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Toys and Gadgets: Construct Validity of Apathy in Parkinson Disease

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Abstract

Apathy is one of the primary neuropsychiatric signatures in Parkinson's disease, yet little research has addressed the construct validity of two commonly used apathy measures, the Apathy Scale and the Lille Apathy Rating Scale. The authors tested the hypothesis that apathy is associated with reduced initiative/engaged behaviors on a laboratory-based measure of apathy. Support was found for the hypothesis that apathy, as indexed by the Lille Apathy Rating Scale, is associated with reduced initiative/engagement on an experimental measure of apathy in Parkinson patients. These findings provide independent evidence for the construct validity of self-report apathy scales, beyond clinician judgment.

Keywords

Parkinson's Disease; Apathy; Psychological tests

INTRODUCTION

Apathy was first formally described by Marin 1990 as a primary "lack of motivation" resulting in defects within cognitive, affective and behavioural domains. It is characterized by decreased initiation, flattened affect and reduced interest in new experiences, which cannot be attributed to "diminished level of consciousness, cognitive impairment or emotional distress"¹. Since Marin's initial formulation a growing body of research has examined apathy across various neurological disorders, resulting in several major findings. Although associated with reduced cognitive status, apathy also occurs in cognitively intact individuals and is dissociable from depression. The underlying neural mechanisms appear to involve mesial frontal motivational systems and alterations in dopamine^{2–6}.

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The main purpose of the present study was to examine apathy in Parkinson's disease (PD) and its relationship to experimental indices of behavioural initiation. As is well known, PD is a common neurodegenerative disorder, involving dopamine depletion that affects 2% of adults over the age of 65. Primarily typified by motor symptoms (rigidity, tremor, akinesia and postural instability), the disorder also includes cognitive and mood symptoms with apathy and depression being particularly prominent². Apathy occurs in a large proportion of patients, ranging from 16.5% to 60% across studies^{3–5}. Recent studies support the view that apathy is a unique syndrome in Parkinson's disease, rather than being a symptom of depression or secondary to physical disability per se^{6, 7}. Longitudinal studies suggest that apathy symptoms in Parkinson disease progressively worsen in parallel with non-dopaminergic motor symptom, whereas depression symptoms do not^{8, 9}. Further support for the distinction between apathy and depression in PD includes the differential effects on depression and apathy symptoms following Deep Brain Stimulation (DBS)^{10, 11} and failure of antidepressant medications in treating apathy symptoms¹². In fact, serotonergic reuptake inhibitors (SSRI's) are well known to increase symptoms of apathy in non-PD samples^{13–15}.

Currently, the most widely used tool for assessing apathy in PD is the Apathy Scale (AS), a modification of Marin's original 18-item measure, the Apathy Evaluation Scale (AES)¹⁶. A more recent measure is the Lille Apathy Rating Scale (LARS)¹⁷, a semi-structured interview providing an overall apathy score as well as, four domain-specific scores, overlapping with Marin's original conceptualization of apathy. These four domains include intellectual curiosity (cognitive), action-initiation (behavioral), emotional response (affect), and concern.

Although the AS and LARS have reasonable psychometric properties and have been endorsed by a task force of the Movement Disorders Society, their criterion validity has been sparsely assessed¹⁸. This type of assessment is essential as clinicians base their evaluations on current apathy measures. Marin initially examined the criterion validity of his scale (AES) in patients with unilateral stroke and dementia¹⁶. One way this was done was by examining scores on the AES in relation to an "incidental" laboratory-based measure that quantified the extent to which patients spontaneously spent time playing with toys and gadgets¹⁶. Unfortunately, a similar approach has not been taken with Parkinson patients using the modified Apathy Scale. Because growing evidence suggests that apathy may be a key neuropsychiatric signature of Parkinson's disease, independent of depression, it becomes increasingly important to use indices of apathy that are meaningful in a real world context. Thus, we aimed to examine the construct validity of two well-recognized measures, the AS and the LARS by utilizing a measure of initiation, modeled after that of Marin¹⁶. Our first hypothesis was that high levels of apathy, as defined by two frequently used measures, the AS and the LARS, would be associated with reduced initiative and active engagement during a laboratory-based measure. Our second hypothesis was that reduced engagement during the laboratory-based measure would not be associated with depression symptom severity.

