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Cross-cultural adaptation and validation of the Brazilian Portuguese version of the Maladaptive Daydreaming Scale (BMDS-16)

Adaptacja międzykulturowa i walidacja brazylijsko-portugalskiej wersji Skali Dezadaptacyjnego Marzycielstwa (BMDS-16)

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Abstract

Introduction and objective: Daydreaming is a common mental experience in which one gets immersed in stories, narratives, images, and fantasies, imagining them as they were real, although knowing they are unreal. Maladaptive daydreaming is characterised by an excessive and compulsive involvement on fantasy which in severe cases replaces human interaction and impairs academic, interpersonal, or vocational functioning. It can be measured using the 16-item Maladaptive Daydreaming Scale (MDS-16) which has been translated into 39 languages but validated only in eight. This study investigates the psychometric properties of the Brazilian version of this instrument (BMDS-16). **Materials and methods:** A total of 2,682 Brazilian adults (78% women; M_{age} = 26.6 years, standard deviation, SD = 7.0) participated in the study. Exploratory and confirmatory factor analyses provided support for a three-factor structure of BMDS-16 with satisfactory reliability indices. **Results:** Maladaptive daydreaming had positive but weak correlations with attention deficit hyperactivity disorder symptoms and dissociative experiences. As a result of the latent profile analysis, a cut-off score of 63 for maladaptive daydreaming was suggested. Based on this cut-off score, 18.6% of our sample could be considered maladaptive daydreamers. The general reliability of the scale was good (McDonald's ω = 0.93; Cronbach's α = 0.90). **Conclusions:** Overall, BMDS-16 demonstrated sound psychometric properties and applicability for general use to assess maladaptive daydreaming. The daydreaming tendency should be carefully examined in people with scores above 63, who may use fantasy in a maladaptive way, causing impairment in daily functioning and potentially conflicting with treatment.

Keywords: maladaptive daydreaming, inattention, absorption, amnesia, assessment

Streszczenie

Wprowadzenie i cel: Fantazjowanie to naturalne doświadczenie psychiczne, podczas którego ludzie tworzą w umyśle historie i obrazy, wyobrażając je sobie tak, jakby były prawdziwe, chociaż wiedzą, że są jedynie wyobraźnią. Z drugiej strony dezadaptacyjne marzycielstwo (*maladaptive daydreaming*) to nadmierne i kompulsywne angażowanie się w fantazje, które zastępuje interakcje międzyludzkie i upośledza funkcjonowanie szkolne, interpersonalne lub zawodowe. Do jego pomiaru służy 16-punktowa Skala Dezadaptacyjnego Marzycielstwa (Maladaptive Daydreaming Scale, MDS-16), którą przetłumaczono na 39 języków, ale tylko osiem poddano walidacji. W niniejszym badaniu sprawdzono właściwości psychometryczne brazylijskiej wersji tej skali (BMDS-16). **Materiał i metody:** W badaniu uczestniczyło łącznie 2682 dorosłych Brazylijczyków (78% kobiet; M = 26,6 roku, odchylenie standardowe, *standard deviation*, SD = 7,0). Eksploracyjne i konfirmacyjne analizy czynnikowe potwierdziły trójczynnikową strukturę BMDS-16 o zadowalających wskaźnikach rzetelności. **Wyniki:** Dezadaptacyjne marzycielstwo miało dodatnią i umiarkowaną korelację z objawami zespołu nadpobudliwości psychoruchowej z deficytem uwagi oraz dodatnią, ale słabą z doświadczeniami dysocjacyjnymi. W wyniku analizy profili ukrytych zaproponowano punkt odcięcia dla dezadaptacyjnego marzycielstwa wynoszący 63. Na podstawie tego wyniku

można przyjąć, że 18,6% naszej próby cechowało dezadaptacyjne marzycielstwo. Rzetelność ogólna skali była dobra (ω McDonalda = 0,93; α Cronbacha = 0,90). **Wnioski:** Skala BMDS-16 wykazała solidne właściwości psychometryczne i jest przydatna do ogólnego użytku w ocenie dezadaptacyjnego marzycielstwa. Należy dokładnie badać skłonność do marzycielstwa u osób z wynikami powyżej 63, gdyż mogą one wykorzystywać fantazjowanie w sposób dezadaptacyjny, upośledzający codzienne funkcjonowanie i potencjalnie kolidujący z leczeniem.

Słowa kluczowe: dezadaptacyjne marzycielstwo, zaburzenia koncentracji uwagi, absorpcja, amnezja, ocena kliniczna

INTRODUCTION

Daydreaming is a natural human activity utilised from early childhood to develop cognitive functions, experiment with different roles, foster planning, setting and achieving goals, and aiding emotional regulation (Singer, 1966; Singer and McCraven, 1961). It involves immersion in fantasies, stories, and narratives as if they were happening in the moment, despite knowing that they are actually not real (McMillan et al., 2013). Some researchers consider absorption in fantasy a normative kind of dissociation experience (Butler, 2006). Mind-wandering and similar terms such as unrelated thought, unintentional thought, stimulus-independent thought, task-unrelated thought, meandering, or unguided thought are also described in literature (Seli et al., 2018), but this relates to a redirection of attention from a primary task to an internal stimulus. In contrast to that, daydreaming does not necessarily occur while one is exposed to a primary task (Mrazek et al., 2013). Daydreaming also requires a considerable degree of intentionality because people commonly induce their fantasy experiences and concentration (a need to focus to stay connected to the imagined scenes and stories), which makes it different from mind-wandering (Soffer-Dudek, 2019).

When daydreaming is used excessively (sometimes many hours a day) or beyond control, it often contributes to avoiding social contacts and impairs academic or vocational lives (Pietkiewicz et al., 2023b; Somer and Herscu, 2017; Somer et al., 2017). Somer (2002) coined the term maladaptive daydreaming (MD) to describe this phenomenon. People with MD regularly get involved in highly complex and structured fantasy activity, develop scenarios, worlds, stories, and different characters representing people from real life or derived from books, movies, and games (Bigelsen and Schupak, 2011). The content of MD commonly remains constant and evolves over months and years, or changes over time (Somer et al., 2016a). According to Pietkiewicz et al. (2018), for many maladaptive daydreamers (MDers) fantasy becomes more important than anything else, brings about an arousing "buzz" or a "high", and leads to unpleasant states when activity is discontinued or disturbed. Increased amounts of time spent on daydreaming and avoiding social engagement, or failing to fulfil one's obligations, inevitably cause intra- and interpersonal conflicts.

