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# Validation of the Hebrew Version of the Maladaptive Daydreaming Scale (MDS-H): Evidence for a Generalizable Measure of Pathological Daydreaming

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Maladaptive daydreaming (MD) is a newly described mental disorder characterized by extensive mental fantasy activity featuring addiction-like longing for fantasizing, accompanying repetitive movement, and feeling hindered in everyday life. This study describes the first validation of a non-English version of the Maladaptive Daydreaming Scale (MDS) and provides additional evidence for MD as a clinical phenomenon. The Maladaptive Daydreaming Scale–Hebrew version (MDS-H) is an adaptation of the 14-item English MDS (Somer, Lehrfeld, Bigelsen, & Jopp, 2016), a self-report questionnaire developed on the basis of qualitative information provided by self-identified maladaptive daydreamers (MDers). The MDS-H was administered to 280 individuals aged 13 to 73 years, including 45 self-identified MDers. Findings confirmed the expected 3-factorial structure, scalar invariance in comparison to the English MDS validation sample, and good psychometric properties. MDS-H scores were associated with dissociation, obsessive-compulsive behavior, and attentiondeficit/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 world-wide investigation of this condition.

*Keywords:* maladaptive daydreaming, fantasy, dissociation, obsessive-compulsive disorder, attention-deficit/hyperactivity disorder



Determining the robustness of a newly defined mental disorder requires the demonstration of its applicability in diverse cultures. In the current study, we aimed to confirm that a recently identified mental disorder, *maladaptive daydreaming* (MD), first described by Somer (2002), is consistent across cultures and reliably measurable in a non-English speaking society. Individuals suffering from MD spend large amounts of their time in a fanciful parallel world that they actively and voluntarily create in their minds (Bigelsen & Schupak, 2011). Although not formally recognized as a condition of clinical relevance as of now, steadily accumulating evidence shows that MD differs from normative daydreaming, for example, regarding duration, content, controllability, and impairment (Bigelsen, Lehrfeld, Jopp, & Somer, 2016).

Without available assessment and care, thousands of individuals with self-diagnosed MD already seek peer-support and advice on ways to limit their daydreaming activities on numerous

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webpages and Internet forums. For example, as of June 2018, Yahoo's Maladaptive Daydreamers forum (https://groups.yahoo.com/neo/groups/maladaptivedaydreamers/conversations/messages) had 3,572 registered members. Due to lack of knowledge about the condition in the absence of established diagnostic criteria, individuals with MD have received various diagnoses ranging from attention-deficit/hyperactivity disorder (ADHD) to schizophrenia. Consequently, their search for professional help rarely ends in successful treatment (Somer, Somer, & Jopp, 2016a). Yet, given the need for specific help designated for MD, it is imperative to examine this condition in more detail and to develop valid assessment tools that represent the prerequisite for screening larger populations, gaining information regarding prevalence in various cultures, identifying symptom overlap as well as unique specificities relative to other well-established psychiatric conditions, and ultimately developing diagnostic criteria for MD. This article contributes to this goal by validating a Hebrew version of the recently published Maladaptive Daydreaming Scale (MDS; Somer, Lehrfeld, Bigelsen, & Jopp, 2016) and by demonstrating the relevance of this condition in a non-English speaking culture. Our long-term goal is to establish MD as a valid psychiatric nosology and to develop useful treatment for this condition.

Although MD was first described over a decade ago (Somer, 2002), clinical research has only started recently to examine MD more systematically (e.g., Bigelsen & Schupak, 2011; Somer, Lehrfeld, et al., 2016). One reason for the paucity of research may be the similarity in terminology with "normal" daydreaming, which represents a highly prevalent mental activity that most of us experience on a daily basis. A typical example of normative daydreaming is mind wandering, during which individuals briefly lose focus and contemplate other things, such as an upcoming activity (Klinger, 2009; Singer, 1966). More recent studies document that MD has very distinct features from normative daydreaming in terms of quality, quantity, content, experience, controllability, distress, and interference with life functioning (Bigelsen et al., 2016; Somer, Somer, et al., 2016a).

In terms of quality, daydreams of maladaptive daydreamers (MDers) are self-constructed, and much of the content can be controlled by the MDers (Somer, Somer, & Jopp, 2016b). These daydreams are dominated by highly vivid and elaborated fantasy worlds, in which MDers "mentally" spend, on average, up to 57% of their waking hours engaging in daydreams on a normal day, and up to 69% on a "high daydreaming" day (Bigelsen et al., 2016).

The daydreams of MDers also differ significantly in terms of content from "normal" daydreams (Bigelsen et al., 2016): Comparing the daydreams of 56 non-MDers with those of 85 MDers revealed that non-MDers significantly more often engaged in daydreams that were based in real life or represented concrete wish fulfillment (e.g., winning a lottery). Instead, daydreams of MDers were substantially more fanciful, and they reported most often daydreams of being a celebrity or having a relationship with a celebrity (e.g., rich and famous, and dating a super model), having an idealized version of self (e.g., being very successful and well-liked), and being involved in a much-desired romantic relationship (e.g., having a relationship with a professor; Bigelsen et al., 2016).

In addition, MDers experience a strong sense of presence when engaged in their daydreams (Somer, Lehrfeld, et al., 2016), and many report that their daydreams have "real" visual and sensory quality ("It is like a reality with colors, smells and tastes"; Somer, Somer, et al., 2016b). Furthermore, MDers' daydreams are accompanied by unique behavioral features. These include ritualized daydreaming initiation and maintenance processes involving repetitive stereotypic movement and exposure to music that seem to intensify immersion in the daydreaming. Qualitative studies showed that many MDers had discovered by chance that these behaviors helped them to better concentrate on their fantasies, and that they then further refined these techniques (e.g., from riding a bike in circles to pacing while twirling a string; Somer, Somer, et al., 2016b). Some MDers also select specific music to intensify the emotional tone of their daydreams (Somer, Somer, et al., 2016b).

Other central characteristics of the MD experience include yearning and inability to stop. Two qualitative studies (Somer, Somer, et al., 2016a, 2016b) provided in-depth description of the addictive nature of MD ("I can't tell myself to stop, I don't even notice when I daydream, it's in my head all over"; "I'll try not to go to the

bathroom because I don't want to get up and stop for a second"). The subjective addictive nature of MD was also supported by recent quantitative data showing that MD was significantly correlated with fantasy addiction and that addiction to fantasy was an important mediating variable between both childhood trauma and social anxiety and MD (Somer & Herscu, 2017).

