic figures | 0.92 | 15. Sports | 0.93 |
| 2. Imaginary figures | 0.95 | 16. Particularity | 0.90 |
| 3. Domesticated animals | 0.96 | 17. Total number of miniatures | 0.89 |
| 4. Wild animals | 0.92 | 18. Kinds of miniatures | 0.91 |
| 5. Imaginary animals | 0.98 | 19. Use of sand | 0.85 |
| 6. Plants | 0.81 | 20. Fullness | 0.83 |
| 7. Living buildings | 0.92 | 21. Type of water | 0.92 |
| 8. Spiritual buildings | 0.97 | 22. Relationship | 0.86 |
| 9. Connections | 0.94 | 23. Overall feeling tone | 0.75 |
| 10. Obstacles | 0.93 | 24. Uniqueness | 0.71 |
| 11. Vehicles | 0.92 | 25. Vitality | 0.90 |
| 12. Mineral | 0.94 | 26. Openness | 0.85 |
| 13. Foods | 0.98 | 27. Dynamic property | 0.87 |
| 14. Articles for daily use | 0.90 | 28. Themes of healing | 0.81 |

**Table 5**
Spearman Rank Correlation between GSCM and ER89.

| Indicators | ρ | Indicators | ρ |
|---|---|---|---|
| 1. Realistic figures | 0.33** | 15. Sports | 0.15 |
| 2. Imaginary figures | 0.13 | 16. Particularity | 0.14 |
| 3. Domesticated animals | 0.15 | 17. Total number of miniatures | 0.32** |
| 4. Wild animals | 0.31** | 18. Kinds of miniatures | 0.32** |
| 5. Imaginary animals | −0.15 | 19. Use of sand | 0.24* |
| 6. Plants | −0.09 | 20. Fullness | 0.41** |
| 7. Living buildings | 0.14 | 21. Type of water | 0.39** |
| 8. Spiritual buildings | 0.13 | 22. Relationship | 0.44** |
| 9. Connections | −0.08 | 23. Overall feeling tone | 0.49** |
| 10. Obstacles | −0.01 | 24. Uniqueness | −0.14 |
| 11. Vehicles | 0.20* | 25. Vitality | 0.55** |
| 12. Mineral | 0.12 | 26. Openness | 0.19* |
| 13. Foods | 0.22* | 27. Dynamic property | 0.44** |
| 14. Articles for daily use | 0.19 | 28. Themes of healing | 0.32** |

*Note.* * $p < .05$. ** $p < .01$ (two-tailed).

reliability. Reliabilities of objective indicators (ranging from 0.81 to 0.98) were better than those of subjective indicators (ranging from 0.69 to 0.90). Inter-rater reliabilities of 17 of the 21 objective indicators were over 0.9, while one subjective indicator was over 0.9.

*Correlation between GSCM and ER89*

Spearman rank correlation was used between each indicator of GSCM and ER89. As shown in Table 5, there were 15 indicators of GSCM have significant correlations with ego-resiliency, which were realistic figures, wild animals, total number of miniatures, kinds of miniatures, use of sand, vehicles, foods, fullness, type of water, relationship, overall feeling tone, vitality, openness, dynamic property, and themes of healing.

*Multiple regression analysis between GSCM and ER89*

With 15 indicators significantly correlated with ego-resilience as independent variables, and ego-resilience as the dependent variable, a stepwise multiple linear regression analysis was conducted. As shown in Table 6, vitality, type of water, and relationship entered the final regression equation, $\beta = 0.29$, $R^2 = 0.37$, $F = 59.09$, which formed the Sand tray Test of Resilience (STR). As shown in Table 7, all three indicators are scored from 1 to 4, therefore, the total score of STR ranges from 3 to 12.

*Reliability and validity of STR*

The three indicators and the total score of STR had fine and similar interrater reliability: 0.89 ($p < 0.01$) for vitality, 0.92 ($p < 0.01$) for type of water, 0.86 ($p < 0.01$) for relationship, and 0.95 ($p < 0.01$) for total score. The internal consistency reliability of STR was 0.74 when using Cronbach's Alphas as an indicator. The criterion-related validities were 0.78 ($p < 0.01$) and 0.49 ($p = 0.039$) when using UPI and SES as criterion respectively.