MD is often a solitary behaviour and, experiencing shame, MDers rarely disclose this tendency to others or minimise the significance of their daydreaming (Bigelsen and Schupak, 2011; Ghinassi et al., 2023; Pietkiewicz et al., 2023a, 2018; Somer et al., 2016a, 2017). Some MDers are so absorbed in their fantasies that they ignore stimuli from the environment, which impairs their attention and coding. Confrontation and being caught fantasising or ridiculed for doing so may increase distress (Ferrante et al., 2022). It is quite probable that, absorbed in a fantasy world, some MDers may talk out loud to imaginary people or perform movements and gestures (e.g. mouthing, moving around, blinking, dancing, holding imaginary objects, riding a bicycle), which seem important for both inducing and maintaining MD (Somer et al., 2016a). Using music is also a common trigger and for some people it is indispensable to keep them absorbed in daydreaming (Jopp et al., 2019; Schimmenti et al., 2019).

There is little research exploring MD in different clinical groups. In a recent study, MD was significantly more common in patients with a narcissistic personality disorder, compared to mixed-clinical and non-clinical populations (Pietkiewicz et al., 2023a). The syndrome was also found in individuals diagnosed with depression, anxiety, attention deficit hyperactivity disorder (ADHD), obsessive-compulsive disorder (OCD), post-traumatic stress disorder (PTSD), psychotic disorders, dissociative disorders, and addiction to the internet, pornography or gaming (Pietkiewicz et al., 2018; Ross et al., 2020; Sharma and Mahapatra, 2021; Somer, 2002; Theodor-Katz et al., 2022).

Two studies raise questions about overlapping features between MD and ADHD symptoms: among 39 MDers examined by Somer et al. (2017), 76% also presented ADHD features, and 20.5% of the ADHD sample (n = 83) studied by Theodor-Katz et al. (2022) met criteria for MD. Kessler et al. (2005) identify two main ADHD domains, namely: 1) inattention, and 2) hyperactivity/impulsivity. Experiences indicating the first can be reported by some MDers, who may also have problems remembering appointments or obligations, avoiding tasks, or delaying getting them started, fidgeting or squirming with their hands when sitting for a long time, having difficulty keeping attention when doing boring or repetitive work, or having difficulty concentrating on what people say, even when they are speaking to them directly. These examples are used in the Adult ADHD Self-Report Scale for measuring ADHD (Kessler et al., 2005).

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However, attention problems in ADHD individuals result from a tendency to become easily distracted with external stimuli and difficulties to sustain attention in primary tasks at hand (Kuntsi et al., 2014). MDers, on the other hand, seem to withdraw attention from the outside world, focusing on the content of their fantasies. MD can thus create attention deficit as a side-effect (Theodor-Katz et al., 2022). Nevertheless, this requires further research to investigate whether and how people with ADHD may use MD as an emotional regulation strategy.

Literature also describes relationships between MD and some dissociative experiences, which made some researchers posit that MD might be a dissociative disorder (Soffer-Dudek and Somer, 2022). Moderate positive correlations have been found between MD and the general score in the Dissociative Experiences Scale (DES), while the relationship between MD and the Absorption subscale was positive and high (Somer et al., 2016b). Moderate to high correlations between MD and Absorption were also found by Jopp et al. (2019) and Schimmenti et al. (2019).

Dissociative absorption occurs when an individual is highly absorbed in their own thoughts, feelings, or sensory perceptions to the extent that they become disconnected from their immediate surroundings or reality. This overlaps with the experiences of MDers, who can be so immersed in their inner world that they lose track of time, forget where they are, or experience a sense of detachment from their body (Soffer-Dudek et al., 2015). Furthermore, MD can also impair coding of information, leading to problems recalling information, which has not actually been stored in their memory (dissociative amnesia). Thus, MDers may get higher scores on both Amnesia and Absorption subscales in DES. Difficulties recalling things may not only result from structural dissociation of the personality (when information is stored by one dissociative part but not another) but also from inattention or absorption, leading to failure in encoding information, for instance, due to daydreaming. Thus, further research exploring the links between MD, absorption, and amnesia might help clinicians identify similarities and subtle differences between these phenomena.

The most popular instrument for assessing the levels of excessive and compulsive daydreaming is the Maladaptive Daydreaming Scale (MDS) (Somer et al., 2016b). It was originally developed as a 14-item self-report questionnaire about daydreaming experiences and their impact on daily life. Later, two new items were added to the original instrument, based upon observations that music was important in activating and maintaining MD. This led to developing MDS-16 in its current form, presenting four factors: Yearning (desire to indulge in daydreaming), Impairment (difficulties and suffering resulting from this activity), Kinesthesia (physical or perceptual experiences which accompany daydreaming), and Music (for the activation or maintenance of fantasy). Each of the subscales showed high temporal consistency in test–retest reliability (Somer et al., 2017), although alternative one-, two-, three- and four-factor solutions were proposed in different language versions (see Appendix A).

In recent decades, there has been a growing interest among researchers in MD. MDS-16 has been translated into 39 languages, but validated only in eight language versions: Arabic, French, Hebrew, Hungarian, Italian, Polish, and Turkish in addition to English. This may be why there are still few studies on MD in the different clinical groups. There has been no Brazilian Portuguese version of this instrument, subsequently MD is largely ignored in mental healthcare in Brazil and other Portuguese-speaking countries. Developing a cross-cultural adaptation of MDS-16 is likely to aid screening and enable addressing its symptoms during treatment. The aim of this study was to adapt and measure psychometric properties of the Brazilian version (BMDS-16). We tested two hypotheses:

H1. BMDS-16 will correlate positively with ADHD inattention.

H2. BMDS-16 will correlate positively with DES general score and its subscales.

CROSS-CULTURAL ADAPTATION OF BMDS-16

First, three translators – Brazilian psychologists, fluent in English – independently conducted translations of the MDS-16. Next, a researcher compared the translations to create a preliminary version of the translation. He also discussed the adequacy of this version with four external consultants – two of whom had broad clinical experience and the other two were expert in developing psychometric instruments. Then, 34 people were invited by social media to participate in a testing stage of this preliminary version and filled-in the questionnaire via SurveyMonkey. They also answered additional questions: 1) Is the language clear enough? 2) Is the language appropriate for your age group? 3) Did you understand the questions? and 4) This item has to be modified (yes/no, with a blank space for participants to write their suggestions). Each item's content validity index (CVI) was calculated after this data collection. All items were found to be suitable, with a CVI ranging from 0.865 to 0.947. Participants' suggestions were applied to increase clarity, appropriateness, and comprehension of the items. This version was back-translated by a native Anglophone with experience in English grammar, and the back-translation was sent to one of the authors of the original MDS-16 for assessment. Subsequently, two items were slightly modified to maintain the original English meaning, and the final version of the BMDS-16 was obtained.