These reports also illustrated MDers' anxiety associated with being unable to curb the yearning and the resulting vicious circle of a need to daydream more to cope with their condition ("The stronger my fears get, the more depressed I become, and then I need to daydream to make myself feel better"). At the same time, about 80% of the MDers indicate that their daydreams are enjoyable and an important source of comfort (Bigelsen et al., 2016), which may explain some of MD's addictive character. In particular, MDers described how being in their daydreaming worlds made them feel good ("I love to picture myself as a musician, I get addicted to that because I can't replicate that in real life") and relaxed ("Your mind doesn't feel fully relaxed unless you daydream"; Somer, Somer, et al., 2016b). They furthermore indicated that their daydreaming had also served as a coping strategy ("It has served its purpose in getting me through my childhood"; Somer, Somer, et al., 2016b).

Of key importance is also that most of the individuals with MD experience their daydreams as highly dysfunctional. A large percentage of the MDers report that MD interferes with their life goals (at 63% of the time), academic goals (61%), basic chores (59%), social relationships (55%), and sleep (47%; Bigelsen et al., 2016). Overall, 97% of the MDers reported interference with one or more of these domains (Bigelsen et al., 2016). Participants in the qualitative studies also described how much they feel that the daydreams hindered their daily lives ("I feel like a ghost that misses out life"; "It keeps me from having a full life"; Somer, Somer, et al., 2016b).

Recently, we developed a questionnaire that captures the distinct features of MD, which can be used as a screening tool (Somer, Lehrfeld, et al., 2016). The original MDS includes 14 items that were developed on the basis of qualitative data from self-identified MDers capturing the key aspects of MD (quality, controllability, distress, experienced benefits and dysfunction). Testing its psychometric properties with a sample of 447 English speaking individuals from 45 different countries, the MDS proved to have good face, convergent, and discriminant validity, representing three underlying key dimensions, or subscales: Yearning (capturing the addictive quality of the rewarding experiences of MD), Kinesthesia (capturing the stereotypical physical movements associated with MD), and Impairment (capturing dysfunction associated with MD). The overall MDS and its subscales demonstrated sound internal consistency ($\alpha$s = .80–.94) and temporal stability (test–retest: $r$s = .87–.92; test–retest interval was 21 weeks). The MDS discriminated well between self-identified individuals with and without MD (effect sizes of Cohen's $d = 1.8$ or higher). Because of the groundbreaking nature of the first MDS study, finding a suitable criterion measure proved challenging. Wilson and Barber's (1981) fantasy proneness, the closest related construct, is gauged by the Inventory of Childhood Memories and Imaginings, which investigates childhood and adolescent experiences rather than current mental activities and offers limited supporting psychometric evidence (Lynn & Rhue, 1988; Myers, 1983). Similar to the Inventory of Childhood Memories and Imaginings, the Creative Experiences Questionnaire (CEQ; Merckelbach, Horselenberg, & Muris, 2001) is also based on Wilson and Barber's (1981) fantasy proneness construct; however, it also focuses largely on childhood experiences and paranormal constructs rather than on extensive current mental activity. We found that the MDS was substantially, but not perfectly, associated with the CEQ, $r = .53$, $p < .01$, indicating that both constructs are related yet distinct.

Given the seminal nature of the original MDS study, self-identified MD status was the best available proxy for a correct identification of MD. We compared the classifications derived from the MDS using cut-off scores ranging from 5 to 100 in increments of 5 points. That is, for each cut score, we computed a two-way contingency table to examine self-identified MD status versus MD status as determined by MDS score. Sensitivity was computed by determining the proportion of self-reported MDers who were classified as MDers at each cut score, and likewise with specificity. The original MDS showed high sensitivity (95%) and specificity

(89%) levels. Therefore, we concluded the MDS was ready for further development (Somer, Lehrfeld, et al., 2016).

The purpose of the current study was to shed light on whether the MDS, originally developed in English, can be used successfully with members of a non-English speaking society, by testing the validity and reliability of a Hebrew version of the instrument. We translated the MDS and aimed to replicate our original validation study among Hebrew-speaking community respondents living in Israel. The aims of the present study included to show that the Maladaptive Daydreaming Scale–Hebrew version (MDS-H) has good psychometric properties, an identical factorial structure and similar cut-off, as well as comparable convergent validity (e.g., fantasy proneness, sense of presence: Somer, Lehrfeld, et al., 2016; attention disorder/particularly inattention; Somer, Soffer-Dudek, & Ross, 2017; dissociative/particularly absorption: Somer & Herscu, 2017; and obsessive-compulsive attitudes: Bigelsen et al., 2016), as well as discriminant validity (e.g., no association with psychosis, Somer, Lehrfeld, et al., 2016) relative to the original MDS. Determining the robustness of the MD construct in a non-English speaking culture is important not only from a methodological point of view, giving support to the MDS as a useful measure, but also to identify MD in different cultures and population groups, including individuals with less education who are unable to speak English. Thus, the present study also serves to provide further evidence for the existence of MD. This is in line with our higher-order goals to (a) increase the awareness of this condition; (b) develop tools to assess MD both in larger populations as well as clinical settings; (c) gain population-based prevalence information in different countries to better understand the relevance of MD across cultures; and, in the long-run, to (d) advance the professional recognition and treatment of what we believe to be a universal (i.e., culturally independent) clinical phenomenon.

## Method

### Participants

**Hebrew sample.** Two-hundred eighty Hebrew-speaking individuals participated in the study (230 females, 48 males, two transgender). Age range was 13 to 72 years ($M = 33.21$, $SD = 10.32$). Participants were recruited (a) by offering course credit to graduate students; (b) through Facebook groups devoted to psychology and mental health issues; (c) by word of mouth, particularly through researchers who asked students, interns, and research assistants to participate and encourage the participation of their peers by forwarding the recruitment notice to their social networks. To determine self-identified MD status, we presented participants with a screening question asking whether they would consider themselves as daydreaming normally, as much as most people do, or whether they considered themselves as maladaptive or compulsive daydreamers, defined in the recruitment notice as "extensive, compulsive daydreaming that can cause distress or impair functioning." Forty-five participants (16.1%) self-identified as struggling with MD (MDers), and 199 participants (71.1%) self-identified as daydreaming normally and served as the comparison group (non-MDers: Table 1). Furthermore, 36 (12.9%) participants only contributed to a part of the study and were not asked to self-identify as MDer or non-MDer; this subgroup filled out the MDS-H only as part of a first pilot effort and was therefore only considered within the structural questionnaire analysis.

