ARTIGO ORIGINAL

BRAZILIAN VERSION OF THE DELAYING GRATIFICATION INVENTORY (DGI): TRANSCULTURAL ADAPTATION, EVIDENCES OF VALIDITY AND RELIABILITY

Versão brasileira do Delaying Gratification Inventory (DGI): adaptação transcultural, evidências de validade e confiabilidade

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ABSTRACT

INTRODUCTION: The objective of this study was to perform the transcultural adaptation of the Delaying Gratification Inventory (DGI) and evaluate its psychometric properties related to validity and reliability. **METHODS**: The inventory was translated by two bilingual researchers, followed by a back-translation and analysis of item adequacy and content by expert judges. We assessed its psychometric properties in a sample of 562 Brazilian adults, which responded DGI in the internet. We assessed reliability by internal consistency and test-retest stability, and validity by correlations with other measures and group comparisons. **RESULTS**: We found evidences of validity and reliability for the Brazilian context. We also established preliminary values for interpretation of the questionnaire in this context. **CONCLUSION**: the Brazilian version of the DGI is suitable for use in this context, allowing clinicians and researchers to use this brief instrument to evaluate the ability to delay gratification.

Keywords: applied psychology, psychometrics, clinical psychology, medical psychology, self-assessment.

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RESUMO

INTRODUÇÃO: O objetivo deste estudo foi realizar a adaptação transcultural do *Delaying Gratification Inventory* (DGI) e avaliar suas propriedades psicométricas relativas à validade e confiabilidade. **MÉTODO**: O inventário foi traduzido por dois pesquisadores bilíngues, seguido de retrotradução e análise de adequação da adequação e conteúdo dos itens por juízes capacitados. Avaliamos a validade e confiabilidade do instrumento em uma amostra de 562 adultos, que responderam ao DGI e outros instrumentos via internet. Analisamos a confiabilidade calculando a consistência interna e a estabilidade teste-reteste, e a validade por meio de correlações com outras medidas e comparação de grupos. **RESULTADOS**: Encontramos evidências de validade e confiabilidade para o contexto brasileiro. Estabelecemos ainda valores preliminares para interpretação do questionário nesse contexto. **CONCLUSÃO**: a versão brasileira do DGI mostra-se adequada ao uso nesse contexto, permitindo a clínicos e pesquisadores o uso desse breve instrumento para avaliação da capacidade de postergação de gratificação.

Palavras-chave: psicologia aplicada, psicometria, psicologia clínica, psicologia médica, autoavaliação.

INTRODUCTION

Temporal discounting is a psychophysical function related to how waiting for certain reward decrease its subjective value[1]. In most people the longer the subject must wait for a certain reward smaller its subjective value will be. Delaying gratification is a psychological process related to temporal discounting, where the subject exerts self-control to delay a specific reward[1]. According to Hoerguer and colleagues[1] delaying gratification is an aspect of self-control and self-regulation, showing shared features with impulse control and ego resilience, psychological processes related to decision-making.

The Delaying Gratification Inventory (DGI) was proposed as a brief and ease to use instrument to assess the individual ability to delay gratification[1]. In DGI the subject report how much he agrees or disagree regarding everyday situations where delaying gratification might be important. The full-scale contains 35 questions divided in 5 subscales, representing specific aspects of delay gratification: food, money, physical, achievement and social. A short version was also proposed by authors, containing 10 questions (two from each subscale). It is one of the few self-reported measures of delaying gratification available in psychology and psychiatry.

The inventory development and the analysis of its psychometric properties was described in detail by the authors[1]. Since its publication the DGI was used in different experimental and clinical contexts, including assessment of mental[2] and physical disorders[3]. DGI psychometric properties were investigated in a large heterogeneous sample of adults from different countries and cultures, including North America, Europe, Asia, Mexico, Australia and others[1]. From their large dataset, one of the regions with fewer respondents was South America, accounting for less than 1% of responses. Since the original study of DGI we found no adapted versions for this setting.

Our objective is to perform the transcultural adaptation of DGI for Brazilian-Portuguese speakers, assess its psychometric properties (validity and reliability) and provide preliminary normative data in a large Brazilian sample.

METHODS

Study Design
Cross-sectional study with convenience sample.

