

# Psychometric Evaluation of the Persian Version of Spontaneous Use of Imagery Scale in the Iranian Population

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Received 2022 February 26; Revised 2022 December 13; Accepted 2023 January 17.

## Abstract

**Background:** In recent years, particular emphasis has been placed on the role of mental imagery in psychopathologies.

**Objectives:** The current study aimed to investigate the psychometric properties of the Persian version of the Spontaneous Use of Imagery Scale (SUIS-P) in the general Iranian population.

**Methods:** The current psychometric study was carried out on 474 Iranian individuals in 2020 through convenience sampling. The SUIS, ambiguous scenarios test relevant to depressed mood (AST-D), and Beck Depression Inventory-second edition (BDI-II) were filled out by the study subjects. Moreover, for the determination of divergent validity between the SUIS and BDI-II, the Pearson correlation was also used. Data analysis was performed by SPSS Software (version 24).

**Results:** The internal consistency of the total score of the SUIS was acceptable (Cronbach's alpha = 0.75). The significant positive relationship between the SUIS and AST-D ( $r = 0.34$ ;  $P < 0.01$ ) showed good convergent validity. No significant correlation was observed between the SUIS and BDI-II. Factor analysis using the principal component analysis with a varimax rotation introduced four factors. The four factors explained 0.55 of the total variance. Regarding construct validity, the inter-item correlation and item-total correlations of the SUIS-P were in an acceptable range.

**Conclusions:** Based on the results, the SUIS has excellent psychometric properties in the Iranian population and can be used in research and therapeutic interventions.

**Keywords:** Iranian Population, Spontaneous Use of Imagery Scale, Psychometric Properties

## 1. Background

Mental images play an important role in individuals' lives. In everyday life, thoughts about past or future events often appear as mental images. Mental imagery is defined as the experience of seeing with the mind's eye, hearing with the mind's ear, and others (1). Mental imagery can be important for cognitive functions, such as learning, memory, and problem-solving (2). In addition, imagination might be essential in developing and maintaining psychiatric disorders (3, 4). Imagination can also contribute significantly to the development and recovery of emotional states (5-7). In studies based on mental imagery, a scale that can measure the participants' differences in their mental imagination ability at the baseline stage will be helpful (7). Despite the importance of mental imagery in psychiatric disorders, its evaluation in the conceptualization and treatment of disorders has been neglected.

Evaluating the generation of clear and vivid mental imagery has been of interest to researchers for many years,

and several scales have been developed in this regard, for example, the Vividness of Visual Imagery Questionnaire (VVIQ) (8) and Questionnaire upon Mental Imagery (QMI) (9). In previous studies, these measuring instruments were associated with cognitive functions, such as attention and memory performance, and with creativity and affective reactions (4, 8, 10, 11). However, the Spontaneous Use of Imagery Scale (SUIS) was developed by Kosslyn (12), which seems to measure the habitual use of mental imagery as a trait. Therefore, the SUIS assessed some aspects that have been missed in previous studies.

The SUIS is a 12-item self-report scale developed by Reisberg et al. (13) in 2003 to evaluate individual differences in imagination ability in daily life on a 5-point Likert scale ranging from 1 "never" to 5 "always" (12). Higher values in the SUIS indicate a stronger tendency for mental imagery. This scale emphasizes only visual imagination, and other modalities, such as auditory imagination, are not assessed by the SUIS (4). The SUIS has high internal consistency and good convergent validity (13-15). The SUIS emphasizes the

likelihood and frequency of imagination in an everyday situation. However, other tools of imagination ability, such as the QMI (9) and VVIQ (8), emphasize the vividness and quality of imagination.

In recent years, research into mental imagery has gained increasing importance, especially in clinical psychology, and the SUIS is also a frequently used instrument in this regard (16). Previous research has revealed (17) that mental imagery affects our emotional experience more than verbal processing. For this reason, theoretical models have recently been developed for the special importance of emotion-enhancing mental images in emotional disorders (18). In English-speaking countries, the SUIS is a widely used tool for the self-assessment of imagery propensity (4, 12). However, to date, no research has been conducted in Iran to investigate the psychometric properties of the SUIS, and there is no information on the test psychometric properties of this scale.

## 2. Objectives

This study aimed to translate the SUIS into Persian and determine its validity, reliability, and factor structure in the Iranian population.

