The Psychometric Properties of the Arabic 16-Item Maladaptive Daydreaming Scale (MDS-16-AR) in a Multicountry Arab Sample

Hisham Motkal Abu-Rayya
University of Haifa and La Trobe University

Eli Somer and Suha Meari-Amir
University of Haifa

Maladaptive daydreaming (MD) is a newly identified condition characterized by absorption in fantasy, which appears to progress into psychological dependence, associated with substantial distress and maladaptation. This study determines, for the first time, the psychometric properties of the 16-item Maladaptive Daydreaming Scale (MDS-16), an updated version of the MDS-14 (Somer, Lehrfeld, Bigelsen, & Jopp, 2016), originally designed to identify maladaptive daydreaming experiences. The MDS-16 was administered in a multicountry Arab sample composed of 180 respondents aged 18 to 58 years ($M = 26.28$, $SD = 8.14$). Our analyses indicated 2 strongly related factors underlying the MDS-16, capturing immersive daydreaming and the distress and impairment associated with it. The MDS-16 demonstrated sound psychometric properties and differentiated well between self-identified individuals with and without MD on a range of psychosocial indicators. The instrument had high sensitivity and specificity, implying that the MDS-16 can confidently be deployed in future investigations of MD in the Arab world. Our findings shed light on the potential value of the MDS-16 for international inquiry of this newly defined condition.

Keywords: Maladaptive Daydreaming Scale, psychometric properties, psychological problems, social problems

Maladaptive daydreaming (MD) is a newly identified condition characterized by absorption in fantasy. In some cases, this condition appears to progress into psychological dependence that is presented in the urge to daydream intensively, often for many hours every day, causing distress and maladaptation (Somer, 2002). MD is statistically associated with dissociation, and most intensely with dissociative absorption (DA;

Somer, Lehrfeld, Bigelsen, & Jopp, 2016), the propensity to become immersed in a single stimulus, either external (e.g., a movie) or internal (e.g., a fantasy), while neglecting other stimuli in the environment (Soffer-Dudek, Lassri, Soffer-Dudek, & Shahar, 2015). The DA literature originates in hypnosis research and can be traced back to Hilgard's (1979) research on imaginative involvement, described as the capacity to experience imagined events with an "almost total immersion in the activity, [and] with indifference to distracting stimuli in the environment" (p. 5). Hilgard's findings were in line with earlier results reported by Tellegen and Atkinson (1974), who concluded that highly hypnotizable individuals had an inclination for what they called an openness to self-altering experiences that could be characterized as states of total attention. Absorption and Imaginative Involvement were later described in the dissociation literature as one of the three subscales of the Dissociative Experiences Scale (DES-II; Carlson & Putnam, 1993), along with Deperson-

Hisham Motkal Abu-Rayya, Faculty of Social Welfare and Health Sciences, University of Haifa, and School of Psychology & Public Health, La Trobe University; Eli Somer and Suha Meari-Amir, Faculty of Social Welfare and Health Sciences, University of Haifa.

Hisham Motkal Abu-Rayya and Eli Somer contributed equally to all sections of the article. Meari-Amir assisted in fieldwork, data gathering, and coding.

Correspondence concerning this article should be addressed to Hisham Motkal Abu-Rayya, Faculty of Social Welfare and Health Sciences, University of Haifa, 199 Abba Khoushy Avenue, Mount Carmel, Haifa, 3498838, Israel. E-mail: Hisham.aburayya@gmail.com

alization–Derealization and Dissociative Amnesia (e.g., Armour, Contractor, Palmieri, & Elhai, 2014). As noted, MD is highly correlated with the Absorption subscale of the DES-II.

MD and DA are also related to other constructs describing task-unrelated spontaneous or self-generated mental activity. For example, like DA and mind wandering (MW), daydreaming represents a decoupling of attention from sensorial perception and the shifting of focus to internally generated mentation (Smallwood & Schooler, 2015). However, unlike DA and MW, MD is associated with stereotypical movements, a need for exposure to music, and the volitional fantasizing of fanciful fantastical plots (Bigelsen, Lehrfeld, Jopp, & Somer, 2016). Additionally, MD involves excessiveness, distress, and dysfunction (Somer, Somer, & Jopp, 2016a), and is associated with high rates of comorbidity with psychiatric disorders (Somer, Soffer-Dudek, & Ross, 2017), rendering it distinct from both DA and MW.

Internet users have adopted the new term of *maladaptive daydreaming* to grant themselves a collective identity and provide meaning to their common condition (Bigelsen et al., 2016). Still, the existence of MD in various cultures has yet to be understood and accepted by mental health professionals.

Recently published phenomenological data on maladaptive daydreamers (MDers) from several nationalities (Somer et al., 2016a; Somer, Somer, & Jopp, 2016b) have identified a number of attributes typifying MD. Specifically, these attributes are as follows: (a) Individuals with MD discovered their ability to activate their immersive fantasies early in life; (b) Important facilitators of this absorptive form of daydreaming are privacy, movement (e.g., pacing or rocking), and exposure to music; (c) Some MDers reported a regular struggle with the outcomes of traumatic childhood experiences or ongoing psychosocial difficulties; and (d) The rewarding experience of MD can evolve into a harmful habit. However, the robustness of the MD construct requires further cross-cultural evidence, to which the current study contributes by addressing MD and its validity and psychosocial correlates among Arab MDers.

One major concern expressed by individuals with MD is the lack of awareness concerning their condition among mental health professionals, a problem that often leads to misdiagnosis and inadequate treatment (Somer et al., 2016b). To that end, it was vital to develop and evaluate an assessment instrument that could improve accurate identification of this condition and later facilitate the development of specific treatments. The Maladaptive Daydreaming Scale (MDS; Somer, Lehrfeld, et al., 2016) was originally designed as a 14-item rating scale to identify MD experiences. MDS items were developed following analyses of online reports uploaded on several websites and Facebook pages dedicated to excessive daydreaming (Somer, Lehrfeld, et al., 2016) and based on data presented by Bigelsen and Schupak (2011), Somer (2002), and Somer et al. (2016a). On the basis of this extensive review, the developers of the original MDS identified five symptom dimensions on which MD differed from normative daydreaming and developed a set of self-report items to capture these dimensions. The wording of some items was altered following consultation with a prominent daydreaming scholar and feedback received from a pilot administration of the scale to a focus group of 10 individuals with self-diagnosed MD. The final instrument included 14 items assessing five key components of MD: MD Content/Quality (two items), MD Compulsion/Control (four items), MD Distress (three items), Perceived Benefits of Daydreaming (two items), and Interference with Life Functioning (three items; Somer, Lehrfeld, et al., 2016).