METHODS

Participants

Participants included 28 individuals with idiopathic PD and 19 healthy controls. The PD patients were recruited through the University of Florida's Center for Movement Disorders and Neurorestoration, and the controls were recruited through the community or were spouses of the patients. All PD participants met stringent diagnostic criteria for idiopathic Parkinson's disease and were free of other neurological or medical illnesses compromising participation. Half the PD participants were candidates for DBS surgery. Exclusion criteria for all participants entailed current or past history of major psychiatric disturbance (e.g. bipolar disorder, psychosis, current major depression), severe chronic medical illness (e.g. HIV, metastatic cancer), and scores in the demented range on the Mini-Mental Status exam

24. Informed consent was obtained according to University of Florida Institutional Review Board guidelines and the Declaration of Helsinki.

Table 1 depicts descriptive characteristics of the PD and control groups. As shown, the two groups did not differ in terms of demographics, although there were proportionally more males in the PD group, and they tended to have lower MMSE scores. Overall, the participants were well educated and ranged in age from 44 to 81 years. All patients were on dopaminergic medication and in the early to mid state of their disease according to the Hoehn-Yahr classification¹⁹ (On medication mean = 2.16 (SD 0.4); Off medication mean = 2.43 (SD 0.4)) and the motor score of the Unified Parkinson Disease Rating Scale (UPDRS)²⁰ (On medication mean = 23.57 (SD 8.2); Off medication mean = 34.9 (SD 11.6).) The Hoehn-Yahr and UPDRS staging took place within 6 months of participation in this study.

Baseline and Self-Report measures

All participants completed the *Beck Depression Inventory-II* (BDI-II), a 21 item self-report measure indexing depression symptom severity. The recommended cut-off 14 was used²¹.

Apathy was assessed using two scales. The *Apathy Scale* (AS) is a 14-item measure, initially created by Marin¹⁶ and later abbreviated for PD patients by Starkstein²². Each item is rated on a 4-point Likert scale, with total score ranging from 0–42. Higher scores reflect more severe apathy symptoms. The AS has high internal consistency (Cronbach's $\alpha=.76$) as well as good test-retest reliability ($r=.90$). We used the recommended cut-off 14 for classifying participants as apathetic^{18, 22}. The *Lille Apathy Rating Scale (LARS)* is a 33-item semi-structured interview that covers everyday productivity, interests, initiative, novelty seeking, motivation, emotional responses, concern, social life and self-awareness¹⁷. Items are worded as positive questions and yes or no answers are required with the exception of three questions that require answers on a 5-point Likert scale. Scores are derived for total apathy and four composite subscales: Intellectual Curiosity, Action Initiation, Emotional response and Self-Awareness. The total apathy score ranges from –36 (optimal score) to +36 (worst score), whereas subscales range from –4 to +4, with lower scores indicating higher impairment. We used the recommended cut-off of –22, to classify individuals as apathetic, based on a recent study in a US-based Parkinson sample²³ as well as a recommendation by

Sockeel and colleagues, with regards to its sensitivity ($r=.64$) and specificity ($r=.92$)¹⁷. The latter classified apathy with four global cut off values of (-36 ; -22) for non-apathetic and (-21 ; -17) (-16 ; -10) and (-9 ; $+36$) for slightly, moderately to severely apathetic, respectively, allowing for our cut-off of -22 to fall into the non-apathetic category¹⁷.