## 3. Methods

The design of this study was a cross-sectional descriptive correlational analysis. The statistical sample comprised 474 individuals in 2020 using the convenience sampling method. The original English version of the scale was initially translated into Persian by a scientifically active psychologist. In the second stage, the items were translated into English by a bilingual translator with particular experience in psychology. The two English versions are very similar. No items were omitted or changed. The data were collected online through social media; accordingly, after distributing the announcement in cyberspace (e.g., Instagram, Telegram, and WhatsApp), the forms were sent to the participants.

The inclusion criteria included Iranian nationality, education of at least a diploma, age range of 18 - 65 years, and ability to read and write. The exclusion criteria included lack of cooperation, inability to complete the questionnaire for any reason, and lack of interest in continuing the study. An informed consent form was provided for the participants, and all participants gave their consent either in writing or verbally. Subsequently, the study subjects filled out the online study's main questionnaire. Before responding to the questionnaire's items, the subjects were asked to record demographic information.

### 3.1. Ethical Considerations and Informed Consent

The study was conducted after receiving an ethics code from the University of Social Welfare and Rehabilitation Sciences, Tehran, Iran (approval code: IR.USWR.REC.1400.102). The present study followed all the ethical standards listed in the Declaration of Helsinki.

### 3.2. Statistical Analysis

Descriptive and inferential statistical methods were utilized during this study. Descriptive methods were accustomed to calculating central indicators and dispersion. The exploratory multivariate analysis method was utilized to determine the questionnaire's subscales. SPSS software (version 24) was used for statistical analyses. The demographic data were analyzed using mean (M), variance (standard deviation [SD]), and descriptive statistics before the inferential analysis. Additionally, the outlier's data were checked via z-scores and box plots (values + 3 standard deviations from the mean indicating univariate outliers). A visual check showed that the information was distributed normally. Reliability, which relates to the consistency and stability of a measure, was assessed with the internal consistency of tests and retests (i.e., Cronbach's  $\alpha$ ). The ambiguous scenarios test relevant to depressed mood (AST-D) and Beck Depression Inventory- second edition (BDI-II) were used for convergent and divergent validity, respectively.

All participants voluntarily participated or did not participate in the study. Additionally, the examiners pledged that the individual's data remain confidential and every participant will access the questionnaire results.

### 3.3. Measures

The Spontaneous Use of Imagery Scale: The SUIS, as a 12-item questionnaire, was designed for the measurement of the spontaneous use of images in daily life (13). A 5-point scale is utilized for rating the level of the appropriateness of each item (from "never appropriate" to "entirely appropriate"). A complete score is usually computed by summing the scores of the 12 items, resulting in a complete score range of 12-60, in which higher scores show more use of imagining in everyday life. The SUIS's internal consistency is reported within an acceptable range (Cronbach's  $\alpha = 0.83$ ) (4).

The Beck Depression Inventory- second edition: This scale is the revised version of the BDI (19), including 21 items. Each question's four choices are scored on a four-level scale from 0 to 3. As a result, the questionnaire's total score is within the range of 0 - 63. Additionally, the internal consistency of this inventory is claimed to be 0.91. (19).

In Iran, the alpha coefficient was 0.91, the correlation coefficient between the two halves was 0.89, and the one-week retest coefficient was 0.94 (20).

The ambiguous scenarios test relevant to depressed mood II (AST-D-II) (Long Version): The AST-D-II is a 30-item self-report test that asks the individuals to imagine each scenario (e.g., one's performance and skills, past experiences, future situations) as vividly as possible. Then, it rates the level of the pleasantness of each situation on an 11-point Likert scale ranging from -5 (extremely unpleasant) to +5 (extremely pleasant). The AST-D-II was developed to evaluate the interpretation of depression-related biases (higher scores indicating a more positive bias). The internal consistency of the AST-D-II in Rohrbacher's study (21) was within an acceptable range ( $\alpha = 0.87$ ). Confirmatory factor analysis (CFA) showed that the three-factor models fit with the AST-D-II. In addition to convergent validity, the AST-D-II has a significant correlation with depression scores (21).