The original 14-item MDS and its subscales discriminated well between self-identified individuals with and without MD (with effect sizes of Cohen's $d = 1.8$ or higher), and it demonstrated sound internal consistency and temporal stability (test–retest reliability, $r = .92$; average time between the administrations was 21.17 weeks; $SD = 5.62$ weeks). The MDS has also shown excellent sensitivity (95%) and high specificity (89%) levels (Somer, Lehrfeld, et al., 2016). A factorial analysis of the MDS yielded a three-factor structure: (a) Yearning, containing items that reflected the appeal of daydreaming and the intense craving to engage in this activity; (b) Kinesthesia, a factor containing items describing physical movements that accompany MD; and (c) Impairment, including items portraying the dysfunction and suffering associated with MD. A subsequent study utilizing the 14-item MDS demonstrated a relationship between MD and childhood trauma and social anxiety, two independent risk factors for

MD mediated by addiction to fantasy (Somer & Herscu, 2017).

Recently, cross-cultural evidence was presented documenting the validity of an earlier version of the MDS in a society in which English is not the native language. The study, conducted in Israel, recommended replications in other cultures to further assess the robustness of the MD construct (Jopp, Dupuis, Somer, Hagani, & Herscu, 2018). Based on responses of 280 Hebrew-speaking Israelis aged 13 to 73 years, including 45 self-identified MDers, the Hebrew adaptation of the original 14-item MDS (MDS-H) proved valid. Findings confirmed the expected three-factorial structure, scalar invariance compared with the English MDS validation sample, and good psychometric properties. MDS-H scores were associated with dissociation, obsessive–compulsive behavior, and attention-deficit hyperactivity. Given high sensitivity and specificity separating MDers and non-MDers, the MDS-H represents a useful tool to assess MD among Hebrew speakers, suggesting the relevance of MD in a non-English-speaking culture and highlighting the potential value of the MDS for worldwide investigation of this condition (Jopp et al., 2018). Israel, although a country in which English is not the native language, is considered to be part of the Western world (Western World, n.d.). The tendency in Western academic psychology to assume a universalistic cultural context has led to a decreased scrutiny of the relevance of non-Western cultural considerations in psychology (Awaad & Reicherter, 2016). This trend has also led to biased population sampling in research participants and bias in answering research questions (Diamond, 2012). The current study aims to examine the validity of the MD construct and its relevance to Arab MDers, shedding light on the applicability and measurement of the MD condition developed in Western cultures to Arab MDers.

Several very recent studies on MD used a revised version of the MDS. Based on evidence regarding the important role of music in MD (Somer et al., 2016b), two additional items were added to the original MDS that measure the importance of music in the MD experience. These studies had already used a revised 16-item version of the MDS (MDS-16; Abu-Rayya, Somer, & Knane, 2018; Soffer-Dudek, & Somer, 2018; Somer, 2018; Somer, Abu-Rayya, & Nsairy Samaan, in press; Somer, Soffer-Dudek, & Ross, 2017; Somer, Soffer-Dudek, Ross, & Halpern, 2017), but no actual psychometric investigation of MDS-16 was conducted.

The purpose of the current study was to investigate the relevance of the MD condition to Arab MDers and whether the revision of the instrument has sound psychometric qualities that justify its deployment in the vast Arab world. The present validation study (a) determines, for the first time, the factorial structure of the MDS-16 through exploratory factor analytic techniques and calculates the internal consistency (Cronbach's alpha) of the emergent structures; (b) identifies the MDS-16's cutoff point that best differentiates between MDers and non-MDers through reliance on a receiver operating characteristic (ROC) curve used to assess the overall criterion validity, sensitivity, and specificity of the MDS-16 as a function of the scale's various cutoffs; and (c) tests the convergent and predictive validity of the MDS-16. With the absence of a valid assessment tool that captures MD characteristics, convergent validity of the MDS-16 was assessed by using the Tellegen Absorption Scale (TAS; Tellegen, 1982), which measures psychological absorption, an important feature of MD, and openness to mystical and consciousness-altering experiences. A range of psychosocial difficulties were evidently correlated with MD in previous research, including deteriorated self-esteem, quality of social relations, and satisfaction with life, and heightened social phobia, social isolation, depression, anxiety, and stress symptoms (e.g., Abu-Rayya et al., 2018; Somer et al., 2016a, 2016b). These indicators were used in the present study to assess the predictive validity of the MDS-16. Determining the robustness of the MD construct in the Arab world is important from a methodological point of view, giving support to the MDS as a useful measure in a non-Western Arab culture that comprises an estimated 422 million people. More importantly, studying the MD construct in the Arab world contributes to the correct identification of MD in this divergent culture.

Method

Participants

A total of 180 adult Arabs aged 18 to 58 years old ($M = 26.28$, $SD = 8.14$) participated in this study. Nationalities represented included 10

Arab countries (Jordan, Syria, Lebanon, Egypt, Saudi Arabia, United Arab Emirates, Morocco, Tunisia, Algeria, and Iraq) and seven non-Arab countries (Pakistan, Turkey, United States, Germany, Spain, Romania, and Israel), of which participants were Arab residents/citizens. Only 166 participants provided sociodemographic information pertaining to their gender, religion, education, and marital and employment statuses. Of those, 68.7% were females, 88.5% were Muslim, 2.4% were Christian, 1.8% were Druze, and 7.3% belonged to other religions. The average number of participants' formal education years was 13.32 ($SD = 3.67$). Single participants composed 69.7% of the sample; the rest were married (21.8%) or "other" (8.5%). Fifty-nine percent of participants were unemployed, 23.5% had a part-time job, and 17.5% had a full-time job. Respondents were asked whether they suffered from MD by answering an MD screening question (detailed in the Measures section). As described in the following Study Procedure section, our main recruitment effort primarily targeted individuals who were struggling with MD. Consequently, we recruited 95 respondents (52.8%) who self-identified as coping with MD (MDers); the remaining 47.2% ($n = 85$) were self-identified as daydreaming normally (non-MDers) and served as the comparison group in certain validity analyses in this study. A series of chi-square tests indicated that MDers and non-MDers did not differ in the distribution of their gender, religion, education, and marital and employment statuses. Similarly, age and number of education years were not different when MDers and non-MDers were compared as independent samples using t tests.