The Novelty Toy Task (NTT) All participants were given the NTT, adapted from Marin¹⁶, as an independent probe for gauging apathy. Testing took place in a quiet room in the Cognitive Neuroscience Laboratory at the McKnight Brain Institute. Participants sat alone for approximately 12 minutes with six toys/gadgets located on a table in front of them. The toys/gadgets included a slinky, kaleidoscope, IQ wooden puzzle, etch-a sketch, rubik's cube and a metal puzzle and were randomly placed on the table in a set location prior to the participant entering the room. After seating the participant, the examiner announced that she would be busy setting up the next task in an adjacent room and that participant should feel free to use the items on the table while waiting for the examiner. No other instructions were given. During the 12-minute interval, the participants were videotaped using a digital camera located across the room from the participants. Participants consented to being videotaped throughout the evaluation, though they were not told when the "critical" period of recording would occur.

For each participant, a 10-minute segment of video was extracted, beginning at the point when the examiner exited the room. Tapes were reviewed by two blinded raters (inter-rater reliability $r=0.995$), in terms of the amount of time (in seconds) spent on manipulating each of the six gadgets. From this time data, four dependent variables were calculated: a) total percentage time spent playing with gadgets (NTT-% Time Engaged) derived from time spent handling gadgets/600 seconds; b) percentage time spent on each gadget individually (NTT-% Time per Game) derived from time spent handling each individual gadget/600 seconds; c) absolute number of gadgets used by the participant irrespective of time (NTT-# of Unique Games) with scores ranging from 0–6; and d) repeated use defined by number of times participants returned to an item with a break in between (NTT-# Repeats) during a 10-minute time interval.

RESULTS

General Mood Characteristics of PD and Control Groups

As depicted in Table 1 the PD group endorsed significantly more symptoms of apathy (AS and LARS) and depression (BDI-II) than the control group. Even so, the scores of the PD patients as a group fell below the recommended cut-offs for clinically significant depression and apathy^{22, 23}. The frequency of apathy in our PD sample varied slightly, depending on what apathy scale was used, though they fell within the range of those previously reported in the literature^{3–6, 23}. The frequency of individuals exceeding the clinical cut-offs for depression was lower than that described in the older literature, but falls within the range reported by more recent studies^{21, 24}.

Novelty Toy Task: Parkinson vs. Control Groups

We first examined the performance of the PD and the control groups on the dependent variables of the NTT as a whole. Because these data were not normally distributed, non-parametric analyses (Mann-Whitney U) were performed. Results of these analyses indicated no significant difference between groups with respect to any of the 3 major dependent variables on the Novelty Toy Task; a) % Time engaged PD=58.44 (37.9) Control=64.05 (41.7), $U = 235$, $p=0.501$; b) # unique games PD=3.81 (2.2) Control=3.84 (2.3), $U = 263$, $p=0.947$; c) # repeats PD=1.07 (1.1) Control=1.26 (1.15), $U = 236$, $p=0.504$.

Apathetic vs. Non-apathetic PD Groups: Descriptive Characteristics

To test our hypothesis that apathetic PD patients would spend less time than non-apathetic PD patients using the games during the NTT, we divided the PD patients into apathetic vs. non-apathetic groups based on the recommended AS cut-off of 14²² and the LARS cut off of -22 respectively²³. Demographic and disease variables for these group divisions can be seen in Table 2. These groups did not differ in terms of demographic features and most disease characteristics. However, the apathetic group tended to have worse UPDRS-III motor scores when tested on medication and obtained significantly higher scores on the BDI-II than the non-apathetic group.

Using the *LARS*, apathetic groups did not differ in terms of demographics and disease characteristics except for the UPDRS-III on motor scores. The BDI-II tended to be higher in the apathetic than the non-apathetic PD group. With regards to *LARS* subscales, the apathetic group attained significantly worse scores on two of the subscales: Intellectual Curiosity and Action Initiation. They did not differ on Self-Awareness or Emotion.