#### 4. Results

The statistical sample of the current study was 474 subjects. The age range of the participants was within 18-58 years ( $M=30.33$ ,  $SD=8.49$ ). The participants included 270 (77.1%) and 70 (22.9%) female and male subjects, respectively. In addition, 164 (35.5%), 225 (47.4%), and 85 (17.01%) participants were married, single, and divorced, respectively. The SUIIS response rate was around 78%. The scores of the SUIIS were normally distributed, with no evidence of univariate or multivariate outliers. The distribution of the total values showed a skewness of -0.44 ( $SE=0.15$ ) and a kurtosis of 0.35 ( $SE=0.29$ ) within the normal range.

Analyses' findings reported the relationship between the SUIIS, BDI-II, and AST-D to determine convergent and discriminant validity. The SUIIS correlated significantly with the AST-D vividness subscale ( $r = 0.34$ ,  $P < 0.01$ ) and AST-D pleasantness subscale ( $r = 0.21$ ,  $P < 0.05$ ). In addition, the SUIIS did not significantly correlate with the BDI-II ( $r = -0.08$ ,  $P > 0.05$ ). The independent t-test showed no significant statistical differences between the SUIIS and its subscale with the AST-D-II and BDI-II (Table 1). The mean total value of the 12 items was 44.0 ( $SD = 8.55$ ). Female subjects (Mean = 42.87,  $SD = 7.06$ ) achieved non-significantly higher total values than male subjects (Mean = 41.05,  $SD = 8.42$ ,  $t [214] = 1.42$ ,  $P > 0.05$ ).

The internal consistency of the 12 items can be rated as acceptable with a Cronbach's alpha value of 0.75. According to Table 2, the internal consistency (Cronbach's alpha) of the SUIIS was within the range of 0.70 - 0.75.

The item difficulty was calculated using SPSS software (version 24). The difficulty of the individual items varied

**Table 1.** Correlation of Ambiguous Scenarios Test Relevant to Depressed Mood II and Beck Depression Inventory-Second Edition with Spontaneous Use of Imagery Scale<sup>a</sup>

Variable (Scales)	Mean $\pm$ SD	Correlation with SUIIS
AST-D-II (vividness subscale)	120.70 $\pm$ 20.68	0.34**
AST-D-II (pleasantness subscale)	83.36 $\pm$ 36.51	0.21*
BDI-II	10.68 $\pm$ 9.0	0.08
SUIIS	42.64 $\pm$ 7.32	-

Abbreviations: AST-D-II, ambiguous scenarios test relevant to depressed mood II; BDI-II, Beck Depression Inventory-second edition; SUIIS, Spontaneous Use of Imagery Scale

<sup>a</sup> \*\*  $P < 0.01$ ; \*  $P < 0.05$

within the range of 0.25 - 0.78. Table 2 shows the descriptive statistics for any subscale and the total scale. Although item 6 had the lowest correlation with the total score, it was still kept in the final version of the Persian version of the Spontaneous Use of Imagery Scale (SUIIS-P). According to the item-total correlation analysis presented in Table 3, all of the 12 items correlated significantly with each other and the total score of the SUIIS-P (in the domain of 0.25 to 0.68,  $P < 0.01$ ).

With regard to the reduction of the sample size due to missing data that results in problems in exploratory factor analysis (EFA), the missing data replacement method was employed with the variable mean for missing data management. The Kaiser-Meyer-Olkin (KMO) test and Bartlett's sphericity test were used before EFA to investigate the sample size adequacy. The results of the KMO test (0.78) and Bartlett's sphericity test (chi-square = 782.45;  $df = 66$ ;  $P < 0.000$ ) indicated data suitability for factor analysis.

Table 4 shows the findings of the factor analysis. Factor loads and variance explained the correlation of each item with the relevant subscales and descriptive data related to the extracted factors. Principal component analysis indicated that four factors could explain 55% of the variance. Table 4 shows factor load, eigenvalue, and percentage of variance explained. The EFA indicated that the four-factor solution accounted for 67.03% of the variance. Factor loadings ranged from 0.39 to 0.86. Four factors were created using varimax rotation (Table 5).

