

The Repetitive Behavior Scale-Revised: Independent Validation and the Effects of Subject Variables

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Background

Restricted repetitive behaviors (RRB) are a core feature of autism. Despite their clinical significance, little is known about their phenomenology and treatment. A major obstacle to the study of RRB has been the lack of an rating instrument that can accurately assess and distinguish among the variety of repetitive behaviors seen in autism.

Recently, Bodfish and colleagues have developed the Repetitive Behavior Scale-Revised (RBS-R), an informant-based rating scale that appears to uniquely capture the breadth of repetitive behavior in individuals with autism spectrum disorders. The items of the RBS-R have been *conceptually-grouped* into six subscales: (1) Stereotyped Behavior, (2) Self-Injurious Behavior, (3) Compulsive Behavior, (4) Ritualistic Behavior, (5) Sameness Behavior, and (6) Restricted Interests. Initial analyses have suggested sound psychometric characteristics, though independent study of this rating tool was needed to validate its utility.

Objectives

- Empirically determine the subscale structure of the RBS-R through factor analysis
- Assess psychometric characteristics of the RBS-R
- Determine if any patterns of RRB were moderated by subject variables

Method

- FOR FACTOR ANALYTIC STUDY:
N = 1245 mailings sent to parent mailing list of South Carolina Autism Society
- FOR RELIABILITY STUDY
N = 74 mailings were sent to caregivers in Nisonger Center's research databases (n=30), parents from the Ohio Autism Society (n=25), and staff at J. Iverson Riddle Developmental Center (n=19)

Method (cont.)

• INSTRUMENT:

- RBS-R:** 43 item questionnaire designed to assess 6 dimensions of RRB. Items rated on a 4-point Likert scale ranging from (0) "behavior does not occur" to (3) "behavior occurs and is a severe problem"
- Demographic questions:**
 - Age - Reported type of ASD
 - Sex - Level of mental retardation
 - Race - School placement
 - Co-morbid behavioral problems
 - Use of psychotropic medication
 - Presence of mood disturbances in family

Results

Response Rate of SCAS: Out of effective target size of 1003, 320 were returned for a response rate of 32%

Participant Characteristics:

- Age:** 3-48 years (mean=15.3, SD=9.6)
- Race:** 69.1% Caucasian; 23.1% African American
- Severity of ASD:** 33.9% mild, 38.8% mod., 20.5% severe
- School placement:** 16.6% Regular placement
- Presence of co-morbid behavioral problems**
 - Anxiety: 71.1%
 - Aggression: 52.5%
 - Irritability: 84.7%
 - ADHD Symptoms: 78.9%
 - Depression: 54.8%

- Sex:** 82.4% male
- Type of ASD:** 81.4% Autistic Disorder, 4.6% Unknown
- Level of MR:** 45.6% none, 15.6% mild, 14.3% mod, 10.4% severe/profound
- Taking psychotropic medication:** 53.4%
- Family history of mood disorders**
 - Anxiety Disorder: 18.6%
 - Obsessive Compulsive Disorder: 11.7%
 - Depression: 32.6%
 - Bipolar Disorder: 5.5%