Study Procedure

Ethics approval to conduct the study was obtained from the Human Ethics Committee of the University of Haifa Faculty of Social Welfare & Health Sciences. Participants were mainly recruited by (a) creating and promoting an Arabic language Facebook group for MDers, and (b) posting an explanatory call for participation in a daydreaming study on Arab online groups (e.g., forums, blogs, and Internet chat rooms) devoted to psychology and mental health. Here, we specifically invited individuals concerned about their excessive daydreaming (a) through popular Facebook, Instagram, and Twitter pages of famous Arab singers, celebrities, writers, and poets, and (b) through snowball sampling, asking actual participants to encourage the participation of their peers by forwarding the recruitment notice to their social networks. This latter method was deployed primarily for the recruitment of individuals without MD who possessed similar demographic characteristics (e.g., age, religion, education, employment, marital status) as partakers with MD. Participants were assured of full confidentiality by concealment of their identities and that of the involved virtual groups. They were then given a link to an online self-report research questionnaire in the Arabic language, which the authors created using Survey Monkey (http://www.surveymonkey.com).

Translation from the source language to Arabic was initially made by a professional bilingual translator. This was followed by a back translation and accuracy assurance conducted by two native Arab members of our research team, competent in both the source and target languages.

Measures

Participants provided general demographic questions that sought information on their age, gender, religion, marital status (married, single, other), number of years of education, and employment status (full-time employment, part-time employment, unemployed). In addition, they completed an MD criterion question (used for criterion validity purposes) and the MDS-16, which is the focus of the current study; the TAS (used to assess convergent validity); and six self-report measures that assessed a variety of psychosocial characteristics (self-esteem, quality of social relations, life satisfaction, social phobia, social isolation, depression, anxiety and stress) used herein to assess predictive validity. All employed measures for MDS-16 validation purposes have currency in international research and have well-established psychometric properties. In the present study, all of these measures demonstrated very sound reliability (Cronbach's alpha $\geq.84$), with the exception of the social isolation measure, which had an acceptable alpha of .73.

MD criterion question. We asked participants a criterion question to determine whether

they met the description of MD or not (Somer, Soffer-Dudek, Ross, & Halpern, 2017). The criterion question was worded as follows:

> Daydreaming is a universal human phenomenon that a majority of individuals engage in on a daily basis. For the purposes of the study, we define daydreaming as fantastical mental images and visual stories/narratives that are not necessarily part of your life. Therefore, we are not referring to such acts such as reminiscing over past events, planning for future activities such as a meeting with your boss, or thinking about your mental "to do" list. We also do not include pure sexual fantasies in this study. Examples of daydreams that can be included would be hanging out with a favorite celebrity, winning the Nobel Prize, telling off your boss after winning the lottery, or having an affair with an attractive coworker who isn't the slightest bit interested in you, living in a parallel fantasy world, engaging in heroic or rescue actions, speaking with historical figures, and so forth Any daydreams involving fictional characters or plots can also be included. MD is defined as extensive (in terms of duration and/or frequency) daydreaming that can be experienced as addictive, replaces human interaction and/or interferes with academic, interpersonal or vocational functioning and/or creates emotional distress (e.g., guilt, shame, frustration, sadness, anxiety (Somer, Soffer-Dudek, & Ross, 2017, pp. 180–181). Does your daydreaming fit this description? (a) no or (b) yes.

The Maladaptive Daydreaming Scale. Somer, Soffer-Dudek, and Ross's (2017) 16-item MDS (MDS-16) was used to gauge participants' self-reported degree of MD experiences, in particular, the extent of immersion in daydreaming, the amount of yearning to engage in daydreaming, and the maladaptation associated with it. Respondents rated their answers on an 11-point Likert scale presented as percentages, anchored at 0% on the left and 100% on the right, to show how often they have this experience. The MDS-16 is presented in the Appendix.

Absorption. The 34-item TAS (Tellegen, 1982) measures the degree to which the participants' "perceptual, motoric, imaginative, and ideational resources" can be deployed to form a "unified representation of the attentional object" (Tellegen & Atkinson, 1974, p. 274). Two scoring versions exist. The standard version of the scale is dichotomously scored (true–false). In the present study, respondents rated their answers on an 11-point Likert scale presented as percentages, anchored at 0% on the left and 100% on the right (Somer & Herscu, 2017), to show how often they have this experience. The TAS overall score (ranging from 0% to 100%) is obtained by averaging all responses.

Self-esteem. Self-esteem was gauged using Rosenberg's (1965) 10-item Self-Esteem Scale. It comprised statements that relate to how participants view themselves, such as, "I am able to do things as well as most other people." The participants were asked to rate these statements on a 6-point Likert scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*).

Quality of social relations. Ryff's (1999) nine-item scale was deployed to measure quality of social relations. The scale includes items like "I enjoy personal and mutual conversations with family members or friends." Participants were asked to respond by using a 6-point Likert scale from 1 (*strongly disagree*) to 6 (*strongly agree*).

Life satisfaction. Life satisfaction was measured on a 6-point Likert scale from *strongly disagree* (1) to *strongly agree* (6), with five items—for example, "I am satisfied with my life" (Diener, Emmons, Larsen, & Griffin, 1985).