Participants
The research is accordance with the Helsinki Declaration and was approved by the local ethics board (registry: 57378016.5.0000.5134). All subjects gave consent for participation. We assessed 562 Brazilian adults in an online platform for the present study. Most of them were female (68%), white (55%), single (55%), with high school education (53%) and a study and work routine (35%). Standardized socioeconomic data (Brazilian Economic Classification Criteria – avaiable at www.abep.com) was collected for 366 subjects, and most of them (50%) were middle-class according to Brazilian standards. When questioned about previous mental disorders 23% reported at least one disorder and 28% were in use of medication.

Table 1: participant's description and sociodemographic data

|		N (%)
Age group	18-21	152 (27%)
	22-28	208 (37%)
	29+	202 (36%)
Sex	Male	179 (32%)
	Female	383 (68%)
Marital Status	Single	404 (72%)
	Married	137 (24%)
	Divorced	21 (4%)
Education	Basic	13 (2%)
	High School	300 (53%)
	College	249 (44%)
Routine	Study	187 (33%)
	Work	153 (27%)
	Study and Work	196 (35%)
	Neither study or work	26 (5%)
Socioeconomic status[1]	High	88 (24%)
	Middle	182 (50%)
	Low	96 (26%)
History of mental disorder	No	435 (77%)
	Yes	127 (23%)
Current use of psychotropic	No	402 (72%)
	Yes	160 (28%)
Depression (SRQ-20)	No	406 (73%)
	Yes	156 (27%)
ADHD (ASRS-18)[1]	No	302 (83%)
	Yes	64 (17%)

1 – n=366. SRQ-20: Self-reporting questionnaire 20, Adult Attention Deficit/Hyperactivity Disorder (ADHD) Self-Report Scale

Translation and transcultural adaptation of the Delaying Gratification Inventory

The original version of DGI was translated for Brazilian Portuguese after consent from the original authors. A detailed description of the adaptation process is shown in Figure 1. Briefly, the initial translation was performed independently by two members of our team. After the initial and the production of a consensual version, the test was sent to back-translation by to independent translators. A synthesis of the back-translation was done with help of two Australian researchers, which commented on each item and suggested changes. After this correction, we sent the Brazilian version to a panel of experts (psychologists and psychiatrists with masters or Ph.D. in different areas) which commented on every item. We calculated a content validity index (% of agreement on the adequacy of each item) for all judges and furthers adjusted two items where problems were detected by the expert panel. After the latter corrections the final Brazilian version of DGI and then submitted to back-translation by a certified translator. The original and back-translated versions were evaluated by an English-native speaker (Psychiatrist), which recommend modifications. The modified version was submitted to a panel of experts which judged the language clarity for each of the items. Items judge as ambiguous or unclear were further modified by the

researchers and resubmitted to the expert panel. When all items were judged clearly understandable, a final version was proposed and used for the following analysis.

The translated version and brief instructions of usage and scoring are freely available at www.labepneuro.com.
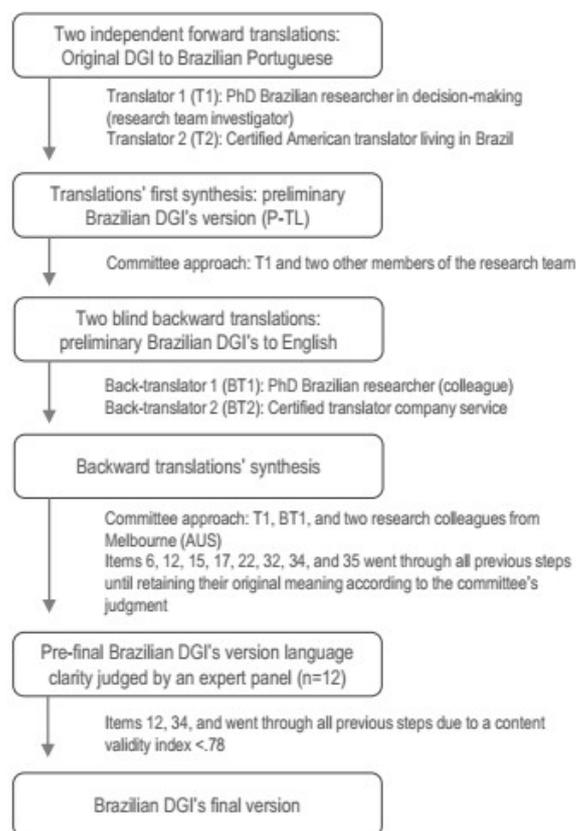
Figure 1: Step-by-step procedures of translation and of DGI's translation and adaptation to the Brazilian context.