METHODS

Participants

The total sample included 2,682 individuals from all Brazilian regions, mainly from the Southeast (47.2%), South (21.9%),

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Authors	Version	Sample (*N*)	Additional measurements	Factor analysis and factors	*M*/*SD*	MD cut-off point	Cronbach's α
Abu-Rayya et al., 2019	MDS-16 Arabic	180	Toronto Alexithymia Scale Rosenberg Self-Esteem Scale Quality of social relations Life satisfaction, social phobia, social isolation, depression, anxiety and stress symptoms	EFA with the direct oblimin rotation method Two factors: Immerse Daydreaming (id) Distress and Impairment (di)	MDrs ($n = 95$) 61.25/17.65 nMDrs ($n = 85$) 26.48/16.89	45	0.94 0.889 (id) 0.92 (di)
Balestra (2019)	MDS-14 French	456	Hospital Anxiety and Depression Scale Dissociative Experiences Scale Sense of Presence in Daydreaming	EFA Three factors: Yearning (y) Impairment (i) Kinesthesia (k)	MDrs ($n = 77$) 49.93/16.99 nMDrs ($n = 51$) 25.91/14.28	36	0.90 0.84 (y) 0.88 (i) 0.65 (k)
Jopp et al., 2019	MDS-14 Hebrew	280 retest ($n = 59$)	Creative Experiences Questionnaire Sense of Presence in Daydreaming WHO ADHD Self-Report Scale Obsessive-Compulsive Inventory Revised Hebrew Dissociative Experiences Scale Psychosis Screener	CFA Three factors: Yearning (y) Impairment (i) Kinesthesia (k)	MDrs ($n = 41$) 40.05/22.02 nMDrs ($n = 167$) 11.90/12.17	25	0.92 0.81 (y) 0.92 (i) $r = 0.65$ (k)
Metin et al., 2022	MDS-16 Turkish	377	Beck Depression Scale Dissociative Experiences Scale Attention Deficit & Hyperactivity DSM Scale	EFA Two factors: Dreaming Degree Distress and Disruption Experienced	31/15	Not reported	0.89
Pietkiewicz et al., 2023b	PMDS-16 Polish	491	Self-assessment of daydreaming's negative effect WHOQOL-BREF Ego Resiliency Scale (ERS)	EFA One factor	MDrs ($n = 31$) 50.44/24.57 nMDrs ($n = 166$) 25.57/17.39	42	0.941
Sándor et al., 2020	MDS-16 Hungarian	160	Tellegen Absorption Scale (TAS) Adverse Childhood Experience Questionnaire (ACE-10) shortened version Structured Questionnaire of Daydreaming Experience	Not reported	Not available	35	0.957
Schimmenti et al., 2019	MDS-16 Italian	468	Personality Inventory for DSM-5 (Brief Form for Adults) Symptom Checklist–90–R Traumatic Experiences Checklist, Dissociative Experiences Scale–II, Relationship Questionnaire, 20-item Toronto Alexithymia Scale, Experiences of Shame Scale	EFA Two factors: Interference with Live (iwl) Sensory-Motor Retreat (smr)	46.68/22.35 MDrs ($n = 135$) 69.77/14.10 nMDrs ($n = 333$) 37.33/17.83	51	0.93 0.95 (iwl) 0.83 (smr)
Somer et al., 2016b	MDS-14 English	447 retest ($n = 66$)	Creative Experiences Questionnaire WHO Adult ADHD Self-Report Scale Obsessive-Compulsive Inventory Revised Dissociative Experiences Scale Psychosis Screener Sense of Presence in Daydreaming	EFA, CFA Three factors: Yearning (y) Impairment (i) Kinesthesia (k)	MDrs ($n = 341$) 62.67/20.53 nMDrs ($n = 106$) 11.20/13.88	25	0.95 0.90 (y) 0.94 (i) 0.80 (k)
Somer et al., 2017	MDS-16 English	62	Structured Clinical Interview for Maladaptive Daydreaming	Not reported	MDrs ($n = 31$) 76.03/18.2 nMDrs ($n = 31$) 21.94/11.59	**40***	Not reported

* Initially, a cutoff point of 50 was reported but it was later corrected in an errata by Soffer-Dudek (2021).

Appendix A. Validation studies for the MDS in different language versions

and Northeast (16.3%). 78% identified themselves as cisgender women, 16% as cisgender men, and 5.74% were classified as other (including transgender women, transgender men, and non-binary individuals). They were between 18 and 69 years old ($M = 26.64$; standard deviation, $SD = 6.99$), single (74.9%), with an income of up to three Brazilian minimum wages (73.6%) and completed high school (48.7%) or undergraduate (31.1%). The majority identified themselves as White (61.2%), followed by Mixed (27.2%), Black (9.5%), Asian (1.4%), and Indigenous (0.5%). Tab. 1 shows the sociodemographic characteristics of the participants in the total sample and in two subsamples.