Apathetic vs. Non-apathetic PD Groups: Novelty Toy Task performance

AS—Initial analyses using Kolmogorov-Smirnov test indicate that none of the dependent variables were normally distributed for either group when apathy was defined by the AS [Apathy: $D(13)=p < .01$]; [Non-Apathy $D(15)=p < .01$]. Thus, all subsequent analyses and effect size calculations were conducted using nonparametric statistics. Results of between-group comparisons for NTT variables are presented in Table 3. There was a strong trend ($p=0.056$, effect size 0.36) for the apathetic group to spend proportionately less time playing with toys/gadgets in comparison to the non-apathetic group. Across the six specific toys, there were no significant group differences, though apathetic patients tended to spend less time playing with Metal Puzzles. Correlation analyses (Spearman rho) between the AS, NTT variables and disease characteristics demonstrated a significant positive correlation between the AS overall score and depression $r=0.63$, $p<0.000$, explaining 41% of the variance.

LARS—Because none of the dependent variables were normally distributed when apathy group assignment was based on the LARS [Apathy: $D(14)=p < .03$]; [Non-Apathy $D(14)=p < .00$], all subsequent analyses were based on nonparametric statistics. Results of between-group comparisons are presented in Table 3. The apathetic group spent significantly less time playing with toys than the non-apathetic group with an effect size 0.36. The apathetic group also tended to play with fewer unique toys than did the non-apathetic group ($p=0.074$). Across the six specific toys, the apathetic group spent significantly less time than

the non-apathetic group on 3 of the toys; The IQ Wood Puzzle, the Etch-a-Sketch and the Metal Puzzles.

Subsequent correlation analyses (Spearman rho) between the four domains of the LARS (Intellectual Curiosity, Emotional Responses, Action Initiation and Self-Awareness), NTT variables and disease characteristics showed a significant negative correlation between the LARS overall score and NTT-%Time Engaged $r=-0.63$, $p<0.000$, explaining 40% of the variance. Thus, greater apathy was associated with less time engaged with toys and gadgets. This specific relationship appeared to be driven by the negative correlation between the NTT-%Time Engaged and the domains Intellectual Curiosity with $r = -0.57$, $p<0.001$, explaining 32% and by trend of Action Initiation $r = -0.28$, $p<0.074$ explaining 8% of the variance.

Possible Confounders

Additional analyses were conducted to examine the contribution of disease variables and mood to performance on the NTT. Results from Spearman rho correlation analyses revealed no significant relationship with motor severity scores (UPDRS-III), LED, or depression (BDI-II).

DISCUSSION

In this study, the hypothesis that high levels of apathy would be associated with reduced initiative and engaged behaviours during a laboratory based task, was tested in PD patients. We used a convenience sample of PD patients who were well-educated, predominantly male, and in the middle stages of the disorder. Fifty percent were candidates for DBS and none met criteria for clinical dementia. The prevalence of apathy (46–50%) and depression (25%) were in line with previous reports in the literature^{6, 21}. Our sample might not reflect the true prevalence of apathy in the population due to large proportion of DBS candidates. Nonetheless this study is the first to evaluate the construct validity of apathy in a sample of PD patients using the AS and the LARS.

The hypothesis, that higher levels of apathy would result in reduced initiative and engaged behaviours during the laboratory based measure, was supported by our data. Utilizing apathetic and non-apathetic grouping, we found that both the AS and the LARS demonstrated convergent validity with our laboratory-based measure of apathy, the NTT. These findings indicate that participants displaying higher levels of apathy spent less time examining gadgets/toys that were available during a relatively unstructured laboratory-based task. Furthermore, the lack of discrepancy, between PD and control groups, on NTT variables, signifies that reduced time on task was not related to having Parkinson disease per se, but rather due to the presence of apathy in the context of Parkinson disease. We demonstrated a marked difference between groups in overall time spent engaged in activity with significantly less time spent on the IQ-Wood puzzle, Etch-A-Sketch and Metal Puzzles. This broadly corresponds to the view that apathy involves decreased curiosity, interest, and motivation to engage in the environment.