Table 1. Five-factor solution of RBS-R*

| | Factor I | Factor II | Factor III | Factor IV | Factor V |
|--------------------------------|----------|-----------|------------|-----------|----------|
| Stereotypy Subscale | | | | | |
| 1. Body movements | 0.13 | 0.12 | 0.47 | 0.04 | -0.29 |
| 2. Head movements | 0.11 | 0.07 | 0.11 | 0.02 | -0.13 |
| 3. Finger movements | 0.04 | 0.06 | 0.65 | 0.00 | -0.09 |
| 4. Locomotion | -0.04 | 0.11 | 0.57 | 0.05 | 0.07 |
| 5. Object usage | -0.02 | 0.18 | 0.63 | -0.06 | 0.17 |
| 6. Sensory | 0.05 | 0.18 | 0.49 | 0.02 | 0.10 |
| Self-Injurious Subscale | | | | | |
| 7. Hits w/ body | -0.01 | 0.67 | 0.14 | 0.01 | -0.03 |
| 8. Hits against surface | 0.04 | 0.55 | 0.17 | -0.03 | 0.06 |
| 9. Hits w/ object | 0.01 | 0.70 | 0.07 | -0.02 | 0.03 |
| 10. Bites self | 0.09 | 0.51 | 0.13 | -0.14 | -0.03 |
| 11. Pulls hair/skin | 0.12 | 0.62 | 0.05 | 0.05 | -0.05 |
| 12. Rubs/scratches | 0.00 | 0.68 | -0.02 | 0.04 | 0.03 |
| 13. Inserts finger/object | 0.00 | 0.51 | 0.09 | 0.06 | -0.03 |
| 14. Picks skin | 0.03 | 0.57 | -0.26 | 0.15 | -0.05 |
| Compulsive Subscale | | | | | |
| 15. Ordering | 0.02 | -0.06 | -0.03 | 0.73 | 0.05 |
| 16. Completeness | -0.11 | 0.17 | 0.11 | 0.55 | 0.13 |
| 17. Washing | -0.07 | 0.17 | 0.02 | 0.55 | -0.03 |
| 18. Checking | 0.08 | 0.10 | 0.08 | 0.58 | -0.20 |
| 19. Counting | -0.05 | 0.11 | 0.06 | 0.52 | 0.14 |
| 20. Hoarding | 0.08 | 0.14 | -0.08 | 0.47 | 0.12 |
| 21. Repeating | 0.35 | 0.02 | 0.13 | 0.27 | 0.10 |
| 22. Needs to touch/tap | 0.15 | 0.04 | 0.35 | 0.11 | 0.12 |
| Ritualistic Subscale | | | | | |
| 23. Eating/mealtime | 0.33 | -0.11 | 0.12 | 0.25 | 0.09 |
| 24. Sleeping/bedtime | 0.32 | -0.04 | 0.01 | 0.36 | 0.18 |
| 25. Self care routine | 0.43 | -0.07 | 0.00 | 0.41 | 0.04 |
| 26. Transportation routine | 0.48 | -0.06 | 0.11 | 0.29 | 0.02 |
| 27. Play/leisure routine | 0.51 | -0.03 | 0.08 | 0.18 | 0.16 |
| 28. Communication | 0.37 | 0.06 | -0.23 | 0.10 | 0.24 |
| Sameness Subscale | | | | | |
| 29. Placement of objects | 0.41 | 0.01 | -0.02 | 0.45 | 0.02 |
| 30. No new places | 0.71 | 0.00 | 0.00 | -0.06 | -0.08 |
| 31. No interruption | 0.57 | 0.13 | -0.01 | 0.08 | 0.13 |
| 32. Walks certain way | 0.57 | 0.09 | -0.20 | 0.04 | -0.19 |
| 33. Sits certain place | 0.63 | -0.03 | 0.20 | 0.11 | -0.17 |
| 34. Appearance of others | 0.53 | 0.11 | 0.10 | 0.09 | 0.010 |
| 35. Uses certain door | 0.48 | -0.02 | 0.24 | 0.07 | -0.20 |
| 36. Videotapes | 0.30 | 0.00 | 0.00 | 0.03 | 0.49 |
| 37. Difficult transitions | 0.74 | 0.06 | -0.02 | -0.13 | 0.18 |
| 38. Insists on routine | 0.78 | 0.08 | -0.01 | -0.01 | 0.08 |
| 39. Insists on time | 0.77 | 0.09 | -0.09 | 0.03 | 0.08 |
| Restricted Subscale | | | | | |
| 40. Preoccupied w/ subject | 0.14 | 0.0 | 0.08 | 0.08 | 0.65 |
| 41. Attached to object | 0.13 | 0.0 | 0.31 | 0.14 | 0.45 |
| 42. Preoccupied w/ object | 0.08 | 0.01 | 0.44 | 0.14 | 0.34 |
| 43. Preoccupied w/mvmt | 0.03 | 0.02 | 0.46 | 0.16 | 0.29 |