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Characteristic	Total sample (*N* = 2,682)	Subsample 1 (*n* = 338)	Subsample 2 (*n* = 2,344)
Age – *M* (*SD*)	26.64 (6.99)	27.04 (6.91)	26.59 (7.00)
Geographic region – *n* (%):			
• Southeast	1,266 (47.20)	160 (47.34)	1,106 (47.18)
• South	588 (21.92)	63 (18.64)	525 (22.40)
• Northeast	437 (16.29)	66 (19.53)	371 (15.83)
• Centre-West	245 (9.13)	32 (9.47)	213 (9.09)
• North	129 (4.81)	17 (5.03)	112 (4.78)
• not reported	17 (0.63)	-	17 (0.72)
Marital status – *n* (%):			
• single	2,009 (74.91)	263 (77.81)	1,746 (74.49)
• civil union	309 (11.52)	32 (9.47)	277 (11.82)
• married	297 (11.07)	35 (10.35)	262 (11.18)
• divorced	63 (2.35)	8 (2.37)	55 (2.35)
• not reported	4 (0.15)	-	4 (0.17)
Income*– *n* (%):			
• no income	788 (28.38)	89 (26.33)	699 (29.82)
• less than 1 minimum wage	602 (22.45)	59 (17.45)	543 (23.16)
• from 1 to 3 minimum wages	611 (22.78)	97 (28.70)	514 (21.93)
• from 3 to 6 minimum wages	485 (18.08)	69 (20.41)	416 (17.75)
• from 6 to 9 minimum wages	103 (3.84)	13 (3.85)	90 (3.84)
• from 9 to 12 minimum wages	41 (1.53)	4 (1.18)	37 (1.58)
• from 12 to 15 minimum wages	22 (0.82)	5 (1.48)	17 (0.72)
• more than 15 minimum wages	21 (0.78)	-	21 (0.90)
• not reported	9 (0.34)	2 (0.59)	7 (0.30)
Completed educational level – *n* (%):			
• none	5 (0.19)	-	5 (0.21)
• elementary school	56 (2.09)	7 (2.07)	49 (2.09)
• high school	1,306 (48.69)	183 (54.14)	1,123 (47.91)
• undergraduate	835 (31.13)	102 (30.18)	733 (31.27)
• MBA or specialisation	318 (11.86)	30 (8.88)	288 (12.29)
• master's degree	130 (4.85)	12 (3.55)	118 (5.03)
• PhD degree	29 (1.08)	3 (0.88)	26 (1.11)
• not reported	3 (0.11)	1 (0.29)	2 (0.08)
Gender – *n* (%):			
• cisgender women	2,092 (78.00)	73 (21.60)	2,019 (86.10)
• cisgender men	430 (16.00)	240 (71.00)	190 (8.13)
• other	153 (5.74)	25 (7.40)	128 (5.47)
• not reported	7 (0.26)	-	7 (0.30)
Race/ethnicity – *n* (%):			
• White	1,641 (61.18)	184 (54.44)	1,457 (62.16)
• Mixed	729 (27.18)	116 (34.32)	613 (26.15)
• Black	255 (9.51)	30 (8.87)	225 (9.60)
• Asian	38 (1.42)	5 (1.48)	33 (1.41)
• Indigenous	14 (0.52)	3 (0.88)	11 (0.47)
• not reported	5 (0.18)	-	5 (0.21)
* By the time of this study, the minimum wage in Brazil corresponded to approximately US$ 232.			

Tab. 1. Sociodemographic characteristics of the sample

Instruments

Participants' profile

A short sociodemographic survey containing questions about age, gender, educational background, marital status, income, etc.

Brazilian Maladaptive Daydreaming Scale (BMDS-16)

A self-report tool measuring the severity of MD. It contains questions pertaining to the daydreaming experience and its impact on daily life in the past month. Responses are scored with an 11-point scale, ranging from 0% to 100%. The total score is calculated as the mean. The cut-off point for MD was between 25 and 51 in different studies (see Appendix A).

Adult ADHD Self-Report Scale (ASRS-18) (Kessler et al., 2005)

Used to assess ADHD symptoms in adults, containing 18 items describing different behaviours and concerns related to ADHD, and covering the main areas affected by the disorder: attention, hyperactivity, and impulsivity. Participants respond to items on a scale ranging from 0 = "never" to 4 = "very frequently". ASRS-18 is divided into two factors, namely: Inattention and Hyperactivity. Total score is the sum of all answers. The maximum score is 72. ASRS-18 has been adapted and translated into Brazilian Portuguese (Mattos et al., 2006). For this study, ASRS-18 found good reliability for its general score (McDonald's $\omega = 0.88$; Cronbach's $\alpha = 0.88$), as well as for Inattention (McDonald's $\omega = 0.86$; Cronbach's $\alpha = 0.86$) and Hyperactivity (McDonald's $\omega = 0.82$; Cronbach's $\alpha = 0.82$) dimensions.

Dissociative Experiences Scale (DES-II) (Carlson and Putnam, 1993)

A revised version of the original DES developed by Bernstein and Putnam in 1986, evaluating one's tendency to experience dissociative states. It maintains the same basic features of the original scale with some modifications improving its accuracy and clinical use. The scale contains 28 items describing common dissociative experiences divided into three subscales: Amnesia (loss of memory of important events), Depersonalization-Derealization (the feeling of being separated from one's own body or mind or experiencing the environment as unreal), and Absorption (immersion in certain stimuli). Individuals rate the frequency with which they experience symptoms on an 11-point Likert scale ranging from 0 to 100, where they select the percentage of time each symptom occurs. Higher scores indicate a greater tendency toward dissociation. DES-II was translated and adapted into Brazilian Portuguese (Fiszman et al., 2004; Maraldi and Zangari, 2016). For this study, DES-II found good reliability for its general score (McDonald's ω = 0.88; Cronbach's α = 0.88), as well as for Amnesia (McDonald's ω = 0.82; Cronbach's α = 0.82), Depersonalization-Derealization (McDonald's ω = 0.78; Cronbach's α = 0.78), and Absorption (McDonald's ω = 0.73; Cronbach's α = 0.73) dimensions.

Procedure

This study is part of more extensive research exploring MD and other mental health outcomes in the Brazilian population. Following the approval of the Ethical Board at the Federal University of Rio de Janeiro, the project was advertised on social media networks, particularly on Instagram and with the use of paid traffic sources to reach more participants. Potential candidates could enrol by signing an Informed Consent Form and filling in instruments accessible online via SurveyMonkey. Data collection was conducted between December 2021 (subsample 2) and January 2022 (subsample 1).

Ethical issues

All research procedures were revised and approved by the institutional board of the Institute of Psychiatry of the Federal University of Rio de Janeiro (CAEE 49784521.1.0000.5263). The sample was recruited by convenience. Individuals who agreed to take part in the research signed an Informed Consent Form, which indicated their rights, potential risks and benefits associated with participation. They were guaranteed anonymity, and that data were only accessed by the researchers, according to the ethical considerations of the Declaration of Helsinki for research involving human beings.