We found no difference in gender distribution or marital status associated with self-identified MD status, but unidentified participants were significantly younger than MDers, who were in turn substantially younger than non-MDers: unidentified participants, $M_{age} = 24.86$, $SD = 4.81$; MDers, $M_{age} = 28.78$, $SD = 9.76$; non-MDers, $M_{age} = 34.32$, $SD = 10.38$, $F(2, 277) = 17.69$, $p < .001$.

To determine test–retest reliability, a subgroup of $n = 59$ filled out the MDS-H for a second time about 5 months after the first assessment (time between questionnaire administrations $M = 20.11$ weeks, $SD = 5.28$). This test–retest group consisted of 50 females and 9 males and was 17 to 63 years old ($M = 32.32$, $SD = 9.47$) and did not show substantial differences in terms of gender distribution or age compared with the total sample.

**Comparison sample.** To test whether the factor structure of the MDS-H was comparable to the original MDS (administered in English), we used the sample that had served to validate the MDS as the comparison sample (Somer, Lehrfeld, et al., 2016, for more details). This

Table 1
*Demographic Information for the Complete Sample (N = 280)*

| Demographic | Total (*N* = 280) | MDers (*n* = 45) | Non-MDers (*n* = 199) | Unidentified (*n* = 36) | Test statistic[a] | Effect size[b] | *p*[c] |
|---|---|---|---|---|---|---|---|
| Age, *M* (*SD*) | 33.21 (10.32) | 28.78 (9.76) | 34.32 (10.38) | 24.86 (4.81) | 17.69 | .11 | <.001 |
| Female, *N* (%) | 230 (82.1) | 37 (82.2) | 161 (80.9) | 32 (88.9) | 1.93 | .06 | .516 |
| Ever married, *N* (%) | 87 (31.1) | 8 (17.8) | 70 (35.2) | 9 (25.0) | 11.11 | .22 | .052 |

*Note.* MDers = maladaptive daydreamers (self-identified on basis of single item question); non-MDers = individuals who indicated to not be maladaptive daydreamers; Unidentified = individuals who were not asked the question regarding their MDer status.
[a] *F* or $\chi^2$ empirical value for the difference between MDers, non-MDers, and individuals without self-reported MDer status. [b] $\eta_p^2$ or Cramer's *V* for the difference between MDers, non-MDers, and individuals without self-reported MDer status. [c] For analysis of variance or $\chi^2$ tests for the difference between MDers, non-MDers, and individuals without self-reported MDer status.

comparison sample included 447 (347 women, 96 men, two transgender, and two with no indication of gender) English-speaking individuals aged 13 to 78 from 45 countries.

## Measures

After providing general demographic information, participants answered questions about daydreaming, filled out the MDS-H, and completed five questionnaires that assessed potentially related or distinct mental health disorders.

**Demographic and basic clinical information.** Participants were asked for basic demographic information (i.e., age, gender, education).

**Personal daydreaming evaluation, time spent, and related functional impairment.** We defined MD for participants 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 (for example: guilt, shame, frustration, sadness, anxiety)." We then asked participants to complete the following item: "Do you think you daydream in a way that is different or more enhanced than others?" The answering format was 0 (*no*), 1 (*yes but it does not bother me*), or 2 (*yes and it bothers me*). We also asked participants to quantify how much time they spent with daydreaming on average ("What percent of your waking hours do you daydream in an average or typical week?") as well as on a "high daydreaming day" ("What percent of your waking hours do you daydream on a high daydreaming day?"). They were further asked how much their daydreaming interfered with social functioning ("Some people have the experience of their daydreaming interfering with their real-life relationships. How much does daydreaming interfere with your relationships with friends, family, coworkers, and others?"), and health (using the proxy of sleep interference; "Some people have the experience of their daydreaming interfering with their ability to sleep. On average, how much does your daydreaming interfere with your ability to sleep?"). These latter questions were answered on a scale of 0% to 100% in increments of 10% (only numbers were

shown, but no additional anchors were presented).

**The Maladaptive Daydreaming Scale–Hebrew version (MDS-H).** The MDS (Somer, Lehrfeld, et al., 2016), a 14-item rating scale to identify potential MD, was translated into Hebrew by a native Hebrew speaker (coauthor Dr. Somer) and later was back-translated into English by a native English speaker who was blind to the original English version. The back-translation was compared to the original version and differences were reconciled. This preliminary scale was administered to 10 MDers who were assessed for a separate study, resulting in positive feedback indicating no need for changes. The MDS assesses five key characteristics of MD: MD content/quality (two items), compulsion/control (four items), distress (three items), perceived benefits (two items), and interference with life (three items; see Appendix for the original questionnaire, Hebrew version available upon request). In our validation work of the English version of the MDS (Somer, Lehrfeld, et al., 2016), we found that the items represent an oblique three-factor structure with the factors Yearning (the urge to experience daydreaming; six items), Kinesthesia (the physical or perceptual experiences accompanying daydream; two items), and Impairment (difficulties and distress in conciliating daydreaming with other activities and life goals; six items). Respondents were asked to answer the items on a scale ranging from 0% (*never/none of the time*) to 100% (*all of the time/extreme amounts*), with 10% intervals in between, similar to the widely used Dissociative Experiences Scale (DES; see below).

**Creative Experiences Questionnaire (CEQ).** The 25-item self-report CEQ (Merckelbach, Muris, & Rassin, 1999; Merckelbach et al., 2001) assesses profound involvement in fantasy, developmental antecedents of fantasy proneness, and the consequences of fantasizing. The answering format is *yes* = 1 or *no* = 0. Affirmative responses are summed, and a higher sum score indicates higher levels of fantasy proneness. The CEQ was translated into Hebrew and back-translated into English to verify accuracy. In the present study, the reliability of the CEQ was good (Cronbach's $\alpha = .82$).