Social phobia. Connor et al.'s (2000) 17-item Social Phobia Inventory (SPIN) was employed to assess participants' social phobia. The SPIN measures the degree of social phobic symptoms experienced over the past week across three domains (fear, avoidance, and physiological arousal). Participants were asked to respond by using a 6-point Likert scale from 1 (*not at* all) to 6 (*extremely*).

Social isolation. Participants completed De Jong Gierveld and Van Tilburg's (2006) six-item Loneliness Scale, including items such as "I experience a general sense of emptiness." Participants rated their answers on a 6-point Likert scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*).

Depression, anxiety, and stress symptoms. Berry, Phinney, Sam, and Vedder's (2006) 15-item scale was employed to measure feelings of depression, anxiety, and stress, with five items per factor, such as "I feel unhappy and sad" for depression, "I feel restless" for anxiety, and "I feel dizzy and faint" for stress symptoms in the present time. Participants were asked to rate these statements on a 6-point Likert scale from 1 (*strongly disagree*) to 6 (*strongly agree*).

Results

Factor Analysis

We conducted an exploratory factor analysis (EFA) with the direct oblimin rotation method,

which allows for emerged factors to be correlated. A multivariate normality analysis indicated that the distribution of the MDS-16 response items did not violate normality. Therefore, as recommended by Fabrigar, Wegener, McCallum, and Strahan (1999), we used the maximum likelihood extraction method, which allows for the computation of the chi-square goodness of fit index between the observed MDS-16 sample correlations and the reproduced EFA correlations. Kaiser-Meyer-Olkin statistics, which measure the correlations between pairs of MDS-16 items that can be explained by other MDS-16 items, a necessary condition to support the existence of an underlying factor structure, turned 0.93, suggesting a probable factor structure underlying the MDS-16. The Bartlett's test of sphericity for the interitem correlation matrix suggested that the matrix significantly differed statistically from the identity matrix, $\chi^2(120) = 1,806.74$, $p > .001$. The EFA of MDS-16 yielded two factors with eigenvalues above 1, together explaining 60.26% of the total variance. This two-factor model had a good representation of the data, $\chi^2(179) = 47.25$, $p < .05$. Factor loadings of the MDS-16 items are presented in Table 1. Items that loaded high on the first factor describe the core characteristics of an intense and vivid form of daydreaming; thus, we labeled this factor Immersive Daydreaming. Items that

loaded high on the second factor characterize the distress of yearning and impairment associated with MD; we thus labeled this factor Distress and Impairment. These two factors were strongly correlated ($r = .64$, $p < .001$), according to Cohen's convention.

Criterion and Predictive Validity

We relied on respondents' self-identification as MDers and used this for the assessment of the MDS-16's criterion validity. The criterion question that respondents answered to self-determine whether they met the description of MD was the classic question in previous MD research (e.g., Jopp et al., 2018; Somer et al., in press; Somer, Lehrfeld, et al., 2016). The MDS-16's adherence to criterion validity here is evidenced by MDers scoring higher than non-MDers on the overall MDS-16, $t(178) = 13.46$, $p < .001$, Cohen's $d = 2.01$. This was also true for each of the MDS-16's dimensions of Immersive Daydreaming, $t(178) = 12.81$, $p < .001$, Cohen's $d = 1.94$, and Distress and Impairment, $t(178) = 10.99$, $p < .001$, Cohen's $d = 1.64$. Table 2 includes the means and standard deviations.

We next used a ROC curve to determine the overall criterion validity, sensitivity, and specificity of the MDS-16 as a function of various MD thresholds ranging from 0% to 100%, in

Table 1
Rotated Factor Loadings of the MDS-16-AR (n = 180), Communality (H²), Mean, and SD

Item	Short text	Mean	SD	h^2	F1: Immerse daydreaming	F2: Distress and impairment
MD1	Music trigger	53.86	33.98	.59	**.75**	.02
MD2	Resume after interruption	55.04	32.36	.56	**.67**	.11
MD3	Noises and facial expressions	52.73	32.96	.41	**.52**	.17
MD4	Distressed about inability to find time to daydream	34.90	33.48	.54	**.72**	.03
MD12	Rather daydream than be social or pursue hobbies	43.16	34.94	.68	**.77**	.08
MD13	Urge after waking up	43.72	34.45	.59	**.55**	.29
MD14	Physical activity	41.19	36.04	.48	**.57**	−.22
MD15	Daydreaming is comforting or enjoyable	60.19	33.13	.66	**.92**	−.19
MD16	Daydreaming dependency on listening to music	37.26	32.83	.42	**.68**	−.05
MD5	Interferes with basic chores	41.25	34.76	.76	−.04	**.84**
MD6	Distressed about quantity of time daydreaming	45.61	36.49	.72	.05	**.88**
MD7	Complete goals without daydreaming	45.16	32.76	.65	−.13	**.72**
MD8	Interferes with achieving overall life goals	40.22	33.33	.81	.04	**.93**
MD9	Maintain control	41.22	34.29	.53	−.06	**.69**
MD10	Annoyed at being interrupted	39.34	32.11	.61	−.39	**.47**
MD11	Interferes with academic/occupational success	41.35	35.38	.65	.05	**.84**

Note. MDS-16-AR = Arabic 16-Item Maladaptive Daydreaming Scale.

Table 2

Differences in MDS-16-AR Scores Between Self-Identified MDers and Non-MDers

Score	MDers (n = 95)		Non-MDer (n = 85)	
	Mean	SD	Mean	SD
MDS-16-AR	61.25	17.65	26.48	16.89
Immerse daydreaming	60.35	22.69	21.42	16.94
Distress and impairment	61.88	19.42	30.29	19.03

Note. MDS-16-AR = Arabic 16-Item Maladaptive Daydreaming Scale; MDer = maladaptive daydreamer.

increments of 5 points, that could differentiate between self-identified MDers and non-MDers. Classifications of respondents to MDer status versus non-MDer status derived from the MDS-16's cutoff scores were compared against the known self-identified MDer versus non-MDer status in a two-way contingency table. Overall criterion validity for each MDS-16's threshold was determined by the level of agreement between the two classification methods. Sensitivity at each threshold was computed by determining the proportion of self-identified MDers who were classified as MDers at each MDS-16's threshold. Likewise, specificity was computed by determining the proportion of self-identified non-MDers who were classified as non-MDers at each MDS-16's threshold. For instance, using the MD threshold of 20% on

MDS-16 (i.e., respondents scoring 20% or above were considered MDers) yielded an estimated 71.6% overall agreement with the known self-identified status, a sensitivity of 100%, and a specificity of 40%. As shown in Figure 1, using 45% as the MDS-16's cutoff point for inclusion in the MD category yielded the optimal overall criterion validity (85.5%), sensitivity (89%), and specificity (87%). Although any MDS-16's threshold of 40% and below would boost the correspondent sensitivity to 90% and above, this would cause a notable deterioration in the specificity and criterion validity.