Looking closer at the LARS and its composite subscales, we observed that irrespective of apathy status participants with lower time engaged during the task displayed reduced levels of initiative, interest, novelty seeking, motivation and everyday productivity. Indexed by the composite subscale Intellectual Curiosity and Action Initiation of the LARS, this finding signifies the convergent validity of the cognitive and behavioural domains of the scale¹⁷. The reduced levels of LARS domains also coincide with the cognitive and behavioural domains of recent diagnostic criteria for apathy put forth by a worldwide task force²⁵.

In the current study, the AS seemed slightly less sensitive than the LARS in detecting differences in the initiation and of use of novel gadgets and toys. AS apathy classification yielded differences between apathetic/non-aphathetic groups at a strong trend level ($p=.056$; effect size = .37) on the NTT. In contrast, group differences were stronger using the LARS ($p=.01$, effect size = .43). Future studies with larger sample sizes are important to determine whether true differences in sensitivity exist between these two measures. Although each measure has well-described psychometric properties¹⁸, there are a variety of differences in the structure of the two scales that could potentially contribute to these findings. The version of the AS used in our study was self-administered (paper-pencil version) whereas the LARS is a semi-structured interview. It is unclear whether a clinician-administered version of the AS would be more sensitive. The two scales also differ in number of items and range of scores, which is well known to contribute to increased reliability of a measure. Additionally, the LARS includes more items that specifically query “activities”. Despite differences between the AS and LARS, previous studies have found good reliability between the AS (self-administered) and LARS in both U.S.²³ and European samples¹⁷.

Our second hypothesis regarding depression was supported. In contrast to apathy, we found no relationship between severity of depression symptoms as indexed by the BDI-II and any of the NTT variables. This occurred despite higher depression scores in the apathetic PD groups. Furthermore, this implies that time spent engaged during the NTT was primarily influenced by apathy scores and not depression per se. Although no psychiatric interviews were conducted our findings add to the literature that apathy and depression symptoms are distinct constructs, at a symptomatic level of depression. Recent neuroimaging findings also support this view in older adults and patients with Parkinson disease^{26–28}.

One prevailing view regarding apathy is that it relates to dopaminergic depletion and the effects of this depletion on reward circuitry. The relationship between apathy and dopamine availability remains complex, however we found no association between LED and NTT variables. A key issue, of course, is that the amount of dopamine replacement is limited in PD due to its clinical side effect profile (i.e., disabling dyskinesias, hallucinations). Thus, it is not possible, to discount dopaminergic influences on apathy in general. These just were not apparent in our study using a measure of dopamine medication usage.

There are several confounding factors that might contribute to reduce engagement during the NTT by the “apathetic” PD groups. One relates to motor symptom severity. Indeed, motor symptoms as indexed by the UPDRS total motor score (on medication) were greater in the apathetic than non-aphathetic groups. This raises the possibility that poor motor skills may have reduced the propensity for PD patients to engage in the NTT task. However, we found

no relationship between motor symptom severity and performance variables of the NTT task (i.e., non-significant correlations).

Another issue relates to the validity of the NTT task as a true index of behavioural initiation and engagement. Although directly modelled after the one originally used to validate Marin's initial apathy measure (i.e., the Apathy Evaluation Scale)¹⁶, it is possible that the specific toys (Rubrics cube, Etch-a-Sketch, Slinky) did not engender sufficient interest and curiosity. However, this appears to be a straw argument in that task differences were found when apathy was defined using the LARS and were at trend level when the AS was used. Future studies could extend this work by examining true "ecological validity" by evaluating home base behaviours using techniques such as experience based sampling or actigraphy²⁹.