**Sense of Presence in Daydreaming (SPD).** This seven-item measure assesses the extent to which participants feel present while daydreaming (Somer, Lehrfeld, et al., 2016). Items were derived from tools designed to measure the sense of presence in virtual reality worlds (Slater, Steed, McCarthy, & Maringelli, 1998; Witmer & Singer, 1998). The SPD asks participants to think back to the last 2 weeks, choose their longest and most vivid daydream, and indicate their sense of "being there" in the daydream and involvement of their senses using a scale ranging from 1 (*not at all*) to 7 (*totally involved*). We translated the SPD items into Hebrew and back-translated them into English to verify accuracy. In the present study, the SPD showed good internal consistency ($\alpha = .86$).

**World Health Organization Adult ADHD Self-Report Scale–Version 1.1 (ASRS-v1.1).** The ASRS v 1.1 (Kessler et al., 2005; Kessler et al., 2007) is a standardized six-item measure based on ADHD criteria described in the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text revision; American Psychiatric Association, 2000). An item of the inattention subscale is, for instance, "How often do you have problems remembering appointments or obligations?" An example item from the impulsivity subscale is "How often do you feel overly active and compelled to do things, like you were driven by a motor?" Answers are given on a 5-point Likert scale ranging from 0 (*never*) to 4 (*very often*). We translated the ASRS-v1.1 into Hebrew and then back-translated it into English to verify accuracy. In the present study, the ADRS had a satisfactory internal consistency for the total scale ($\alpha = .74$) as well as its two subscales covering inattention ($\alpha = .74$) and impulsivity ($\alpha = .62$).

**Obsessive-Compulsive Inventory–Revised (OCI-R).** The OCI-R (Foa et al., 2002; Huppert et al., 2007) is an 18-item self-report measure that assesses symptoms of obsessive-compulsive disorders. All of its subscales consist of three items; these subscales include Washing, Obsessing, Hoarding, Ordering, Checking, and Neutralizing. Answers are given on a 5-point Likert scale ranging from 0 (*not at all*) to 4 (*extremely*). Translation into Hebrew and back-translation into English was also employed for the OCI-R. For the total OCI-R, the reliability was excellent ($\alpha = .91$) in the present study, and was good for most OCI-R subscales including Obsessing ($\alpha = .89$), Hoarding ($\alpha = .82$), Ordering ($\alpha = .82$), Checking ($\alpha = .82$), and Neutralizing ($\alpha = .70$). The Cronbach's

alpha was, however, weak for the subscale Washing ($\alpha = .58$).

**The Hebrew Dissociative Experiences Scale (H-DES).** The 28-item H-DES (Somer, Dolgin, & Saadon, 2001) represents the Hebrew version of the most widely used self-report measure of dissociative experiences (Bernstein & Putnam, 1986), demonstrating excellent reliability and validity (Ross, Norton, & Anderson, 1988; Van IJzendoorn & Schuengel, 1996). Three subscales include Amnesia, Absorption, and Depersonalization. Answering options range from 0% (*never*) to 100% (*all the time*) with increments of 10%. Item responses are averaged to represent the H-DES overall score (ranging from 0 to 100). The H-DES had in this study high internal consistencies for the total scale ($\alpha = .91$), as well as for its subscales (Absorption, $\alpha = .91$; Amnesia, $\alpha = .78$; and Depersonalization, $\alpha = .86$).

**Psychosis Screener.** The Psychosis Screener (Degenhardt & Hall, 2001; Degenhardt, Hall, Korten, & Jablensky, 2005) assesses psychotic symptoms and is based on the Composite International Diagnostic Interview (Robins et al., 1988). We used a shortened version including the three following items: "Over the past 12 months, have you felt that your thoughts were being directly interfered with or controlled by another person?"; "Over the past 12 months, have you had the feeling that things were arranged so as to have a special meaning for you, or even that harm might come to you?"; and "Has a doctor ever told you that you may have schizophrenia?" Answering options are *yes* = 1 and *no* = 0. Affirmative responses were combined into a sum score. Items were translated into Hebrew and back-translated into English to verify accuracy. Nevertheless, this shortened scale showed problems of internal consistency ($\alpha = .33$) in the present study. Despite its poor reliability, which is likely to be related to the fact that very few participants responded positively to any of the items, we decided to keep the measure to allow comparability to the prior validation study.

## Procedure

After providing on-screen informed consent, individuals anonymously completed an online survey with no compensation for participating. This study was approved by the Ethics Committee for the Evaluation of Research with Human Subjects at the University of Haifa (Hebrew sample) and Institutional Review Board of Fordham University (English-speaking sample from a prior study, used to test measurement invariance).

## Statistical Analyses

We used SPSS Version 21 and R (R Core Team, 2013) for descriptive statistics, significance tests, and estimation of effect sizes. Levels of significances were adjusted for multiple testing using Bonferroni correction. Testing of factorial structure and measurement invariance was done using the R package for latent variable analysis, *Lavaan* (Rosseel, 2012). Specifically, confirmatory factor analyses were performed to test whether the same three-factor structure, which had been confirmed for the English MDS, separating the factors yearning, kinesthesia and impairment, could also be replicated for the MDS-H. Consistent with the English validation study, maximum likelihood robust estimation served as estimation method.

Several indices were used to evaluate the model fit, namely $\chi^2$ (after Yuan–Bernstein correction for robust estimation), the ratio of $\chi^2$ to its degree of freedom (i.e., $\chi^2/df$), the comparative fit index (CFI) and the Tucker–Lewis index (TLI; i.e., non-normed fit index; Tucker & Lewis, 1973), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). More specifically, a $\chi^2/df < 3$ indicates a good fit. CFI and TLI values $>.90$ are generally considered as acceptable, whereas values $>.95$ are indicative of excellent fit. For the RMSEA and the SRMR, values $<.08$ are suitable, yet values $<.05$ are preferable (Hu & Bentler, 1999; Kline, 2011).

To test measurement invariance across the Hebrew and the English MDS versions, we compared the goodness-of-fit of the models while successively constraining parameters in both samples. After testing the covariance matrix equivalence using Box's *M* test as preliminary analysis, the analyses consisted of the following five steps of testing: configural invariance (Model 1), metric invariance (Model 2), scalar invariance (Model 3), latent mean invariance (Model 4), and strict invariance (Model 5; see Vandenberg & Lance, 2000). To conclude that the factor structure is invariant

across both samples, differences in CFI between each successive model tested must be lower than .01 (Cheung & Rensvold, 2002).