Assessment

The following measures were used in participants assessment. Those measures were adopted as external criteria do test DGI validity.

Self-Reporting Questionnaire 20 (SRQ-20)[4]: The SRQ-20 is a self-reporting measure with twenty dichotomous (yes / no) answers, where the subject must report its feelings and symptoms regarding anxiety and depression in the last month. Examples of items presented in the questionnaire are: "Do you have frequent headaches? Have you lost interest in things?" A high score on this instrument indicates more frequent/intense psychological symptoms. In this study, 18% of our sample showed clinical symptoms of depression and anxiety according to its cutoff score,

Adult Self-Report Scale (ASRS-18) of Attention Deficit Hyperactivity Disorder (ADHD)[5]: The use of this scale

allows the characterization of ADHD symptoms in adults. It has 18 questions scored by frequency, 9 items for inattention and 9 for hyperactivity-impulsivity. Examples of items presented in this questionnaire: "How often do you make mistakes for lack of attention when you have to work on a boring or difficult project?", Higher scores indicate greater frequency and intensity of symptoms. In our sample, 17% of participants showed clinical symptoms of inattention or hyperactivity-impulsivity according to its cutoff score.

Abbreviated Barratt Impulsivity Scale (ABIS-11)[6]: ABIS is a measure of impulsivity where the subject responds to how often he exhibits behaviors commonly related to impulsivity. The abbreviated version has 13 items, scored based in how often the subject show impulsive behavior. Items include "I don't pay attention" and "I act on impulse". Higher scores indicate a greater expression of impulsivity.

Cognitive Failures Questionnaire (CFQ)[7]: A measure of cognitive complaints in daily life, in which the subject answer of often they show small errors of memory, attention, and language in everyday life. Representative items: "Do you forget your commitments?", "Do you have problems making your mind?". Higher scores represent more cognitive failures.

General Perceived Self-efficacy Scale (GPSS)[8]: A ten-item questionnaire of self-efficacy, developed to assess general aspects of this psychological construct. Representative items: "I can solve most of my problems if I work hard enough" and "If I`m in trouble I usually find a way out". Higher scores represent higher self-efficacy.

Ten Item Personality Inventory (TIPI)[9]. This instrument evaluates the personality based on the "Big Five" personality model (neuroticism, extraversion, agreeableness, conscientiousness, and openness). Each item is represented by a positive and negative question, where the subject must judge how well the item fit its experience. Questions include "I see myself as someone reserved, quiet" and "I see myself as someone open to new experiences, complex". Higher scores represent a higher expression of the personality trait.

Procedures

After data collection, we designed the assessment procedures as follows. To test for DGI reliability we adopted two different techniques, assessment of internal consistency (based on the association of each test item) and test-retest stability (how much we observe a change in test scores across multiple assessments). The analysis of test validity was done correlating DGI scores with other psychological measures. We expected significant associations with measures of mental health (depression-anxiety, inattention, hyperactivity, impulsivity and cognitive failures) and personality. Participants with difficulty in

delaying gratification should present higher levels of psychopathology, while personality traits related to self-control should be positively associated with DGI scores.

Statistical Analysis

Internal consistency was assessed using the McDonalds omega and split-half coefficients (due the multidimensionality of the scale). Test-retest stability was assessed using the intraclass correlation coefficient (ICC) in a subsample of 30 subjects assessed two times with one-week interval. We tested validity by correlating (Spearman correlation, due to non-normal distribution of some tests) DGI and other psychological measures expected to be associated with delayed discounting (as reported in Assessment and Procedures).

To test possible clinical applications of DGI we compared participants with clinical symptoms of depression and ADHD, according to SRQ-20 and ASRS-18 cutoffs, with participants without history of mental disorders and below the cutoff in these scales, using one-way ANOVA and Bonferroni-corrected post hoc tests. Finally we reported preliminary normative data based on the latter participants.