To assess the MDS-16's predictive validity, we employed the scale's 45% threshold and compared MDers and non-MDers according to this classification on a range of psychological indicators included in this study. As shown in Table 3, MDers scored higher than non-MDers on social phobia, $t(178) = 6.86$, $p < .001$, social isolation, $t(178) = 7.25$, $p < .001$, and depression, anxiety, and stress, $t(178) = 7.23$, $p < .001$. MDers had lower levels, compared with non-MDers, of self-esteem, $t(178) = -7.68$, $p < .001$, quality of social relations, $t(178) = -6.87$, $p < .001$, and life satisfaction, $t(178) = -5.36$, $p < .001$. The magnitude of all of these differences were large, as Cohen's *d* implies. In addition, the MDS-16 had a moderate to strong correlations with self-esteem ($r = -.54$, $p < .001$), quality of social relations ($r =$
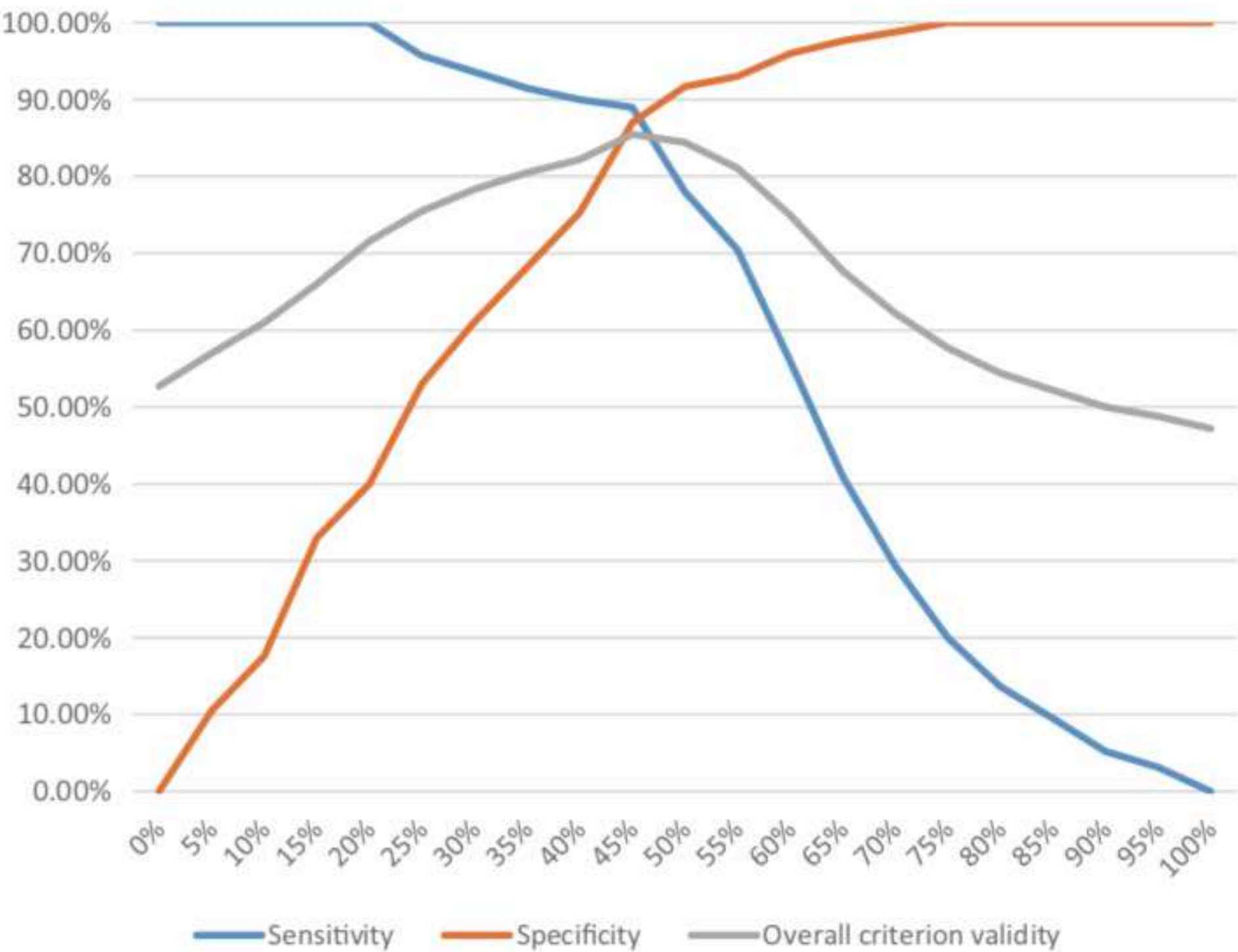

Figure 1. Overall criterion validity, sensitivity, and specificity as a function of various MDS-16-AR cutoff points. See the online article for the color version of this figure.

Table 3
Differences in Psychological Indicators Between MDers and Non-MDers Using the MDS-16-AR's 45% Threshold

Psychosocial indicators	MDer (n = 89)		Non-MDer (n = 91)		Cohen's d
	Mean	SD	Mean	SD	
Self-esteem	3.38	1.03	4.49	.89	1.15
Quality of social relations	3.27	.99	4.27	.94	1.04
Life satisfaction	2.56	1.13	3.41	.91	.83
Social phobia	3.53	1.21	2.46	.85	1.02
Social isolation	4.14	1.0	3.12	.88	1.08
Depression, anxiety, and stress symptoms	4.36	1.11	3.15	1.06	1.11

Note. MDer = maladaptive daydreamer; MDS-16-AR = Arabic 16-Item Maladaptive Daydreaming Scale.