Internal consistency was measured for the total scale and subscales using Cronbach's alpha, except when these were represented by only two items (i.e., Kinesthesia factor). For the latter, reliability was estimated using the Spearman–Brown coefficient, as recommended by Eisinga, Grotenhuis, and Pelzer (2013). Test–retest reliability was determined using data from the 59 participants who complete the MDS-H at two measurement occasions. To determine convergent and discriminant validities of the MDS-H, we investigated the correlations between MDS-H scores and scores from measures assessing psychopathology.

As there is currently no established criteria for MD given the absence of a diagnostic tool, we used the self-reported MD status as a starting point, which was in line with procedures chosen earlier (Somer, Lehrfeld, et al., 2016). Specifically, we used the screening question with which the participants identified themselves as MDers to calculate ROC curves for the MDS-H and to determine the best cut-off separating MDers from non-MDers based on their MDS-H score. Then we used the MDS-H cut-off score indicated in the ROC procedure to identify "diagnosed" MDers and compared them with non-MDers with respect to the potential impairment associated with MD and comorbidities. On the basis of this classification, we investigated the extent to which diagnosed MDers and non-MDers differed in terms of obsessive-compulsive patterns, impulsivity and attention deficit, depersonalization and psychotic symptoms. Differences in mean expression of these dimensions were calculated using Hedges' $g$ (Hedges, 1982). Hedges' $g$ is an unbiased measure for standardized differences that is more accurate than Cohen's $d$ when there are potentially large differences in variance between groups, which could be expected for the comparison between MDers and non-MDers. Hedges' $g$ is expressed in the same metric as Cohen's $d$ (Cohen, 1992); namely, index values around 0.20 indicate small effects, values around 0.50 indicate medium effects, and values of 0.80 or higher indicate large effects.

## Results

### Factor Model

**Confirmatory factor analysis.** The confirmatory factor analysis ($N = 280$) testing a three-factorial structure discriminating the factors Yearning, Kinesthesia, and Impairment resulted in good fit indices, namely, CFI = .92, TLI = .91, RMSEA = .077 ($p < .001$), and SRMR = .042; $\chi^2/df = 2.46$ was found, also supporting a good fit of the model on the present data.

**Measurement invariance.** As preliminary step, a Box's M test was performed to test homogeneity of the covariance matrices. Significant differences between Hebrew ($N = 280$) and English ($N = 447$) samples ($p < .001$) suggested that both samples were not fully comparable. As reported in Table 2, successive testing for measurement invariance resulted in good fit indices for Models 1 to 3 (i.e., configural invariance, metric invariance and scalar invariance) considering the $\chi^2/df$, the CFI, the TLI and the SRMR, but the RMSEA was me-

Table 2
*Summary of Measurement Invariance Tests (N = 280 for Maladaptive Daydreaming Scale–Hebrew Version [MDS-H] N = 447 for Maladaptive Daydreaming Scale [MDS])*

| Measurement invariance tests | $\chi^2$ | $\Delta\chi^2$ | $\chi^2/df$ | CFI | TLI | RMSEA | SRMR |
|---|---|---|---|---|---|---|---|
| Model 1: Configural invariance | 453.35 | — | 3.11 | .933 | .916 | .080 | .042 |
| Model 2: Metric invariance | 482.39 | 29.04** | 3.07 | .929 | .917 | .079 | .055 |
| Model 3: Scalar invariance | 515.11 | 32.72** | 3.07 | .924 | .918 | .079 | .058 |
| Model 4: Latent mean invariance | 581.27 | 66.16** | 3.19 | .913 | .913 | .081 | .061 |
| Model 5: Strict invariance | 683.09 | 101.82** | 3.67 | .891 | .893 | .090 | .206 |

*Note.* $\chi^2$ = Yuan–Bentler-corrected $\chi^2$ for robust estimation; $\Delta\chi^2$ = difference in $\chi^2$ between models; CFI = comparative fit index; TLI = Tucker–Lewis index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual.
** $p < .01$.

diocre. Differences in CFI >.01 were found between Model 3 (i.e., scalar invariance) and Model 4 (i.e., latent mean invariance), as well as between Model 4 and 5 (i.e., strict invariance). For Model 4, both CFI and TLI were >.90, but the RMSEA was >.08 and the SRMR was .061. Model 5 resulted in a CFI and TLI <.90, and both RMSEA and SRMR were higher than acceptable. In sum, scalar invariance was confirmed, indicating that the items were related to the same factor in both languages, and that factor loadings and intercepts were similar, which suggests that the Hebrew and English versions of the MDS resulted in comparable factors structures and associated properties. Figure 1 represents the factor structure of the MDS-H with the standard factor loadings and correlations obtained when constraining for loadings and intercepts across both samples (i.e., Model 3).

## MDS-H Scoring

We used participants' self-classification as MDer in the absence of an established diagnostic criterion. For this analysis, we considered all individuals who had reported their MD status and who did not have any missing values on the MDS-H ($n$ = 208). We first compared self-identified MDers and non-MDers with respect to their MDS-H scores considering the individual MDS items (see Table 3) as well as MDS total score and subscales (see Table 4). Regarding the total MDS-H score, self-identified MDers ($M$ = 40.05, $SD$ = 22.02) scored significantly higher than non-MDers ($M$ = 11.90, $SD$ = 12.17), $t(46.15) = 7.89$, $p < .001$, Hedges' $g$ = 1.92. Differences between MDers and non-MDers were also confirmed for the three subscales Yearning, Kinesthesia, and Impairment, highlighting important differences in MD experience compared to "normal" daydreaming.

We next used a receiver–observer characteristic curve (ROC curve) to determine the sensitivity and specificity of potential cut-off scores to differentiate self-identified MDers and non-MDers. For the English version (Somer, Lehrfeld, et al., 2016), a cut-off score of 25 had been chosen (i.e., MDS scores higher than 25 were considered as MDers). Nevertheless, the cut-off score of 25 resulted in a sensitivity of 73% and in a specificity of 85% for the Hebrew-speaking sample, which was less satisfactory than for the English-speaking sample. Instead, a cut-off score of 20 led to a sensitivity of 83%, and a specificity of 81%, which was preferable regarding the lower risk of false negatives. Individuals with a score above 20 were thus considered MDers.