Our study has several limitations including generalizability of our sample, as the majority of our Parkinson patients were men and approximately ½ were candidates for DBS. Our sample size was relatively small as well. A broader limitation is that there are no formal DSM-IV diagnostic clinical criteria for apathy. Although Marin¹ originally, and more recent workgroups^{30, 31} have attempted to develop and validate criteria, current decisions about "apathy" classification continue to be psychometrically based.

Conclusion

This study is the first to report on the convergent validity of two of the most widely used apathy scales in the PD population. Although higher apathy scores on both measures were associated with reduced initiation and engagement on a laboratory measure (NTT) this relationship seemed slightly stronger for the LARS than the AS. Importantly, there was no relationship between severity of depression symptoms and task performance, findings in line with previous reporting's on the dissociation of apathy and depression^{32–34}. Apathy can have a devastating effect on PD patient's daily life and compliance to treatment plans^{35–36} making it imperative for clinicians to utilize scales such as the AS and LARS, that are meaningful in a real world context and approximate the construct of apathy.

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Table 1

Parkinson's and Control Groups: Descriptive Characteristics

	PD <i>n</i> =28		Control <i>n</i> =19		Statistic	p-value
Age (years)	64.64	10.2	67.26	9.2	t = -0.901	0.372
Education (years)	15.54	2.4	16.42	2.9	t = -1.143	0.259
MMSE	28.75	1.3	29.32	0.8	t = -1.758	0.087 ⁺
Sex (M/F)	21	7	8	11	$\chi^2=5.183$	0.023 [*]
Apathy Scale						
0-42 raw score	13.21	6.7	6.89	4.5	t = 3.584	0.001 ^{**}
14 #Apathy/Non-Apathy	13/15		2/17		$\chi^2=6.74$	0.010 ^{**}
% Apathetic	46%		11%			
Lille Apathy Rating Scale						
-36-+36 raw score	-21.79	6.4	-26.84 (3.5)	3.5	t = 3.144	0.003 ^{**}
-22 #Apathy/Non-Apathy	14/14		1/18		$\chi^2=10.42$	0.010 ^{**}
% Apathetic	50%		5%			
Becks Depression Inventory II						
0-63 raw score	12.07	10.1	2.63	2.7	U=70	0.010 ^{**}
14 #Depression/No Depression	7/21		0/19		$\chi^2=5.58$	0.018 ^{**}
% Depressed	25%		0%			

* P .05;

** P .01

⁺Trend level.

Data are expressed as mean/SD unless otherwise specified.

Table 2

Apathetic vs. Non-apathetic Parkinson's groups: Descriptive Characteristics

	PD Apathetic	PD Non-apathetic	Statistic	p-value		
	n=13		n=15			
Division by Apathy Scale (AS)						
AS (0-42)	19.15	4.4	8.07	3.2	U =0	0.000**
BDI-II	17.69	12.4	7.02	3.4	U=25	0.001**
Age (years)	64.77	10.9	64.52	9.8	U = 41	0.778
Education (years)	15.38	1.5	15.67	2.5	U = 88	0.683
Sex (M/F)	11	2	10	5	$\chi^2 = 1.197$	0.274
Disease Duration (years)	7.46	2.3	7.8	2.8	U = 86	0.618
UPDRS-III on**	28.50	6.6	21.53	8.1	U = 23	0.056+
UPDRS-III off**	35.14	12.4	34.77	12.1	U = 47	0.856
Hoehn & Yahr stage on**	2.21	0.3	2.15	0.3	U = 43	0.689
Hoehn & Yahr stage off**	2.50	0.4	2.38	0.4	U = 55	0.973
LED*	1029.1	776.2	707.4	545.4	U = 47	0.336
Division by Lille Apathy Rating Scale (LARS)						
LARS (-36+36)	-17.21	5.4	-26.36	3.3	U =0	0.000**
Intellectual Curiosity	-1.48	1.3	-2.86	0.6	U =38	0.005**
Emotional Responses	-2.39	1.0	-2.57	0.8	U =90	0.734
Action Initiation	-2.93	2.3	-5.56	1.8	U =30	0.001**
Self-awareness	-3.07	1.3	-2.79	1.4	U =87	0.635
BDI-II	15.43	12.7	8.71	1.4	U=57	0.062+
Age (years)	63.36	10.7	65.93	9.3	U = 84	0.511
Education (years)	14.64	1.6	16.43	2.7	U = 60	0.085+