$-.51$, $p < .001$), life satisfaction ($r = -.48$, $p < .001$), social phobia ($r = .51$, $p < .001$), social isolation ($r = -.53$, $p < .001$), and depression, anxiety, and stress ($r = .55$, $p < .001$), further confirming the psychopathological nature of this form of daydreaming and the predictive validity of its measurement scale.

Convergent Validity

With the unavailability of an alternative valid assessment tool of MD, we used the TAS (Tellegen, 1982) to assess the convergent validity of the MDS-16. Based on Cohen's convention, Pearson's correlation between the two scales was strong ($r = .52$, $p < .001$), indicating that both constructs are related yet distinct. We also calculated the correlation between each of the MDS-16's dimensions of Immersive Daydreaming and Distress and Impairment and the TAS. Although

both correlations were positive ($r = .58$ and $r = .39$, $p < .001$, respectively), this analysis implies that the Distress and Impairment dimension of the MDS-16 is distinct from the TAS.

Internal Consistency

Cronbach's alpha reliabilities of all study measures are given in Table 4. As shown, the reliability of the MDS-16 and each of its two dimensions (Immersive Daydreaming; Distress and Impairment) was excellent for the complete sample. This quality was maintained when the sample was split by self-identified MDers and non-MDers.

Discussion

This study evaluated the psychometric qualities of the MDS-16, the most recent version of an instrument constructed to gauge pathological

Table 4
Cronbach's Alpha of Each Study Measure

Study measure	Number of items	MDers (n = 95)	Non-MDers (n = 85)	Complete sample (n = 180)
MDS-16-AR	16	.85	.90	.94
Immerse daydreaming	9	.85	.87	.89
Distress and impairment	7	.86	.82	.92
TAS	34	.95	.97	.96
Self-esteem	10	.84	.83	.88
Social relations quality	9	.84	.86	.88
Life satisfaction	5	.84	.76	.84
Social phobia	17	.93	.90	.94
Social isolation	6	.70	.65	.73
Depression, anxiety, and stress symptoms	15	.94	.92	.95

Note. MDer = self-identified maladaptive daydreamer; MDS-16-AR = Arabic 16-Item Maladaptive Daydreaming Scale; TAS = Tellegen Absorption Scale.

immersive fantasizing: A compulsion to engage extensively in vivid daydreaming that is associated with substantial distress and impaired functioning (Somer, 2002). Our findings provided support for a two-correlated-factor structure underlying the MDS-16, with factors representing immersive daydreaming and the distress and impairment associated with it, the two core features defining MD. The internal consistency of the MDS-16 and each of the underlying dimensions was excellent, suggesting that the items' loadings on these factors are thematically and substantively interconnected. The strong correlation between the two underlying dimensions suggest substantial links between MDer's immersion in daydreaming and participants' experience of distress and impairment. Although the imperfect relation between the two factors implies they represent distinct features of MD as a clinical condition, we suggest that, for purposes of diagnosis and treatment, both factors should be considered in conjunction.

Our results have further confirmed that the MDS-16 is a valid measure of MD among Arab respondents. More specifically, convergent validity of the MDS-16 was demonstrated by a strong correlation with the TAS (Tellegen, 1982), which gauges some of MD's features, such as psychological absorption and openness to consciousness-altering experiences. Although a strong correlation was attained for the immersive daydreaming dimension of MDS-16, less than 16% of the variance in respondents' distress and impairment due to MD could be explained by the TAS, implying that this MDS-16's factor is distinct from the TAS, as we had surmised. Criterion-related evidence was demonstrated by the higher MDS-16 (and its two underlying factors) scores presented by self-identified Arab MDers compared with non-MDers, showing large effect sizes as evinced by Cohen's d scores. Our study further offers strong evidence in favor of using the MDS-16's cutoff composite score of 45 (out of a maximum of 100) for an optimal differentiation between self-identified MDers and non-MDers. This threshold proved to be a reliable criterion for the accurate identification of MD because it yielded high sensitivity (89%), specificity (87%), and overall criterion validity (85.5%). Moreover, we found that MDers were significantly more disadvantaged psychologically than non-MDers on a range of mental health and social functioning

indicators. Evidencing large effect sizes, MD was associated with lowered self-esteem, elevated social anxiety, poorer social relations, deeper social isolation, more intense psychological distress, and reduced life satisfaction. These grim results also provide further evidence of the predictive validity of the MDS-16. Thus, the present study replicates previous findings showing that MD is clearly associated with maladaptation and psychological distress (e.g., Abu-Rayya et al., 2018; Somer et al., 2016a, 2016b).

Collectively, our psychometric findings support the conclusion that the MDS-16 appears to be appropriate for deployment in subsequent studies and clinical work in the Arab world. Having established the MDS-16 as a useful tool in this large cultural group, future studies are needed to provide stronger evidence for the generalizability of our findings and the robustness of the MDS-16. This can be attained by replicating the study in the context of other languages, cultures, and groups as well as more specific Arab populations such as clinical samples.

A few study caveats deserve mention. First, in the absence of an established diagnostic criterion, we relied on respondents' self-identification as MDers and used this for the assessment of the MDS-16's criterion validity. This lay self-assessment should be cross-validated or optimally replaced by an independent expert evaluation. An example of this complementary or alternative criterion would be the recently developed Structured Clinical Interview for Maladaptive Daydreaming (SCIMD; Somer, Soffer-Dudek, Ross, & Halpern, 2017), which can help in determining more precisely the sensitivity and specificity of the MDS-16. An administration of the SCIMD in a large sample can be extremely time consuming and researchers may, on practical grounds, want to apply the SCIMD to a subset of their large sample in conjunction with the self-identification criterion for cross-validation purposes. Second, although our sample was recruited from a range of Arab nationalities, psychometric investigation of the MDS-16 was only possible for the complete sample. We believe that more robust evidence of the MDS-16's psychometric qualities in the diversified Arab world would have been achieved by the conduct of within-country analyses and the contrast of between-country data. The sample size achieved in this study pre-

vented such an undertaking. Lastly, only the TAS (Tellegen, 1982) was used in the examination of convergent validity of the MDS-16. Although no valid assessment tool that captures MD characteristics currently exists, the deployment of additional measures such as the DES (Bernstein & Putnam, 1986) would have strengthened our convergent validity conclusions. The DES was not employed in our study on practical grounds, seeking to make the questionnaire user friendly in terms of length and estimated completion time. Future replication of our study may want to compromise on particular predictive validity measures in favor of adding a particular convergent validity measure like the DES.