## Internal Consistency and Test–Retest Reliability

**Internal consistency.** The reliability for the MDS-H and its subdimensions was acceptable to high ($N$ = 280): Cronbach's alpha for Yearning ($\alpha$ = .81) and Impairment ($\alpha$ = .92) both reflected very good internal consistency. Spearman–Brown coefficient for Kinesthesia ($r$ = .65) was smaller. Finally, Cronbach's alpha for the whole scale was .92, indicating an excellent internal consistency.

**Test–retest reliability.** Using the subgroup of 59 individuals (26 MDers and 33 non-MDers) who had filled out the MDS-H twice, we found a correlation of $r$ = .87 between the MDS-H assessed at the first and the second measurement occasion, indicating very high temporal stability. Subscales also showed high correlations indicating substantial temporal sta-

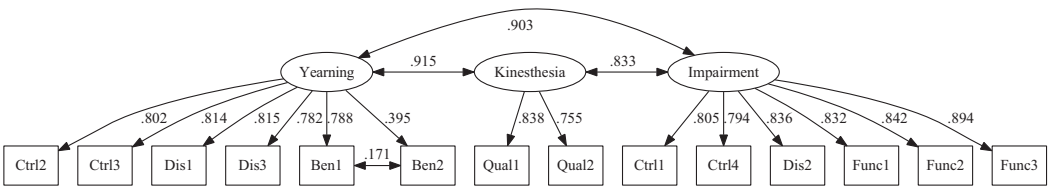


*Figure 1.* Standardized factor structure for the Maladaptive Daydreaming Scale–Hebrew version [MDS-H] based on scalar invariance analysis across Hebrew- and English-speaking samples (Model 3). Qual = quality; Ctrl = control; Dis = distress; Ben = benefits; Func = functioning.

Table 3
*Means and Standard Deviation of Maladaptive Daydreaming Scale–Hebrew Version [MDS-H] Items, Split by Self-Identified Maladaptive Dreamers (MDers; n = 41) and Non-MDers (n = 167)*

| Item | Short text | MDers | | Non-MDers | |
|---|---|---|---|---|---|
| | | *M* | *SD* | *M* | *SD* |
| Qual1 | Physical activity | 22.20 | 26.54 | 6.83 | 17.01 |
| Qual2 | Noises and facial expressions | 41.95 | 38.42 | 19.82 | 28.08 |
| Ctrl1 | Maintain control | 46.83 | 36.91 | 6.11 | 15.04 |
| Ctrl2 | Resume after interruption | 38.29 | 35.21 | 14.85 | 22.94 |
| Ctrl3 | Urge after waking up | 39.02 | 35.20 | 7.96 | 18.22 |
| Ctrl4 | Complete goals without daydreaming | 50.98 | 35.83 | 13.41 | 22.00 |
| Dis1 | Annoyed at being interrupted | 24.63 | 29.08 | 6.29 | 15.50 |
| Dis2 | Distressed about quantity of time daydreaming | 46.59 | 36.31 | 6.95 | 17.45 |
| Dis3 | Distressed about inability to find time to daydream | 32.44 | 35.20 | 7.96 | 17.02 |
| Ben1 | Rather daydream than be social or pursue hobbies | 40.73 | 32.66 | 9.34 | 16.80 |
| Ben2 | Daydreaming is comforting or enjoyable | 59.76 | 37.72 | 46.89 | 33.38 |
| Func1 | Interferes with basic chores | 38.29 | 36.12 | 7.37 | 15.69 |
| Func2 | Interferes with academic/occupational success | 36.34 | 35.05 | 7.19 | 15.60 |
| Func3 | Interferes with achieving overall life goals | 39.51 | 36.81 | 6.41 | 15.30 |

*Note*. Qual = quality; Ctrl = control; Dis = distress; Ben = benefits; Func = functioning. *M*s and *SD*s calculated from original response scale of 0% to 100%.

bility ($r$ = .80 for Yearning, $r$ = .64 for Kinesthesia, and $r$ = .88 for Impairment). In addition, the diagnosis of MD using the cut-off score of 20 resulted in a satisfactory value across time (Cohen's $\kappa$ = .71).

## Criterion Validity: Evidence for MD Being an Impairing Psychopathology

In line with our expectations, the MDS-H separated well individuals with extensive, enhanced daydreams from those with normal daydreams. To investigate MD experiences and negative consequences of daydreams, we used all 242 individuals who provided full information on the MDS-H as well as information about dysfunction. Specifically, when being asked about whether their daydreams were enhanced and whether they were bothered by them, the largest proportion of participants "diagnosed" as MDers (i.e., those with an MDS-H score >20), namely 73.5% ($n$ = 25), agreed (compared to 26.5% [$n$ = 9] of the non-MDers), suggesting that MDers seem to be distressed due to their daydreaming and may experience a reduced quality of life; a smaller proportion of the MDers, 25.8% ($n$ = 17), reported enhanced daydreams but *not* to be bothered by them (compared to 74.2% [$n$ = 49] of the non-MDers); instead, almost all "diagnosed" probable non-MDers (97.9%, $n$ = 139) reported to

Table 4
*Maladaptive Daydreaming Scale–Hebrew Version [MDS-H] Scores, Split by Self-Identified Maladaptive Dreamers (MDers; n = 41) and Non-MDers (n = 167)*

| Scale | MDer | | Non-MDer | | Independent-samples *t* tests | | | |
|---|---|---|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | *t* | *df* | *p* | Hedges' *g* |
| Overall MDS-H score | 40.05 | 22.02 | 11.90 | 12.17 | 7.89 | 46.15 | <.001 | 1.92** |
| Yearning | 39.15 | 23.63 | 15.55 | 14.31 | 6.12 | 47.43 | <.001 | 1.42** |
| Kinesthesia | 32.07 | 28.81 | 13.32 | 19.66 | 3.95 | 53.01 | <.001 | .86** |
| Impairment | 43.62 | 28.85 | 7.77 | 13.02 | 7.79 | 43.75 | <.001 | 1.34** |

*Note*. Noninteger *df*s were due to the use of the Welch–Satterthwaite (Satterthwaite, 1946; Welch, 1947) equation for *df* when the assumption of homogeneity of variances was violated.
** $p < .0025$ (Bonferroni-adjusted alpha levels).

have daydreams that were *not* enhanced (compared to 2.1% [$n = 3$] of MDers; $\chi^2 = 95.50$, $p < .001$).