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Sex (M/F)	12	2	9	5	$\chi^2 = 1.714$	0.190
Disease Duration (years)	7.64	3.3	7.64	2.6	U = 92	0.779
UPDRS-III on**	27.00	7.0	20.45	8.3	U = 24.5	0.029*
UPDRS-III off**	35.90	10.2	34.00	13.2	U = 44	0.468
Hoehn & Yahr stage on**	2.35	0.4	2.00	0.4	U = 33	0.132
Hoehn & Yahr stage off**	2.45	0.4	2.40	0.4	U = 57	0.797
LED*	905.5	545.7	684.8	770.1	U = 48	0.288

* P .05;

** P .01

Data are expressed as mean/SD unless otherwise specified and are not normally distributed per Kolmogorov-Smirnov test thus all comparisons used non-parametric statistics.

BDI-II: Beck Depression Inventory-II. UPDRS-III: Unified Parkinson's Disease Rating Scale (on/off medication). LED: Levodopa Equivalent Dosage

* N=23 (5 missing value)

** N = 21 (7 missing values)

Table 3

Apathetic vs. Non-apathetic Parkinson's groups: Novelty Toy task performance

	PD Apathetic	PD Non-apathetic	Statistic	p-value		
	<i>n=13</i>	<i>n=15</i>				
Division by Apathy Scale (AS)						
NTT-% Time engaged	42.3	36.4	72.4	34.5	U = 56	0.056+
NTT-% Time per Game						
Slinky	9.7	23.6	3.6	2.2	U = 95	0.925
Kaleidoscope	1.9	2.0	2.4	1.3	U = 98	1.000
IQ-Wood Puzzle	10.0	14.7	27.9	33.6	U = 70	0.200
Etch-A-Sketch	7.1	9.5	19.4	27.6	U = 73	0.242
Metal Puzzles	1.3	2.2	5.2	9.8	U = 64	0.094+
Rubik's Cube	12.4	13.9	13.9	26.7	U = 76	0.314
NTT-# Unique Games	3.6	2.1	4.1	2.1	U = 84	0.510
NTT-# Repeats	0.9	1.0	1.3	1.7	U = 89	0.661
	PD Apathetic	PD Non-apathetic	Statistic	p-value		
	<i>n=14</i>	<i>n=14</i>				
Division by Lille Apathy Rating Scale (LARS)						
NTT-% Time engaged	39.1	37.2	77.8	28.9	U = 42	0.010**
NTT-% Time per Game						
Slinky	8.6	22.8	4.2	5.1	U = 76	0.301
Kaleidoscope	1.6	1.9	2.8	2.9	U = 75	0.272
IQ-Wood Puzzle	9.1	21.1	30.1	30.1	U = 42	0.009**
Etch-A-Sketch	4.6	7.2	22.7	27.4	U = 51	0.026*
Metal Puzzles	1.4	3.2	5.4	9.8	U = 54	0.031*
Rubik's Cube	13.8	24.4	12.6	18.7	U = 96	0.905
NTT-# Unique Games	3.1	2.0	4.4	2.1	U = 60	0.074+
NTT-# Repeats	1.1	0.8	1.3	1.3	U = 80	0.381

Data are expressed as mean/SD and are not normally distributed per Kolmogorov-Smirnov test thus all comparisons used non-parametric statistics.
NTT= Novelty Toy Task.

10⁻⁴ P
**
.05⁻ P
*

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