#### 5. Discussion

The present study attempted to investigate the factor structure and psychometric properties of the SUIIS-P to measure the tendency toward using mental imagery in everyday life. Convergent and discriminant validity was investigated to evaluate construct validity. Convergent validity analyses showed a moderate positive correlation between the SUIIS and AST-D. On the other hand, to calculate

**Table 2.** Item Analysis

	Scale Mean If Item Deleted	Scale Variance If Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlations	Cronbach's Alpha If Item Deleted
SUIS 1	38.3	49.966	0.333	0.150	0.733
SUIS 2	38.9	46.337	0.442	0.231	0.719
SUIS 3	37.8	49.278	0.408	0.230	0.724
SUIS 4	38.0	51.527	0.219	0.080	0.747
SUIS 5	37.7	51.604	0.322	0.123	0.734
SUIS 6	39.8	53.629	0.109	0.055	0.758
SUIS 7	38.1	49.371	0.335	0.160	0.733
SUIS 8	37.9	48.952	0.427	0.312	0.722
SUIS 9	37.9	48.628	0.443	0.296	0.720
SUIS 10	38.5	45.888	0.535	0.528	0.706
SUIS 11	38.6	45.457	0.544	0.552	0.705
SUIS 12	39.2	47.757	0.426	0.269	0.721

Abbreviation: SUIS, Spontaneous Use of Imagery Scale

**Table 3.** Inter-item and Item-total Correlations of Spontaneous Use of Imagery Scale

	SUIS1	SUIS2	SUIS3	SUIS4	SUIS5	SUIS6	SUIS7	SUIS8	SUIS9	SUIS 10	SUIS 11	SUIS 12
SUIS 1	1	0.25**	0.20**	0.12**	0.11*	0.06	0.15**	0.21**	0.29**	0.16**	0.13*	0.19**
SUIS 2		1	0.24**	0.09	0.20**	0.11*	0.20**	0.16**	0.22**	0.30**	0.30**	0.36**
SUIS 3			1	0.19**	0.18**	0.03	0.16**	0.40**	0.28**	0.21**	0.25**	0.15**
SUIS 4				1	0.09	0.05	0.11*	0.21**	0.15**	0.13*	0.07	0.04
SUIS 5					1	-0.01	0.20**	0.16**	0.20**	0.23**	0.23**	0.20**
SUIS 6						1	-0.03	0.02	-0.05	0.13**	0.14**	0.12*
SUIS 7							1	0.28**	0.28**	0.18**	0.16**	0.21**
SUIS 8								1	0.41**	0.18**	0.26**	0.12*
SUIS 9									1	0.30**	0.27**	0.13*
SUIS 10										1	0.70**	0.36**
SUIS 11											1	0.42**
SUIS 12												1

Abbreviation: SUIS, Spontaneous Use of Imagery Scale

**Table 4.** Factor Load, Eigenvalue, and Percentage of Explanation of Variance

Component	Total	Variance %	Cumulative %	Total	Variance %	Cumulative %	Total	Variance %	Cumulative %
1	3.179	26.491	26.491	3.179	26.491	26.491	2.285	19.042	19.042
2	1.448	12.066	38.556	1.448	12.066	38.556	1.625	13.545	32.587
3	1.056	8.803	47.359	1.056	8.803	47.359	1.545	12.876	45.463
4	1.008	8.397	55.755	1.008	8.397	55.755	1.235	10.293	55.755

discriminant validity, the BDI-II was selected.

The findings of previous research (22) were the present study's rationale for choosing the BDI-II as a measure of discriminant validity. According to Gorgen's study (23), there was no significant association between the tendency to imagine (the SUIS) and depressive symptoms (the BDI-II) ( $r = 0.11$ ,  $P > 0.05$ ). There was no significant correlation between the SUIS and depression as a discriminant or divergent validity. Compatible with the findings of Lang et al.'s study (22), the current study detected no significant corre-

lation between the tendency to imagine and depression. However, depression symptoms and disorders are primarily specific, self-relevant, and verbal processes not directly recorded and addressed within the SUIS.

Several explanations can be considered for the lack of association between SUIS and BDI. Previous studies have shown that rumination processes play an essential role in intensifying and maintaining depressive symptoms (23, 24). This finding indicated that depression is more closely related to the verbal-ruminative than to an individual's

**Table 5.** Factor Load of the Items on Spontaneous Use of Imagery Scale

Items	Factor 1	Factor 2	Factor 3	Factor 4
Items 1				0.81
Items 2				0.51
Items 3			0.64	
Items 4			0.66	
Items 5		0.67		
Items 6	0.39			
Items 7		0.65		
Items 8			0.65	
Items 9		0.54		
Items 10	0.81			
Items 11	0.86			
Items 12	0.60			

visual-imaginative style of thinking. In contrast to depressive symptomatology, the SUISS assesses the use of mental images about everyday situations or activities that are more neutral in terms of valence. In addition to this difference in valence, it would be possible that the symptoms of depression are less associated with the frequency or inclination toward mental images.