All procedures were performed in SPSS 22.0.

RESULTS

Reliability analysis is show in Table 2. The DGI showed high internal consistency for its total score, short version, food, money and achievement subscales (internal consistency >0.7, test-retest stability>0.75). However, the social and physical subscales showed relatively low internal consistency (ranging from 0.557 to 0.665), although test-retest reliability was satisfactory (0.831 and 0.796 respectively).

Higher scores in DGI are representative of higher capacity to delay gratification. In this sense we expect negative correlations with psychopathology (SRQ-20 and ASRS-18 scores), impulsivity (ABIS-11) and cognitive failures (CFQ). On the other hand, we would expect positive correlations with measures related to self-control, such as self-efficacy (GPSS) and personality traits emotional stability and conscientiousness (TIPI). Correlations between the DGI scores and other measures are shown in Table 2. Correlations were stronger between the DGI full scale and the other measures when compared with the short version of the questionnaire. The pattern of correlations between DGI subscales and the other selected measures were more heterogeneous, reflecting the relative independence of each dimension.

Table 2: Correlation coefficients (Spearman correlation) between DGI and other psychological measures and reliability analysis.

| | Delaying Gratification Inventory | | | | | | |
	Total Score	Short Version	Food	Physical	Social	Money	Achievement
SRQ-20	**-0.320**	**-0.226**	**-0.263**	**-0.334**	**-0.105**	**-0.238**	-0.034
ASRS-18-Inattention	**-0.454**	**-0.318**	**-0.386**	**-0.458**	**-0.195**	**-0.297**	**-0.101**
ASRS-18-Hyperactivity	**-0.375**	**-0.240**	**-0.251**	**-0.339**	**-0.247**	**-0.280**	-0.074
ABIS-11	**-0.388**	**-0.287**	**-0.295**	**-0.299**	**-0.454**	**-0.313**	**0.147**
Cognitive Failures Questionnaire	**-0.477**	**-0.322**	**-0.431**	**-0.449**	**-0.220**	**-0.337**	-0.055
GPSS	**0.248**	**0.222**	**0.224**	**0.174**	**0.185**	**0.167**	0.050
TIPI - Agreeableness	**0.225**	**0.158**	0.081	**0.174**	**0.263**	**0.115**	**0.111**
TIPI - Extraversion	-0.070	0.013	-0.057	-0.047	-0.027	-0.067	-0.014
TIPI - Openness to Experiences	**0.097**	**0.095**	**0.098**	0.057	0.014	0.044	**0.097**
TIPI - Conscientiousness	**0.448**	**0.347**	**0.303**	**0.422**	**0.194**	**0.283**	**0.203**
TIPI - Emotional Stability	**0.314**	**0.248**	**0.328**	**0.314**	**0.209**	**0.225**	**-0.116**
Reliability: McDonalds ω	0.873	0.717	0.759	0.625	0.663	0.855	0.735
Reliability: Guttmann Split-Half	0.867	0.753	0.741	0.557	0.655	0.856	0.749
Reliability: Test-Retest	**0.865**	**0.751**	**0.916**	**0.796**	**0.831**	**0.913**	**0.834**

SRQ: Self Reporting Questionnaire-20, ASRS-18: Adults Self-Reported Scale (ADHD), ABIS: Abbreviated Barratt Impulsiveness Scale, General Perceived Self-Efficacy Scale, TIPI: Ten Items Personality Inventory. Statistics in bold face are significant ($p < 0.05$)

Descriptive data for DGI scores and performance of subjects with clinical symptoms of depression/anxiety and ADHD are show in Table 3. We found significant differences in all DGI measures ($p < 0.001$), except for the Social subscale ($p = 0.152$). Post hoc comparisons suggests a higher capacity of delay gratification for the control group when compared to depression/anxiety and ADHD groups, and no significant group differences between those. An exception occurred for the Achievement subscale, where control and anxiety/depression subgroups did not differ but showed higher scores than ADHD. Table 4 presents detailed descriptive data for the Control group and may be used as preliminary normative values for DGI.