Conclusions

This is the first validation study of the MDS-16. Our data not only show that the MDS-16 is ready for use in the Arab world but also suggest a level of robustness that merits further exploration of its usefulness in other cultures. Our findings clearly distinguished MD from normal daydreaming as a construct comprised of two underlying dimensions representing the core characteristics of this pathological state of consciousness: immersive daydreaming and associated distress and impairment. With the attained evidence for the high sensitivity and specificity of the MDS-16, the instrument can now confidently be used to assess susceptibility for MD in the Arab world.

References

Abu-Rayya, H. M., Somer, E., & Knane, H. (2018). *Maladaptive daydreaming exacerbates psychosocial problems experienced by female survivors of childhood sexual abuse.* Manuscript submitted for publication.

Armour, C., Contractor, A., Palmieri, P. A., & Elhai, J. D. (2014). Assessing latent level associations between PTSD and dissociative factors: Is depersonalization and derealization related to PTSD factors more so than alternative dissociative factors? *Psychological Injury and Law, 7,* 131–142. http://dx.doi.org/10.1007/s12207-014-9196-9

Awaad, R., & Reicherter, D. (2016). Cultural perspectives in the context of Western psychological mind-sets: The need for cultural sensitivity in the mental health of immigrant youth. In S. G. Patel & D. Reicherter (Eds.), *Psychotherapy for immigrant youth* (pp. 185–196). Basel, Switzerland: Springer.

Bernstein, E. M., & Putnam, F. W. (1986). Development, reliability, and validity of a dissociation scale. *Journal of Nervous and Mental Disease, 174,* 727–735. http://dx.doi.org/10.1097/00005053-198612000-00004

Berry, J. W., Phinney, J. S., Sam, D. L., & Vedder, P. (2006). Immigrant youth: Acculturation, identity, and adaptation. *Applied Psychology: An International Review, 55,* 303–332. http://dx.doi.org/10.1111/j.1464-0597.2006.00256.x

Bigelsen, J., Lehrfeld, J. M., Jopp, D. S., & Somer, E. (2016). Maladaptive daydreaming: Evidence for an under-researched mental health disorder. *Consciousness and Cognition: An International Journal, 42,* 254–266. http://dx.doi.org/10.1016/j.concog.2016.03.017

Bigelsen, J., & Schupak, C. (2011). Compulsive fantasy: Proposed evidence of an under-reported syndrome through a systematic study of 90 self-identified non-normative fantasizers. *Consciousness and Cognition: An International Journal, 20,* 1634–1648. http://dx.doi.org/10.1016/j.concog.2011.08.013

Carlson, E. B., & Putnam, F. W. (1993). An update on the Dissociative Experiences Scale. *Dissociation: Progress in the Dissociative Disorders, 6,* 16–27.

Connor, K. M., Davidson, J. R., Churchill, L. E., Sherwood, A., Foa, E., & Weisler, R. H. (2000). Psychometric properties of the Social Phobia Inventory (SPIN): New self-rating scale. *The British Journal of Psychiatry, 176,* 379–386. http://dx.doi.org/10.1192/bjp.176.4.379

De Jong Gierveld, J., & Van Tilburg, T. (2006). A 6-item scale for overall, emotional, and social loneliness. *Research on Aging, 28,* 582–598. http://dx.doi.org/10.1177/0164027506289723

Diamond, J. (2012). *The world until yesterday. What can we learn from traditional societies?* New York, NY: Viking.

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction With Life Scale. *Journal of Personality Assessment, 49,* 71–75. http://dx.doi.org/10.1207/s15327752jpa4901_13

Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods, 4,* 272–299. http://dx.doi.org/10.1037/1082-989X.4.3.272

Hilgard, J. R. (1979). Imaginative and sensory-affective involvement in everyday life and hypnosis. In E. Fromm and R. Shor (eds.), *Hypnosis: Developments in research and new perspectives* (pp. 438–518). New York, NY: Aldine.

Jopp, D. S., Dupuis, M., Somer, E., Hagani, N., & Herscu, O. (2018). Validation of the Hebrew version of the Maladaptive Daydreaming Scale (MDS-H): Evidence for a generalizable measure of

pathological daydreaming. *Psychology of Consciousness: Theory, Research, and Practice*. Advance online publication. http://dx.doi.org/10.1037/cns0000162

Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, NJ: Princeton University Press. http://dx.doi.org/10.1515/9781400876136

Ryff, C. D. (1999). Psychology and aging. In W. R. Hazzard, J. P. Blass, W. H. Ettinger, J. B. Halter, & J. G. Ouslander (Eds.), *Principles of geriatric and gerontology* (pp. 159–169). New York, NY: McGraw-Hill.

Smallwood, J., & Schooler, J. W. (2015). The science of mind wandering: Empirically navigating the stream of consciousness. *Annual Review of Psychology, 66*, 487–518. http://dx.doi.org/10.1146/annurev-psych-010814-015331

Soffer-Dudek, N., Lassri, D., Soffer-Dudek, N., & Shahar, G. (2015). Dissociative absorption: An empirically unique, clinically relevant, dissociative factor. *Consciousness and Cognition: An International Journal, 36*, 338–351. http://dx.doi.org/10.1016/j.concog.2015.07.013

Soffer-Dudek, N., & Somer, E. (2018). Trapped in a daydream: Daily elevations in maladaptive daydreaming are associated with daily psychopathological symptoms. *Frontiers in Psychiatry, 9*, 194. http://dx.doi.org/10.3389/fpsyt.2018.00194

Somer, E. (2002). Maladaptive daydreaming: A qualitative inquiry. *Journal of Contemporary Psychotherapy, 32*, 195–210. http://dx.doi.org/10.1023/A:1020597026919

Somer, E. (2018). Maladaptive daydreaming: Ontological analysis, treatment rationale and a pilot case report. *Frontiers in the Psychotherapy of Trauma and Dissociation, 1*, 1–22.