Empirical findings showed that individuals with symptoms of depression or a depressive disorder describe everyday or positive mental images less vividly than control participants (25-27). Instead, the SUISS asked about the general, affectively neutral, habitual use of mental images in everyday life. In line with the current study's expectations and previous studies (13), the total score of the SUISS had a positive correlation with the AST-D (vividness subscale). Researchers have reported that individuals with excellent vividness capability scored higher on the SUISS than low-vividness individuals (4, 13). One reason behind the moderate correlation coefficient of the SUISS and AST-D is that the AST-D focuses mainly on the quality and vividness of mental imagery; nevertheless, the SUISS generally evaluates the generation of mental images.

The mean values obtained by the SUISS are comparable to the results obtained in other samples from the general population (15, 28). The mean values of the total score of the SUISS in the present study are consistent with those of previous studies (15, 29-31). The present study did not find any significant correlation between mental imagery use with education level, marriage status, and age. Although the difference between male and female participants in the total score of the SUISS was not statistically significant, the present study showed that female subjects achieved higher mean values than male subjects. Nevertheless, according to the literature review on this topic, there was no interpretation or explanation for this result (23). The finding is consistent with the findings of previous research (4). In addition, Tanaka et al. (32) in their study also demonstrated no significant difference in the total score of the

SUISS between the genders.

This study showed that the SUISS-P was a reliable and valid self-report scale. The internal consistency of the SUISS was good ( $\alpha = 0.75$ ). Although the Cronbach's alpha coefficient of the SUISS in the present study was lower than the original English version ( $\alpha = 0.98$ ) (13), it was higher than previous studies ( $\alpha = 0.66$ ) (33), ( $\alpha = 0.63$ ) (34), ( $\alpha = 0.66$ ) (32) ( $\alpha = 0.72$ ;  $\alpha = 0.72$ ;  $\alpha = 0.76$ ) (4). Contrary to the original English version, it was impossible to prove the one-dimensionality of the SUISS for the Persian version with the help of EFA. According to previous studies (4, 32, 33), the CFA of a one-factor model showed an acceptable comparative fit index (CFI), and Tucker-Lewis Index (TLI) to good (the root mean square error of approximation) model fit but lower CFI and TLI values, which could mean that a multi-factor model could also be fit for the SUISS.

In the present study, some items in the SUISS, including items 6, 1, and 4, had poor psychometric properties that were inadequate. Therefore, it is better to eliminate or modify them in future studies to promote the psychometric properties of the SUISS. If a short version of the SUISS is desired, items 1, 4, and 6 might be excluded from the Persian version.

In the scale instructions, it is up to the participants to decide which adopted perspective will affect the quality and vividness of mental images. Emotions are also influenced by the perspective adopted in mental imagery. Adopting a first-person (field) perspective is associated with more emotional states than a third-person (observer) perspective (2). According to the SUISS instructions, it is not clear to the participant how to imagine the scale's situations. Therefore, the participant creates and manipulates mental images based on his/her tendency and discretion in the field perspective (first person) or observer perspective (third person).

This issue is important because previous studies (35) showed that negative interpretation bias is especially high when images are produced from a field perspective. On the

other hand, in the intervention of positive mental imagery, when participants are asked to create imagery from a field perspective, they show more mood changes than when they are asked to create imagery from an observer perspective (36). Therefore, the instructions with which the participant completes the SUIIS can be considered a confounding variable. Interestingly, most mental imagery disorders use an observer perspective (e.g., social anxiety disorder, agoraphobia, post-traumatic stress disorder, and depression) (2). In this regard, future studies are suggested to modify their instructions so that the participant imagines the situations based on the first-person (field) perspective.