**Table 6**
Regression analysis between GSCM and ER89.

| Step | Entered indicators | *B* | *95%CI* | *t* | *Beta* | *Adjusted* $R^2$ | *F* | *N* |
|---|---|---|---|---|---|---|---|---|
| 1 | Vitality | 2.68 | 1.80–3.56 | 6.03*** | 0.51 | 0.25 | 36.32*** | 207 |
| 2 | Vitality | 2.29 | 1.42–3.15 | 5.24*** | 0.44 | 0.33 | 26.42*** | 207 |
| | Type of water | 1.58 | 0.69–2.47 | 3.53** | 0.29 | | | |
| 3 | Vitality | 1.53 | 0.40–2.67 | 2.69** | 0.29 | 0.35 | 19.47*** | 207 |
| | Type of water | 1.58 | 0.70–2.45 | 3.58** | 0.29 | | | |
| | Relationship | 1.05 | 0.01–2.09 | 2.01* | 0.21 | | | |

*Note.* * $p < .05$. ** $p < .01$. *** $p < .001$ (two-tailed). CI = confidence interval.

*Descriptive statistics of STR*

Means and standard deviations of STR of the total sample, the male sample, and the female sample are presented in Table 8. Besides, some examples of STR are presented in Fig. 1.

## Discussion

This study develops a workable sand tray scoring method to evaluate resilience of college students. The sand tray test of resilience (STR) is an alternative measurement of resilience beyond current dominated self-report methods. It has apparent benefits to sandplay, especially in China where sandplay is a very popular method. STR is a rare but valuable attempt to develop projective techniques in China. "……Will the Rorschach be a blot on the history of clinical psychology?……Are projective techniques dead?" - this is what researchers worried about 40 years ago (Klopfer & Taulbee, 1976). The fact is that well-known projective tests like the Rorschach gained solid support from meta-analyses (Mihura, Meyer, Dumitrascu, & Bombel, 2013; Wood et al., 2010). At least two meta-analyses report that the Rorschach predictive power is comparable to other personality assessment measures (Gronnerod, 2004; Hiller, Rosenthal, Bornstein, Berry, & Brunell-Neuleib, 1999), which suggests projective techniques do have great value and deserve further development. In this case, this study is a valuable attempt to projective technique development. Besides, the general sand tray coding manual (GSCM) developed in this study has great potential to develop other sand tray tests.

Another issue needs to be discussed is why the three sand tray indicators (vitality, type of water, and relationship) represent resilience. Vitality was found the strongest predictive indicator of resilience in the current study. It originates from the sand tray coding manual developed by Mason (1986), which refers to the number and type of three life forms (human, animal, and plant) presented in a sand tray. As far as its symbolic meaning, it means energetic, positive, and healthy status of a person (R. S. Zhang, 2006), which are characteristics of a resilient person. Accordingly, in Mason's study, vitality was found significantly predict mental health of participants. As such, vitality should be closely associated with resilience. In sandplay, the strength of one's life source can be presented by the kind of water he or she dug (R. S. Zhang, 2006).

**Table 8**
Descriptive statistics of STR (M ± SD).

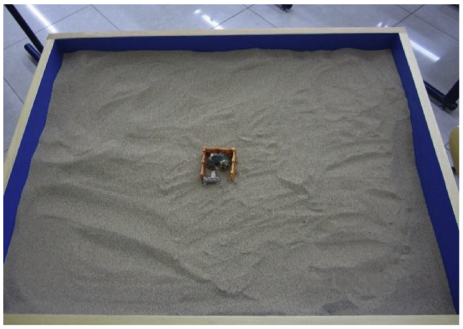
| Indicators | Total | | Male | | Female | |
|---|---|---|---|---|---|---|
| | *N* | *M* ± *SD* | *N* | *M* ± *SD* | *N* | *M* ± *SD* |
| Vitality | 207 | 2.42 ± 1.01 | 68 | 2.40 ± 1.04 | 139 | 2.43 ± 0.99 |
| Type of water | 207 | 2.49 ± 0.98 | 68 | 2.39 ± 0.97 | 139 | 2.54 ± 0.98 |
| Relationship | 207 | 2.48 ± 1.07 | 68 | 2.42 ± 1.06 | 139 | 2.51 ± 1.07 |
| Total score | 207 | 7.42 ± 2.32 | 68 | 7.30 ± 2.36 | 139 | 7.48 ± 2.30 |