Somer, E., Abu-Rayya, H. M., & Nsairy Samaan, Z. (in press). Maladaptive daydreaming among recovering substance use disorder patients: Its prevalence and mediation of the relationship between childhood trauma and dissociation. *International Journal of Mental Health and Addiction*.

Somer, E., & Herscu, O. (2017). Childhood trauma, social anxiety, absorption and fantasy dependence: Two potential mediated pathways to maladaptive daydreaming. *Journal of Addictive Behaviors, Therapy & Rehabilitation, 6*(4). http://dx.doi.org/10.4172/2324-9005.1000170

Somer, E., Lehrfeld, J., Bigelsen, J., & Jopp, D. S. (2016). Development and validation of the Maladaptive Daydreaming Scale (MDS). *Consciousness and Cognition: An International Journal, 39*, 77–91. http://dx.doi.org/10.1016/j.concog.2015.12.001

Somer, E., Soffer-Dudek, N., & Ross, C. A. (2017). The comorbidity of daydreaming disorder (maladaptive daydreaming). *Journal of Nervous and Mental Disease, 205*, 525–530. http://dx.doi.org/10.1097/NMD.0000000000000685

Somer, E., Soffer-Dudek, N., Ross, C. A., & Halpern, N. (2017). Maladaptive daydreaming: Proposed diagnostic criteria and their assessment with a structured clinical interview. *Psychology of Consciousness: Theory, Research, and Practice, 4*, 176–189. http://dx.doi.org/10.1037/cns0000114

Somer, E., Somer, L., & Jopp, D. S. (2016a). Parallel lives: A phenomenological study of the lived experience of maladaptive daydreaming. *Journal of Trauma & Dissociation, 17*, 561–576. http://dx.doi.org/10.1080/15299732.2016.1160463

Somer, E., Somer, L., & Jopp, D. S. (2016b). Childhood antecedents and maintaining factors in maladaptive daydreaming. *Journal of Nervous and Mental Disease, 204*, 471–478. http://dx.doi.org/10.1097/NMD.0000000000000507

Tellegen, A. (1982). *Brief manual for the Differential Personality Questionnaire*. Unpublished manuscript, University of Minnesota.

Tellegen, A., & Atkinson, G. (1974). Openness to absorbing and self-altering experiences ("absorption"), a trait related to hypnotic susceptibility. *Journal of Abnormal Psychology, 83*, 268–277. http://dx.doi.org/10.1037/h0036681

Western World. (n.d.). In *Wikipedia*. Retrieved from https://en.wikipedia.org/wiki/Western_world

(*Appendix follows*)

Appendix

The 16-Item Maladaptive Daydreaming Scale (MDS-16)

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%
Never   Extremely frequent

1. Some people notice that certain music can trigger their daydreaming. To what extent does music activate your daydreaming?

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%
Never   Very often

2. Some people feel a need to continue a daydream that was interrupted by a real world event at a later point. When a real world event has interrupted one of your daydreams, how strong was your need or urge to return to that daydream as soon as possible?

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%
No urge at all   Extreme urge

3. How often are your current daydreams accompanied by vocal noises or facial expressions (e.g. laughing, talking or mouthing the words)?

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%
Never   Extremely frequent

4. If you go through a period of time when you are not able to daydream as much as usual due to real world obligations, how distressed are you by your inability to find time to daydream?

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%
No distress at all   Extreme distress

5. Some people have the experience of their daydreaming interfering with their daily chores or tasks. How much does your daydreaming interfere with your ability to get basic chores accomplished?

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%
No interference at all   Extreme
                                                           interference

6. Some people feel distressed or concerned about the amount of time they spend daydreaming. How distressed do you currently feel about the amount of time you spend daydreaming?

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%
No distress at all   Extreme distress

7. When you know you have had something important or challenging to pay attention to or finish, how difficult was it for you to stay on task and complete the goal without daydreaming?

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%
No difficulty at all   Extreme difficulty

8. Some people have the experience of their daydreaming hindering the things that are most important to them. How much do you feel that your daydreaming activities interfere with achieving your overall life goals?

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%
No interference at all   Extreme
                                                             interference

9. Some people experience difficulties in controlling or limiting their daydreaming. How difficult has it been for you to keep your daydreaming under control?

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%
No difficulty at all   Extreme difficulty

10. Some people feel annoyed when a real world event interrupts one of their daydreams. When the real world interrupts one of your daydreams, on average how annoyed do you feel?

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%
No annoyance at all   Extreme annoyance

11. Some people have the experience of their daydreaming interfering with their academic/occupational success or personal achievements. How much does your daydreaming interfere with your academic/occupational success?

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%
No interference at all   Extreme
                                                             interference

(Appendix continues)

Appendix (*continued*)
_____

12. Some people would rather daydream than do most other things. To what extent would you rather daydream than engage with other people or participate in social activities or hobbies?

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%
Not at all   To the fullest extent

13. When you first wake up in the morning, how strong has your urge been to immediately start daydreaming?

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%
No urge at all   Extreme urge

14. How often are your current daydreams accompanied by physical activity such as pacing, swinging or shaking your hands?

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%
Never   Very often

15. Some people love to daydream. While you are daydreaming, to what extent do you find it comforting and/or enjoyable?

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%
Never   Very often

16. Some people find it hard to maintain their daydreaming when they are not listening to music. To what extent is your daydreaming dependent on continued listening to music?

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%
Never   Very often
_____

Note.   In answering the following questions, please refer to your daydreaming activities in the last month, if not otherwise specified. Choose the option that best fits your experience. For example: Some people get so caught up in their daydreaming that they forget where they are. How often do you forget where you are when you daydream? In this example, 20% is chosen.