Data analysis

An exploratory factor analysis (EFA) was performed on Subsample 1 to evaluate the factor structure of the MDS-16 using the principal axis factor extraction method. The decision on the number of factors to be retained was performed using the technique of Parallel Analysis. The number of factors was not fixed and the oblimin rotation was selected in case the adequate factor solution was multifactorial. Then, the factor structure model suggested by EFA was analysed by confirmatory factor analysis (CFA) on Subsample 2 with the categorical diagonally weighted least squares (DWLS) estimator proposed for use with categorical data (Somer et al., 2017). Missing data were imputed by stochastic method Expected Maximization, using more than 20% missing answers as exclusion criteria (Schlomer et al., 2010). The Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA) fit indexes were considered to the evaluation of well-adjusted models. Values of CFI and TLI close to 0.90, and RMSEA close to or less than 0.08 were considered as satisfactory adjustment criteria (Byrne, 2016). McDonald's Omega values (ωt) were calculated for all the factors and the total score to assess the reliability of the scale. Factor analyses were performed using the psych, lavaan, semPlot, and semTools packages in R software version 4.1.2 and RStudio version 1.4.1717.

Subsequently, theoretically meaningful correlates of MD (i.e. ADHD symptoms and dissociative experiences) were examined using Pearson correlations on the total sample. Skewness and kurtosis were between −2 and +2 for all study-variables; therefore, data distribution was considered approximately normal (George and Mallery, 2010). Finally, latent profile analysis (LPA) was conducted with robust maximum likelihood estimator to identify individuals with high risk for maladaptive daydreaming tendencies (Collins and Lanza, 2010). For this purpose, two to six profiles were investigated. The final model was selected based on theoretical meaningfulness of the profiles and the following model fit indices (Marsh et al., 2009): lower levels of Akaike information criterion (AIC), bias-corrected Akaike information criterion (CAIC), Bayesian information criterion (BIC), and sample-size adjusted Bayesian information criterion (SSABIC), and entropy value close to 1. Moreover, a nonsignificant p-value ($p > 0.05$) for the Lo–Mendell–Rubin Adjusted Likelihood Ratio Test (LMR Test) indicates that a model with fewer classes is more appropriate. Comparisons across latent classes were conducted using one-way ANOVA with Tukey post-hoc tests in MD, ADHD symptoms, and dissociative experiences. Based on the high-risk profile derived from the LPA, sensitivity, specificity, positive and negative predictive value, and accuracy for possible cut-off scores were estimated (Altman and Bland, 1994a, 1994b; Glaros and Kline, 1988). The LPA was performed using Mplus 7.4 (Muthén and Muthén, 1998–2017).

RESULTS

Exploratory factor analyses (EFA)

Bartlett's test of sphericity ($\chi^2 = 2658.468$, degrees of freedom, $df = 120$, $p < 0.001$ and KMO = 0.90) indicated

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Item	Content description	Component		
		I	II	III
5	Daydreaming interferes with daily chores or tasks	**0.82**	0.07	0.02
6	Distressed about time spent daydreaming	**0.82**	−0.04	−0.02
7	Difficult to pay attention in order to stay on task	**0.64**	0.12	0.03
8	Daydreaming hinders achievement of life goals	**0.85**	−0.02	0.00
9	Difficulty in controlling or limiting daydreaming	**0.72**	0.14	0.02
11	Daydreaming interferes with academic/occupational success	**0.84**	−0.06	0.04
2	Urge to return to a daydream that was interrupted by a real-world event	−0.03	**0.78**	−0.05
4	Distressed by inability to daydream due to obligations	0.07	**0.68**	0.08
10	Annoyed when a real-world event interrupts a daydream	0.07	**0.78**	0.07
12	Rather daydream than engage in social activities or hobbies	0.18	**0.67**	−0.02
13	Strong urge to immediately start daydreaming in the morning	0.25	**0.48**	−0.01
15	Find daydreaming comforting and/or enjoyable	−0.35	**0.59**	0.13
1	Music triggers or activates daydreaming	0.03	0.00	**0.66**
3	Daydreams accompanied by vocal noises, facial expressions	0.03	0.15	**0.36**
14	Daydreams accompanied by physical activity (e.g. pacing)	0.09	0.18	**0.42**
16	Maintenance of daydreaming dependent on continued listening to music	0.00	−0.09	**0.60**
	Number of items	6	6	4
	Eigenvalue	4.07	3.04	1.30
	% Total variance explained	25	19	8
	McDonald's ω	0.84	0.89	0.65
Components: I – Impairment; II – Yearning; III –Sensory Stimuli. * Bold entries represent the factor loadings of each item on its corresponding factor.				

Tab. 2. Brazilian version of the MDS-16 factor structure

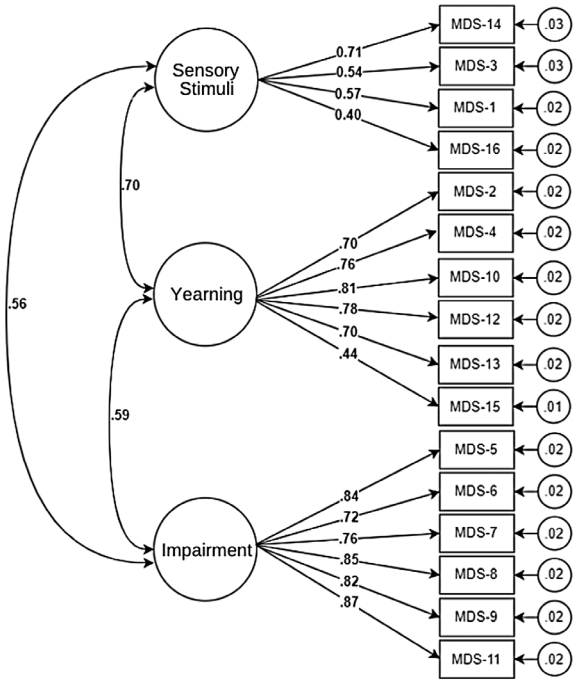

Fig. 1. Three-factor structure of BMDS-16

interpretability of the item correlation matrix. Parallel analysis suggested the three-factor solution as the most representative for the data. In Tab. 2, it can be observed that all items loaded above 0.3 on their respective factors.

The factor structure of the scale was composed of 16 items measuring MD, divided into three factors, which explained 52% of the variance. Sensory Stimuli factor was formed by four items (gathering the Music and Kinesthesia items of the original instrument), while the other two factors – Yearning and Impairment – were formed by six items each (with the same item structure as the original MDS-16). The overall reliability of the instrument was good (ω > 0.70) and, among the factors, only Sensory Stimuli had a borderline but adequate value (ω > 0.60) (Streiner, 2003).