Considering functional impairment, diagnosed MDers reported experiencing much higher levels of daily interference due to daydreaming: They indicated they spend on average 39.85% ($SD = 22.36$) of their waking time daydreaming in a typical week, compared with an average of 13.33% ($SD = 14.77$) reported by non-MDers, $t(93.93) = 8.79$, $p < .001$, $g = 1.50$. On a high daydreaming day, they reported to spend an average of 44.77% ($SD = 25.19$) of their waking time with daydreaming, compared to non-MDers who only reported to spend 13.43% ($SD = 13.54$), $t(81.27) = 9.43$, $p < .001$, $g = 1.73$. MDers also reported that daydreaming frequently interfered with their ability to accomplish basic chores ($M = 34.67\%$, $SD = 31.81$), which was rarely a problem for non-MDers ($M = 2.46\%$, $SD = 6.29$), $t(61.20) = 7.77$, $p < .001$, $g = 1.71$. Furthermore, diagnosed MDers reported that their daydreaming would interfere much more strongly with their social relations ($M = 28.33\%$, $SD = 30.37\%$) compared to non-MDers ($M = 1.43\%$, $SD = 5.89\%$), $t(61.126) = 6.80$, $p < .001$, $g = 1.50$. Finally, 23.85% ($SD = 30.42$) of the diagnosed MDers indicated that their daydreaming interfered with their ability to sleep, whereas non-MDers did only very rarely experience any sleep interference due to daydreams (2.92%, $SD = 7.51$), $t(12.80) = 2.44$, $p < .05$, $g = 1.39$.

## Convergent and Discriminant Validity

We investigated convergent and discriminant validity of the MDS-H by examining the correlations between MDS-H scores and scores from other clinical measures, considering study participants with completed data on all measures ($n = 168$; Table 5). Most of these associations were statistically significant ($p < .01$). The highest correlation was found between MDS-H and SPD, $r = .75$, which represents an expected yet very large relationship of MD symptomatology with an immersive experience of presence in the daydream. All other correlations between MDS-H and other clinical scales were also significant but lower, ranging from about .30 (i.e., the Psychosis Screener; Fisher $Z$ comparing .75 with .27: 6.32, $p < .001$, demonstrating a very large significant difference between MDS-H and Psychosis Screener vs. MDS-H and SPD correlations) to .62 (i.e., H-DES; Fisher $Z$ for .75 vs. .62: 2.25; indicating a nonsignificant difference between the MDS-H and H-DES vs MDS-H and SPD correlations after adjusting for multiple testing). Overall, whereas there were some relations between MD and the clinical indices, MD was, nevertheless, a distinct construct. The correlations presented in Table 5 are consistent with those found by the validation study of the English MDS.

Specifically, we found theory-conforming associations between MDS-H and the OCI-R that covers obsessive-compulsive behaviors and cognitions. The significant correlations between both MDS-H and OCI-R total scores, $r = .48$, $p < .01$ are supportive of the definition of MD as a repetitive and undercontrolled mental activity. Considering OCI-R subdimensions, qualitatively, the highest associations were found between MDS-H and the cognitive components of OCD (e.g., Obsessing, $r = .47$, $p < .01$); the associations with dimensions related to the behavioral components (i.e., compulsions) were significant but tended to be smaller (Ordering, Hoarding, and Neutralizing, $r$s = .31–.36, $p$s < .01), although there were no significant correlational differences (Fisher $Z = 1.21$, $p = .23$ to $Z = 1.72$, $p = .09$). Note that the subscales were compared using a conservative Bonferroni correction. The qualitatively higher correlations are consistent with MD being characterized with yearning for daydreaming, rather OCD-related actions, although these relations should be examined further in subsequent studies.

The correlation between the MDS-H total score and H-DES total scores was high ($r = .62$) and demonstrated a strong relationship between MD and dissociative experiences. The H-DES Absorption subscale had a strong correlation with the MDS-H, $r = .65$, $p < .01$, with the correlations reflecting a large effect size; the MDS-H was also associated with the H-DES Amnesia, $r = .46$, $p < .01$, and Depersonalization subscales, $r = .42$, $p < .01$, with the correlations reflecting a more moderate effect size. Comparing the correlation sizes indicated that the link between the MDS-H and the H-DES Absorption subscale was significantly stronger than the link between the MDS-H and the H-DES Depersonalization subscale ($Z = 2.98$, $p < .001$). However, correlations between MDS-H and H-DES Absorption and between

Table 5
*Correlations Between the Maladaptive Daydreaming Scale–Hebrew Version (MDS-H) and the Other Clinical Scales (N = 168)*