Table 3: Performance of controls, depression/anxiety and ADHD participants and group comparisons.

| | Control (1) | | Depression Anxiety (2) | | ADHD (3) | | F | Post hoc |
	M	SD	M	SD	M	SD		
Total score	123.94	13.19	115.5	13.18	111.13	17.32	**34.51**	1>2, 1>3, 2=3
Short version	35.19	3.75	33.54	3.87	32.75	4.90	**15.67**	1>2, 1>3, 2=3
Food	22.29	4.52	19.97	3.98	19.75	4.94	**17.6**	1>2, 1>3, 2=3
Physical	25.10	4.26	22.07	3.97	21.00	5.74	**37.78**	1>2, 1>3, 2=3
Social	24.60	3.55	24.16	3.56	23.70	5.06	**1.89**	-
Money	27.69	4.99	25.12	5.49	24.94	7.92	**14.02**	1>2, 1>3, 2=3
Achievement	24.26	3.88	24.18	4.18	21.73	3.93	**11.44**	1=2, 1>3, 2>3

Control: subjects without history of mental disorders and score below the cutoff the cutoff scores for depression/anxiety in the self-reporting questionnaire-20 and ADHD adults self-reporting scale 18. Groups 2 and three were defined using the same instruments. M=Mean, SD=Standard-deviation. Group comparisons performed by ANOVA and post hoc tests are corrected by the Bonferroni method. Bold face comparisons are significant ($p < 0.05$).

Table 4: Preliminary normative values for DGI based on controls (n=384) data

Percentile	Delaying Gratification Inventory (DGI)						
	Total Score	Short Version	Food	Physical	Social	Money	Achieve
1	91	26	12	15	17	14	14
5	101	30	15	18	19	19	17
10	107	30	16	19	20	21	19
25	115	33	19	22	22	25	22
50	125	36	22	25	24	28	24
75	133	38	26	28	27	31	27
90	141	40	28	31	30	34	29
95	146	41	30	32	31	35	31
99	152	43	32	34	-	-	32

DISCUSSION

Our results suggest a consistent pattern of associations between DGI and measures of mental health, personality, cognitive failures and self-efficacy, an evidence of validity. Reliability analysis suggests high internal consistency and/or temporal stability of DGI total score, subscales and the short version, although the coefficients for physical and social subscales were suboptimal. Finally, differences between controls, participants with clinical symptoms of ADHD and depression were different for most of the subscales, except for the social measure. Overall, our results are in accordance to the original study[1].

Reliability values were values were generally in the acceptance range in psychometric studies[10,11]. Internal consistency for social and physical subscales were below the ideal values in psychometric studies but was in the acceptable range for a small set of items, where each question may significantly influence overall reliability scores, according to Mitrushina and colleagues[11]. Test-retest coefficients showed good temporal stability. In all reliability indexes the full version of DGI (0.86-0.87) showed higher reliability when compared to the short version (0.71-0.75).

The correlation analysis with other measures suggests convergent correlations with measures indicative of lower self-control, including impulsivity, hyperactivity, depressed mood, inattention and cognitive failures. In the authors proposed model for self-regulation, those measures represent in different extents the cognitive processes related to failures of self-control of behavior, emotions or thoughts. Those results emphasized the role of delaying gratification in different aspects of self-control[1,12,13]. The correlation with personality factors showed coefficients very similar with the original study[1], where we found very weak or non-significant correlations between DGI scores and extraversion and openness to experience, moderate-to-strong correlations with measures related to conscientiousness, and moderate-low correlations with measures of agreeableness and emotional stability.

We also documented significant group differences between controls and subjects with clinical symptoms of depression[14], anxiety[15] and ADHD[13]. Problems with self-regulation, including delaying gratification are common in both clinical groups, and lead to significant psychological distress[3]. Those results are further evidence of validity for the Brazilian version of DGI.

Our study has limitations which should be addressed. We assessed a convenience sample non-representative of the Brazilian population, so our conclusions might not be generalized for this setting. Our fit-indexes for the confirmatory factor analysis were also relatively low, suggesting that maybe the Brazilian version of DGI could be improved by changing its questions or scoring system. These limitations should be addressed in future studies.

CONCLUSION

We performed a transcultural adaptation and analysis of reliability and validity of DGI for Brazil. Our results provided evidence of internal consistency, temporal stability and validity by content analysis corrections with other measures. We provided preliminary normative parameters for its use in Brazil. Further studies may investigate other psychometric characteristics and its clinical applicability.

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