Confirmatory factor analyses (CFA)

The three-factor model presented satisfactory fit indices ($\chi^2/df = 9.798$, $\chi^2 = 989.613$, $df = 101$, CFI = 0.98, TLI = 0.98, RMSEA = 0.06, 90% confidence interval, CI: 0.06). All items of BMDS-16 had factor loadings above 0.40. The three-factor solution for BMDS-16 is shown in Fig. 1.

The overall reliability of the scale was good (McDonald's ω = 0.93; Cronbach's α = 0.90), as were the Yearning (ω = 0.86; α = 0.85) and Impairment (ω = 0.92; α = 0.91) dimensions. The values for the Sensory Stimuli dimension (ω = 0.64; α = 0.64) were borderline (Streiner, 2003).

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	1	2	3	4	5	6	7	8	9	10	11
1. MDS-16 total score	-										
2. MDS-16 Yearning	0.84	-									
3. MDS-16 Impairment	0.84	0.50	-								
4. MDS-16 Sensory Stimuli	0.73	0.53	0.42	-							
5. ASRS-18 total score	0.45	0.34	0.43	0.29	-						
6. ASRS-18 Inattention	0.48	0.36	0.48	0.27	0.87	-					
7. ASRS-18 Hyperactivity	0.29	0.22	0.26	0.22	0.86	0.50	-				
8. DES-II total score	0.38	0.35	0.29	0.30	0.42	0.37	0.36	-			
9. DES-II Absorption	0.29	0.26	0.22	0.22	0.32	0.29	0.27	0.86	-		
10. DES-II Depersonalization-Derealization	0.36	0.33	0.28	0.27	0.35	0.30	0.32	0.83	0.55	-	
11. DES-II Amnesia	0.34	0.30	0.25	0.26	0.39	0.35	0.33	0.85	0.54	0.62	-
Range	0–100	0–100	0–100	0–100	2–72	0–36	0–36	0–69	0–75	0–77	0–79
Mean	42.76	44.06	38.88	46.66	37.41	20.43	17.00	22.64	33.35	17.78	14.27
Standard deviation	20.53	24.21	27.51	23.03	11.85	6.99	6.71	11.96	14.18	15.83	12.95
Skewness	0.21	0.22	0.42	0.06	0.11	0.01	0.23	0.50	0.12	0.93	1.13
Kurtosis	−0.64	−0.82	−0.86	−0.61	−0.23	−0.47	−0.24	−0.23	−0.48	0.31	1.08
Cronbach's α	0.90	0.85	0.92	0.64	0.88	0.86	0.82	0.88	0.72	0.78	0.80
McDonald's ω	0.89	0.86	0.92	0.65	0.88	0.86	0.82	0.88	0.72	0.79	0.80

MDS – Maladaptive Daydreaming Scale; **ASRS** – ADHD Self-Report Scale; **DES-II** – Dissociative Experiences Scale.
All correlations are significant at $p < 0.001$.
Due to missing cases, correlations for the ASRS-18 total score ($n = 2,636$), ASRS-18 Inattention ($n = 2,660$), and ASRS-18 Hyperactivity ($n = 2,651$) were calculated on different sample sizes, while all other correlations are reported based on the total sample ($N = 2,682$).

Tab. 3. Pearson correlations among dimensions of maladaptive daydreaming, ADHD, and dissociative experiences

Correlations with theoretically relevant constructs

To explore the associations of MD with ADHD symptoms and the dimensions of dissociative experiences, Pearson correlations were conducted (see Tab. 3). Moderate, positive associations were found between the MD Impairment dimension and ADHD inattention symptoms, while the association between other MD dimensions (i.e. Yearning and Sensory Stimuli) and ADHD symptoms (i.e. Inattention and Hyperactivity) were generally weak. Moreover, weak, positive associations were found between MD and dissociative experiences, including Absorption, Depersonalization-Derealization, and Amnesia.

Determination of a cut-off score for BMDS-16

Latent profile analysis was conducted on the 16 items of scale. The AIC, BIC and SSABIC values decreased as class numbers increased, while model accuracy remained high (entropy was >0.85 for all models). The LMR Test indicated that the five-class model should be favoured instead of the six-class model. As the five-class model was also theoretically meaningful, this model was used in further analysis (see Tab. 4).

The first class represented individuals with generally low item scores (n = 644; 24%), while the second class included individuals with moderate levels of MD (n = 779; 29%). The third class consisted of individuals with relatively high

Classes (n)	AIC	CAIC	BIC	SSABIC	Entropy	LMR Test	p
2	408251.75	408556.57	408540.57	408384.88	0.92	11911.83	0.000
3	404903.15	405314.17	405292.17	405082.47	0.89	3357.58	0.000
4	402526.47	403043.70	403015.70	402751.98	0.90	2392.85	0.000
5	**401458.75**	**402082.19**	**402048.19**	**401730.46**	**0.87**	**1093.56**	**0.029**
6	400318.02	401047.65	401007.65	400635.91	0.88	1166.05	0.075

AIC – Akaike information criterion; **CAIC** – bias-corrected Akaike information criterion; **BIC** – Bayesian information criterion; **SSABIC** – sample-size adjusted Bayesian information criterion; **LMR Test** – Lo–Mendell–Rubin Adjusted Likelihood Ratio test; ***p*** – p value of the LMR Test.
The final model, selected based on the fit indices and theoretical considerations, is marked in bold.