*Using OLS extraction with oblique quartimax rotation

Table 2. Subscale Statistics

| Subscale | Alpha | Interrater Reliability: Ohio Sample (n=28) | Interrater Reliability: J. Iverson Sample (n=19) | Mean number of typographies in SCAS (sd) | Mean score in SCAS (sd) |
|----------------------|-------|--|--|--|-------------------------|
| Ritualistic/Sameness | 0.91 | 0.67 | 0.72 | 6.65 (3.68) | 11.79 (8.65) |
| Self-Injurious | 0.84 | 0.62 | 0.88 | 2.27 (2.31) | 3.65 (4.50) |
| Stereotypic | 0.85 | 0.73 | -0.24 | 4.97 (2.61) | 8.57 (6.09) |
| Compulsive | 0.79 | 0.57 | 0.95 | 2.78 (1.79) | 5.01 (4.19) |
| Restricted | 0.78 | 0.69 | 0.41 | 2.12 (1.03) | 4.26 (2.86) |
| Total Score | - | 0.70 | 0.30 | 18.61 (8.57) | 33.14 (20.60) |

Table 3. The effects of subject characteristics on RBS-R scores*

| Associated Variable | Ritualistic/Sameness | Self-Injurious | Stereotypic | Compulsive | Restricted | Total Score |
|---------------------------------------|----------------------|-------------------|------------------|----------------|------------|-------------|
| Age | - | - | Higher in 3-5 | - | - | - |
| Sex | - | higher in females | y.o. | - | - | - |
| Race (Caucasian vs. African American) | - | - | higher in a.a. | HIGHER IN A.A. | - | - |
| Diagnosis | - | - | higher in autism | - | - | - |
| Degree of autism | D | D | D | D | - | D |
| Level of MR | d | D | D | c | C | d |
| School placement | D | D | D | d | d | D |
| Irritability | D | D | D | D | D | D |
| Aggression | D | D | D | D | D | D |
| ADHD symptoms | D | D | D | D | D | D |
| Depression | D | D | D | D | D | D |
| Anxiety | D | D | D | D | D | D |
| OCD in Family | D | - | - | D | D | D |
| Depression in Family | - | D | - | - | d | - |
| Anxiety in Family | d | - | - | - | d | d |
| Bipolar in Family | - | D | D | - | D | D |
| SSRI use | - | - | i | - | i | i |
| Antipsychotic use | D | D | - | D | - | D |
| Anxiolytic use | - | - | - | - | - | - |
| Stimulant use | - | - | - | - | - | - |

*D indicates a direct association, I indicates an indirect association, and C indicates a curvilinear association. Items in capital letters p<.01, items in lowercase p<.05

Discussion

- A five-factor solution was found in this sample due to:
 - ✓ Easily interpretable factors
 - ✓ Good measures of internal consistency
 - ✓ Reasonable fit as measured by the RMSEA statistic
- This solution was quite similar to Bodfish and colleagues original 6-subscale solution. The most noticeable difference is the collapse of the Ritualistic and Sameness subscales into one subscale (called "Ritualistic/Sameness Behavior").
- The subsequent 5-subscale version of the RBS-R was found to have sound psychometric characteristics, particularly in outpatient settings.
- Many significant effects were found between demographic characteristics and RBS-R scores. These findings are best viewed as exploratory.

- Limitations: Mail surveys of this type may not be representative of all individuals with ASD. In addition, the RBS-R was presented in a physical layout that was already divided into subscales, which could have influenced the FA. The RBS-R does not assess echolalia, and the Restricted Interests subscale is in need of expansion. Further work is needed to determine if relevant items should be added.

- Implications: There appears to be considerable structure within RRB in autism. Assessing categories of RRB may help in identifying subgroups of ASD, which could aid workers in the fields of genetics and neurobiology. The RBS-R may also be a useful tool for the assessment of treatment effects. Future studies are needed to replicate the 5-subscale structure found in the present study.

References

- Bodfish, J.W., Symons, F.J., Parker, D.E., & Lewis, M.H. (2000). Varieties of repetitive behavior in autism. *Journal of Autism and Developmental Disorders*, 30, 237-243.
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