Most previous studies revealed that the SUIIS had a single-factor model (4, 32, 33), which suggested a fundamental component: the general use of visual mental images. However, a two-factor model was also identified by Nelis and Holmes (4). In addition, the fit indices in CFA were not wholly fit for the one-factor model. On the other hand, the fitness indices of CFA in the German and Japanese studies (32, 33) were not entirely fit with the one-factor model of the SUIIS. In the present study, EFA showed four factors.

According to the previous findings (4, 32, 33), the SUIIS is a one-dimensional scale; however, the findings of the current study extracted four factors. Therefore, this finding is not consistent with the findings of previous studies (4, 32, 33). Since these four factors were still observed in various factor analyses, several other reasons can be interpreted regarding this finding, including inappropriate sampling or careless answering of the participants, the sensitivity of the target structure, and the concern of the samples in responding to potential stigma.

The current study had several limitations. One of the limitations was the larger number of females than males, which might jeopardize the external validity or generalizability of the findings. Therefore, in future studies, this limitation should be overcome by quota sampling. Secondly, given that the EFA of the present study indicated four factors of the SUIIS, to resolve this discrepancy in research findings, one of the research suggestions is to perform CFA with a larger sample. Thirdly, online data collection was another limitation. Although online data collection is very convenient and practical, it has been noted that sampling biases are most likely to occur in this data collection method. Fourthly, another limitation was that this study did not use a screening scale to detect psychiatric disorders.

### 5.1. Conclusions

According to the obtained findings, the SUIIS-P has acceptable psychometric properties in the Iranian population to assess individual differences in the everyday use

of mental imagery. Therefore, it can be utilized in clinical and research contexts. The SUIIS is a promising instrument for further research into the association between mental imagery and cognitive (e.g., problem-solving) and emotional (e.g., emotion regulation) processes and psychological symptoms. In addition, it is a useful method for the applied tendency to imagine as a control variable (e.g., between different conditions) in mental imagery-based intervention, as Blackwell recommended in his study (37). Future studies can investigate and promote the psychometric properties of the SUIIS, especially in clinical populations.

### Footnotes

**Authors' Contribution:** Y.N. conceived and designed the evaluation and drafted the manuscript. B.D. and A.P. participated in designing the evaluation, performed parts of the statistical analysis, and helped draft the manuscript. M.Z. re-evaluated the clinical data, revised the manuscript, performed the statistical analysis, and revised the manuscript. Y.N. collected the clinical data, interpreted them, and revised the manuscript. All the authors read and approved the final manuscript.

**Conflict of Interests:** Funding or research support: University of Social Welfare and Rehabilitation Sciences; Employment: A PhD student at University of Social Welfare and Rehabilitation Sciences; Personal financial interests: Psychotherapy; Stocks or shares in companies: None; Consultation fees: University of Social Welfare and Rehabilitation Sciences; Patents: University of Social Welfare and Rehabilitation Sciences; Personal or professional relations with organizations and individuals (e.g., parents and children, wife and husband, and family relationships): None; Unpaid membership in a governmental or non-governmental organization: None; Are you one of the editorial board members or a reviewer of this journal? Yes, Yazdan Naderi is an associate editor of this journal. Reply to the below questions about this author and write them in "Conflicts of Interest [CoI]": What is the role of the author (reviewer, associate editor, or editor-in-chief [EIC])? Yazdan Naderi is an associate editor, and Mehran Zaghamsi is an EIC. Has this author with CoI had an active role in the editorial board (if yes, since when)? Yes, Yazdan Naderi has been the associate editor since 3 years ago. Was this author involved in the review process of the current manuscript? "The authors declared that one of the authors ([Yazdan Naderi, associate editor] and [Mehran Zaghamsi, EIC]) is one of the editorial board members. The journal confirmed that the mentioned author with CoI was completely excluded from all review processes. The authors also introduced this author with CoI during the submission as an opposed reviewer".

**Data Reproducibility:** The data presented in this study are uploaded during submission as a supplementary file and are openly available for readers upon request.

**Ethical Approval:** The ethics code was obtained from University of Social Welfare and Rehabilitation Sciences (approval code: IR.USWR.REC.1400.102). This study followed all the ethical standards listed in the Declaration of Helsinki.

**Funding/Support:** University of Social Welfare and Rehabilitation Sciences, Tehran, Iran funded this study.

**Informed Consent:** An informed consent form was provided for the participants, and all participants gave their consent either in writing or verbally.

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