Tab. 4. Fit indices for the latent profile analysis (LPA) (N = *2,682)*

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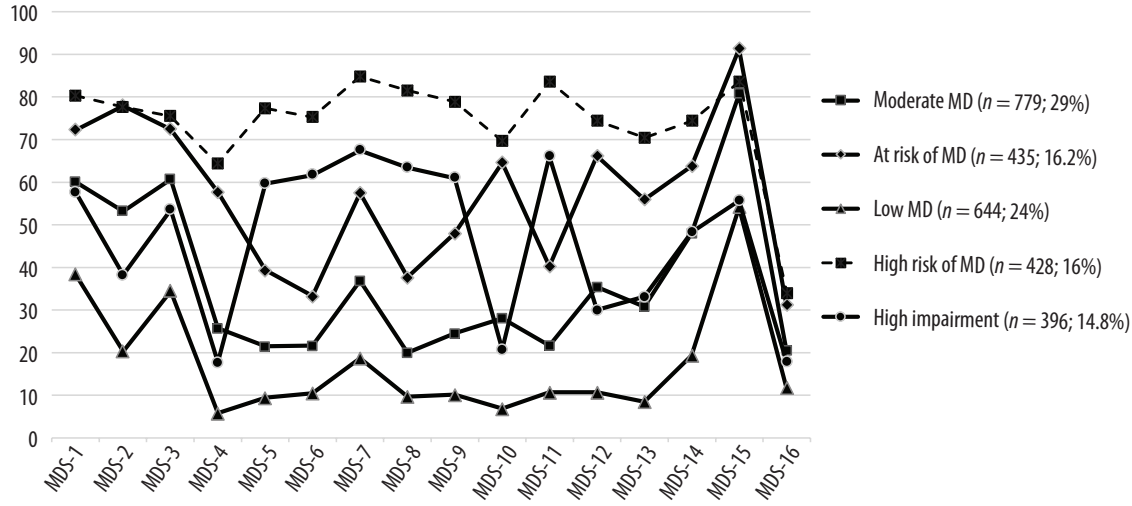

Note: Reference class for the subsequent calculations of a potential cut-off score is indicated with a dashed line.

*Fig. 2. Scores on the Brazilian version of the Maladaptive Daydreaming Scale (MDS-16) across the five latent classes (*N *= 2,682)*

scores on BMDS-16 items, thus potentially being at risk of MD (n = 435; 16.2%), while the fourth class represented individuals with relatively high item scores on the Impairment subscale (n = 396; 14.8%). The fifth class represented individuals potentially being at high risk of MD as these individuals scored generally high on BMDS-16 items (n = 428; 16%; see Fig. 2). Individuals of this class also yielded significantly higher scores on all dimensions of MD, symptoms of inattention, and depersonalization compared to other classes. Regarding hyperactivity and amnesia, this class yielded similarly high scores as the at-risk class. In relation to absorption, the high-risk class scored higher than those with low and moderate levels of MD, while no significant difference was found between the high-risk, at-risk, and high impairment class in this dimension of dissociative experiences (see Tab. 5).

Using the high-risk class (n = 428; 16%) as a gold standard, sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and accuracy were estimated to determine the possible cut-off score (see Tab. 6). The score of 63 was suggested as an optimal cut-off point to classify individuals as MDers based on the following preferences: the highest accuracy with sensitivity and specificity >90%. Based on this threshold, the vast majority of MDers (92.1%) and non-MDers (95.3%) were correctly identified. Overall, 18.6% of our sample (n = 500; 84% women,

	1. Low MD (n = 644; 24%)	2. Moderate MD (n = 779; 29%)	3. At risk of MD (n = 435; 16.2%)	4. High impairment (n = 396; 14.8%)	5. High risk of MD (n = 428; 16%)	ANOVA	
						F	η^2
MDS-16 total score	16.99 (6.94)^{2,3,4,5}	36.83 (6.59)^{1,3,4,5}	57.19 (7.24)^{1,2,4,5}	46.74 (9.86)^{1,2,3,5}	74.02 (8.96)^{1,2,3,4}	4052.87*	0.86
MDS-16 Yearning	17.11 (9.64)^{2,3,4,5}	42.32 (11.70)^{1,3,4,5}	69.41 (12.35)^{1,2,4,5}	32.00 (14.82)^{1,2,3,5}	73.15 (13.98)^{1,2,3,4}	1943.48*	0.74
MDS-16 Impairment	11.08 (10.36)^{2,3,4,5}	24.43 (12.40)^{1,3,4,5}	42.73 (12.45)^{1,2,4,5}	63.54 (13.89)^{1,2,3,5}	80.26 (11.57)^{1,2,3,4}	2820.62*	0.81
MDS-16 Sensory Stimuli	25.67 (17.12)^{2,3,4,5}	47.19 (17.98)^{1,3,4,5}	60.53 (18.93)^{1,2,4,5}	43.62 (19.09)^{1,2,3,5}	65.96 (18.85)^{1,2,3,4}	398.57*	0.37
ASRS-18 total score	30.26 (10.88)^{2,3,4,5}	35.98 (10.59)^{1,3,4,5}	41.94 (10.71)^{1,2,4,5}	38.64 (10.09)^{1,2,3,5}	45.21 (11.17)^{1,2,3,4}	149.98*	0.1
ASRS-18 Inattention	16.15 (6.30)^{2,3,4,5}	19.44 (6.34)^{1,3,4,5}	22.98 (6.20)^{1,2,4,5}	21.14 (6.08)^{1,2,3,5}	25.49 (6.19)^{1,2,3,4}	168.38*	0.20
ASRS-18 Hyperactivity	14.15 (6.39)^{2,3,4,5}	16.53 (6.27)^{1,3,5}	18.93 (6.53)^{1,2,4}	17.48 (6.19)^{1,3,5}	19.75 (6.82)^{1,2,4}	61.80*	0.09
DES-II total score	15.57 (9.99)^{2,3,4,5}	21.72 (10.59)^{1,3,4,5}	27.56 (11.71)^{1,2,4}	24.66 (10.94)^{1,2,3,5}	28.12 (12.54)^{1,2,4}	118.91*	0.15
DES-II Absorption	25.72 (13.16)^{2,3,4,5}	33.50 (13.46)^{1,3,4,5}	38.85 (13.68)^{1,2,4}	36.17 (12.70)^{1,2,3}	36.35 (14.07)^{1,2}	80.12*	0.11
DES-II Depersonalization	9.59 (11.48)^{2,3,4,5}	15.99 (13.82)^{1,3,4,5}	22.46 (16.49)^{1,2,5}	20.60 (15.75)^{1,2,5}	26.01 (17.82)^{1,2,3,4}	99.87*	0.13
DES-II Amnesia	8.59 (9.90)^{2,3,4,5}	12.76 (11.11)^{1,3,5}	18.71 (13.58)^{1,2,4}	14.83 (12.57)^{1,3,5}	20.54 (15.07)^{1,2,4}	80.04*	0.11

Means and standard deviations (in parenthesis) are reported for all variables.
* $p < 0.001$.
MD – maladaptive daydreaming; **MDS** – Maladaptive Daydreaming Scale; **ASRS** – ADHD Self-Report Scale; **DES-II** – Dissociative Experiences Scale.
Due to missing cases, means and standard deviations for the ASRS-18 total score (n = 2,636), ASRS-18 Inattention (n = 2,660), and ASRS-18 Hyperactivity (n = 2,651) were calculated on different sample sizes, while all other data are reported based on the total sample (N = 2,682).
Superscript numbers (1, 2, 3, 4, and 5) indicate significant ($p < 0.05$) difference between the respective class and the indexed class in the variable of the same row based on the post-hoc Tukey tests.