Water in sand tray refers to inner energy, growth, nourishment, creativity, and the downward exploration of self-potential and resources (R. S. Zhang, 2006). Besides, water has the function of self-regulation and self-purification, which is consistent with the connotation of resilience. Among all kinds of water, the sea has the greatest inclusive, absorptive, and self-repairing capability, so Chinese people often describe people with such capability or trait as having "ocean-like" mind. This indicator is closely related to another indicator – use of sand - which means the range and degree of sand moving. Most of the time, clients move sand is to make waters. A higher range and degree of sand moving usually means making a larger water area. However, it is the realistic representation of water rather than the degree of sand moving was found representing resilience. The indicator of relationship is from Sternberg (1995), which was original to evaluate children's attachment. Attachment is an important theme for both children and adults. Previous studies found that there is a close relationship between attachment and resilience that negative attachment leads to lower resilience (Caldwell & Shaver, 2012). In sand tray, attachment is basically presented through interactions between humans or animals.

However, STR is still a rather novel and young measurement. Limitations should not be ignored. First, STR needs more validity and reliability evidence. Validity issue is a common challenge faced by projective tests. The greatest difficulty in measuring the validity of projective instruments is the lack of acceptable criteria against which to validate them (Klopfer & Taulbee, 1976). Adopting validating method

**Table 7**
Sand tray Test of Resilience (STR).

| Indicators | Scoring rules |
|---|---|
| Vitality | 1: Only two or fewer life forms appear in the sand tray and few in quantity;<br>2: All three life forms appear, but few in quantity, or two life forms but large in quantity;<br>3: All three life forms appear, and large in quantity;<br>4: All three life forms appear in various ways and large in quantity. |
| Type of water | 1: None;<br>2: A stream, a pond, or a well;<br>3: A river or a lake;<br>4: A sea. |
| Relationship | 1: No evident relationship appears among miniatures or antagonistic relations are presented in the sand tray;<br>2: A bilateral good relationship appears in the sand tray, for example, a couple is having dinner, or a man is playing with his pet;<br>3: More than one bilateral good relationship or a family appears in the sand tray;<br>4: Relationships are rich, bilateral relationships and families both appear, in a cooperative, constructive, and secure way. |



*Vitality*: only a small tortoise, scored 1; *Type of water*: no water, scored 1; *Relationship*: no relationship, and the participant wished to avoid interpersonal relationships, scored 1; Total score: 3.

*Vitality*: all three life forms appeared and large in quantity, scored 3; *Type of water*: a stream, scored 2; *Relationship*: opposite relationship between two sides of the stream, scored 1; Total score: 6.

*Vitality*: two life forms appeared and large in quantity, scored 2; *Type of water*: a river, scored 3; *Relationship*: a couple, scored 2; Total score: 7.

*Vitality*: all three life forms appeared in various ways, scored 4; *Type of water*: a large sea, scored 4; *Relationship*: people are families, friends, or tourists, relationships are rich and secure, scored 4; Total score: 12.

*Vitality*: all three life forms appeared in various ways, scored 4; *Type of water*: a stream, scored 2; *Relationship*: a family, scored 3; Total score: 9.

*Vitality*: all three life forms appeared and large in quantity, scored 3; *Type of waters*: a shallow sea, scored 4; *Relationship*: a couple and two friends (near the car) are visiting, scored 3; Total score: 10.

**Fig. 1.** Scoring examples of STR.

of self-report methods may be the best way to validate projective tests and promote its clinical utility. Therefore, the current study examined the interrater reliability, the internal consistency reliability, and two criterion-related validities (i.e., the overall mental health assessed by UPI and self-esteem assessed by SES). Future studies can explore the test-retest reliability, predictive validity, and other criterion-related validities, such as the associations between STR and other clinical indicators closely related to resilience, such as depression (Wingo et al., 2010) and anxiety (Hjemdal, Vogel, Solem, Hagen, & Stiles, 2011). Next, the scoring system of STR is still rough. All three indicators were attached equal importance, which is not consistent with findings of this study. As a short test with only three items, the scoring method of this study may lead to low test sensitivity. One of the most useful work for future study is to find a way to integrate indicator weight to STR. Last but not least, it is highly encouraged to explore the effectiveness of STR in other samples and cultures.

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