Tab. 5. Comparison of latent classes based on the scores of the Brazilian version of the Maladaptive Daydreaming Scale (MDS-16) in ADHD and dissociative experiences

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Cut-off score	True positive	True negative	False positive	False negative	Sensitivity (%)	Specificity (%)	Positive predictive value (%)	Negative predictive value (%)	Accuracy (%)
58	421	2019	235	7	98.4%	89.6%	64.2%	99.7%	91.0%
59	418	2061	193	10	97.7%	91.4%	68.4%	99.5%	92.4%
60	413	2073	181	15	96.5%	92.0%	69.5%	99.3%	92.7%
61	404	2103	151	24	94.4%	93.3%	72.8%	98.9%	93.5%
62	395	2131	123	33	92.3%	94.5%	76.3%	98.5%	94.2%
63	**394**	**2148**	**106**	**34**	**92.1%**	**95.3%**	**78.8%**	**98.4%**	**94.8%**
64	380	2168	86	48	88.8%	96.2%	81.6%	97.8%	95.0%
65	367	2180	74	61	85.8%	96.7%	83.2%	97.3%	95.0%
66	338	2194	60	90	79.0%	97.3%	84.9%	96.1%	94.4%
67	319	2208	46	109	74.5%	98.0%	87.4%	95.3%	94.2%
68	428	2214	40	120	78.1%	98.2%	91.5%	94.9%	94.3%
The suggested cut-off score is marked in bold. Scores on the MDS-16 can range from 0 to 100.									

*Tab. 6. Potential cut-off thresholds for the Brazilian version of the Maladaptive Daydreaming Scale (MDS-16) (*N *= 2,682)*

16% men) can be considered as MDers based on the suggested cut-off score of 63 on BMDS-16.

DISCUSSION

The MDS-16 has been widely used to measure experiences of excessive daydreaming in non-clinical and some clinical settings (Soffer-Dudek and Somer, 2022) but has been validated in only eight language versions. To extend its usability in other populations, this study investigated the psychometric appropriateness of the Brazilian version (BMDS-16). Various factor structures were identified in different language validations (see Appendix A). Our exploratory factor analysis indicated a three-factor solution for BMDS-16: Yearning, Impairment and Sensory Stimuli. The first two factors contained items which were originally suggested by Somer et al. (2016b). The third factor, Sensory Stimuli, included items relating to music and kinesthesia, and corresponds to the Sensory-motor Retreat identified in the Italian version by Schimmenti et al. (2019). This makes theoretical sense, as they both refer to sensory properties used to engage and sustain attention while daydreaming (Somer et al., 2016a).

The scale showed satisfactory reliability and validity. Based on the suggested cut-off of 63 points for MD, 18.6% of our sample could be considered potential MDers. Most were women (84%), which might reflect specific gender issues in the Brazilian context, as most participants in local psychological studies are women, which may be related to rigid masculinity patterns. Other validation studies did not show significant gender differences (Abu-Rayya et al., 2019; Metin et al., 2022; Schimmenti et al., 2019).

Validity based on the relationships with external measures was provided by correlation analyses between MD and ADHD symptoms and dissociative experiences. The general BMDS-16 score had positive and moderated correlations with ADHD symptoms. MD's Impairment subscale was found to be moderate and positively associated with ADHD Inattention symptoms, which confirms our H1 and is consistent with previous observations about the relationship between MD and ADHD (Theodor-Katz et al., 2022). The overlap between Impairment and Inattention may result from difficulties in achieving goals and managing tasks in daily life, which are common features in MD and ADHD. However, the association between other dimensions of MD (i.e. Yearning and Sensory Stimuli) and ADHD symptoms (i.e. Inattention and Hyperactivity) were generally weak, which does not support the existence of an overlap between the MD and ADHD, especially regarding Hyperactivity.

Some authors suggest that MD might be a dissociative disorder (Soffer-Dudek and Somer, 2022). Moderate correlations between MD and the DES-II general score were reported by Somer et al. (2016b), Jopp et al. (2019), and Metin et al. (2022). Moderate or high positive relationships were also observed with Absorption (Schimmenti et al., 2019; Somer et al., 2016b), but weak associations with Amnesia and Depersonalization-Derealization (Schimmenti et al., 2019). In our study, we found positive but weak associations between MD and the general DES-II score or its subscales, which partially refutes our H2. These discrepancies might result from sample sizes, because even the largest samples in other studies were still five times smaller than ours.

While on the phenomenological level some MD features might resemble ADHD symptoms or dissociative experiences, our study shows that there is weak correlation between these concepts.

LIMITATIONS AND FURTHER DIRECTIONS

This study has some important limitations. First, due to the convenience sampling method, findings emerging from this study could not be generalised to the whole Brazilian population. Also, the disproportion of women limits the generality of our findings and calls for other studies with more

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gender-diverse samples. Second, due to the self-report nature of the BMDS-16, social desirability, and difficulties in memory recall may bias the results. Test-retest reliability of the BMDS would also be needed to provide further evidence for the validity and reliability. It is also important to note that BMDS-16 is a self-report scale measuring excessive involvement in fantasy but not a diagnostic tool. Therefore, MDers with scores above the cut-off point would require further assessment corroborated with a clinical diagnostic interview (see Somer et al., 2017). The same applies to the other self-report instruments used in this study and further studies exploring MD levels in different clinical samples with confirmed diagnoses are necessary.

CONCLUSIONS

This study confirms the psychometric appropriateness and usability of the Brazilian version of the MDS-16, which may be a valuable tool for mental health providers. The daydreaming tendency should be carefully examined in people with scores above 63, who may use fantasy in a maladaptive way, causing impairment in daily functioning and potentially conflicting with treatment.

Conflict of interest

The authors report no financial or personal relationships with other individuals or organisations that could adversely affect the content of the publication and claim ownership of this publication.

Author contributions

Original concept of study; Collection, recording and/or compilation of data; Analysis and interpretation of data; Writing of manuscript; Critical review of manuscript; Final approval of manuscript: RFC, ÁZ, IJP, AEN.

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