| Scales | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. MDS-H overall | 1 | | | | | | | | | | | | | | | | | | | | |
| 2. MDS-H Yearning | .91** | 1 | | | | | | | | | | | | | | | | | | | |
| 3. MDS-H Kinesthesia | .71** | .63** | 1 | | | | | | | | | | | | | | | | | | |
| 4. MDS-H Impairment | .91** | .69** | .49** | 1 | | | | | | | | | | | | | | | | | |
| 5. CEQ | .53** | .56** | .45** | .40** | 1 | | | | | | | | | | | | | | | | |
| 6. SPD | .75** | .71** | .57** | .63** | .61** | 1 | | | | | | | | | | | | | | | |
| 7. ASRS Overall | .43** | .38** | .29** | .41** | .36** | .35** | | | | | | | | | | | | | | | |
| 8. ASRS Inattention | .40** | .36** | .26** | .38** | .32** | .33** | .93** | 1 | | | | | | | | | | | | | |
| 9. ASRS Hyperactivity | .28** | .25** | .21 | .26** | .24** | .22 | .63** | .31** | 1 | | | | | | | | | | | | |
| 10. OCI-R Overall | .48** | .40** | .33** | .47** | .42** | .41** | .36** | .29** | .32** | 1 | | | | | | | | | | | |
| 11. OCI-R Washing | .41** | .32** | .27** | .43** | .34** | .36** | .25** | .16 | .32** | .77** | 1 | | | | | | | | | | |
| 12. OCI-R Checking | .31** | .27** | .21 | .30** | .32** | .25** | .20 | .17 | .15 | .77** | .52** | 1 | | | | | | | | | |
| 13. OCI-R Ordering | .31** | .24** | .24** | .31** | .25** | .28** | .15 | .08 | .22 | .77** | .56** | .51** | 1 | | | | | | | | |
| 14. OCI-R Hoarding | .32** | .30** | .23 | .29** | .31** | .24** | .38** | .36** | .21 | .70** | .39** | .48** | .44** | 1 | | | | | | | |
| 15. OCI-R Obsessing | .47** | .38** | .29** | .48** | .39** | .42** | .37** | .31** | .29** | .80** | .62** | .49** | .44** | .46** | 1 | | | | | | |
| 16. OCI-R Neutralizing | .36** | .32** | .26** | .33** | .32** | .34** | .25** | .18 | .27** | .76** | .57** | .56** | .56** | .39** | .51** | 1 | | | | | |
| 17. H-DES Overall | .62** | .57** | .47** | .54** | .56** | .65** | .54** | .46** | .44** | .64** | .55** | .43** | .37** | .39** | .64** | .54** | 1 | | | | |
| 18. H-DES Absorption | .65** | .61** | .50** | .57** | .60** | .70** | .52** | .44** | .42** | .59** | .47** | .39** | .32** | .41** | .60** | .46** | .95** | 1 | | | |
| 19. H-DES Amnesia | .46** | .40** | .36** | .43** | .26** | .37** | .37** | .29** | .35** | .47** | .44** | .34** | .30** | .26** | .39** | .48** | .73** | .59** | 1 | | |
| 20. H-DES Depersonalization | .42** | .42** | .25** | .36** | .41** | .44** | .42** | .35** | .34** | .64** | .54** | .40** | .41** | .33** | .64** | .60** | .80** | .64** | .56** | 1 | |
| 21. Psychosis Screener | .27** | .26** | .24** | .22 | .33** | .27** | .33** | .28** | .27** | .46** | .30** | .31** | .36** | .33** | .36** | .44** | .52** | .43** | .46** | .58** | 1 |

*Note*. CEQ = Creative Experiences Questionnaire; SPD = Sense of Presence in Daydreaming; ASRS = ADHD (Attention Deficit/Hyperactivity Disorder) Self-Report Scale; OCI-R = Obsessive-Compulsive Inventory–Revised; H-DES = Hebrew Dissociative Experiences Scale.
** $p < .0005$ (Bonferroni-adjusted alpha levels).

the MDS-H and H-DES Amnesia did not differ significantly in size, as the associated Fisher *Z* score was only marginal when adjusting for multiple testing ($Z = 2.52$, $p = .010$). The smallest of all correlations between the total MDS-H and any clinical measures was the link with the Psychosis Screener, $r = .27$, $p < .01$, indicating some but less substantial overlap between MD and psychotic symptomatology.

Most of the correlations between MDS-H subscales and the mentioned scales were significant. The MDS-H Impairment scale was strongly associated with health impairment, $r = .65$, $p < .001$, while Yearning and Kinesthesia were not linked to health impairment (i.e., sleep interference item; $r = .24$, and $r = .26$, *ns*). The social impairment item was significantly correlated with all MDS-H subscales, but correlations were significantly stronger for Impairment ($r = .80$) and Yearning ($r = .66$) than for Kinesthesia ($r = .35$, $ps < .001$; Fisher *Z* for .80 vs. .35 = 6.66, $p = .001$, and .66 vs. .35 = 3.88, $p = .001$).

## Comparing Probable MDers With Probable Non-MDers: Comorbidity Profiles

We compared diagnosed MDers (i.e., MDS-H score >20) with probable non-MDers with respect to other clinical symptoms (Table 6; $n = 168$). Despite using the conservative Bonferroni correction, suspected MDers scored significantly higher on most scales or subscales compared with non-MDers: large effect sizes (i.e., $g > 1$) were found for the H-DES total scale ($g = 1.57$), especially the Dissociative Absorption subscale of the H-DES ($g = 1.79$), sustaining the existence of very large effects. Large effects (i.e., values higher than .80) were also found for OCI-R total score ($g = .88$), Obsessing dimension ($g = .90$), and H-DES Amnesia ($g = .93$) and Depersonalization ($g = .83$) subscales. Moderate effect sizes (i.e., values >.50) were found for both ARSR dimensions and the OCI-R subscales Washing, Checking, Hoarding, and Neutralizing. Although not representing mental health concerns,

Table 6
*Scores of Diagnosed*[a] *Maladaptive Dreamers (MDers; n = 53) Versus Non-MDers (n = 115) on Clinical Measures*

| Scale | MDer | | Non-MDer | | Independent-samples *t* tests | | | |
|---|---|---|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | *t* | *df* | *p* | Hedges' *g* |
| CEQ | 12.28 | 3.65 | 7.21 | 4.45 | 7.54 | 166 | <.001 | 1.20** |
| SPD | 3.12 | 1.00 | 1.43 | .82 | 10.78 | 87.56 | <.001 | 1.91** |
| ASRS total | 2.60 | 1.95 | 1.37 | 1.47 | 4.57 | 102.34 | <.001 | .75** |
| Inattention | 2.04 | 1.56 | 1.11 | 1.23 | 4.31 | 105.70 | <.001 | .69** |
| Impulsivity | .55 | .70 | .26 | .50 | 3.08 | 98.41 | .0027 | .51* |
| OCI-R total | 21.44 | 15.37 | 11.51 | 8.57 | 4.43 | 69.05 | <.001 | .88** |
| Washing | 1.93 | 2.31 | .81 | 1.28 | 3.32 | 68.68 | .001 | .66* |
| Checking | 3.33 | 3.03 | 1.89 | 2.18 | 3.14 | 79.87 | .002 | .58* |
| Ordering | 4.13 | 3.73 | 2.99 | 2.40 | 2.05 | 74.47 | .044 | .39 |
| Hoarding | 4.15 | 3.03 | 2.18 | 2.39 | 4.55 | 166 | <.001 | .75** |
| Obsessing | 5.78 | 3.87 | 2.77 | 3.04 | 5.02 | 85.09 | <.001 | .90** |
| Neutralizing | 2.13 | 3.06 | .87 | 1.56 | 2.86 | 66.39 | .006 | .58 |
| H-DES total | 26.31 | 15.85 | 9.02 | 7.69 | 7.60 | 65.11 | <.001 | 1.57** |
| Absorption | 37.48 | 18.30 | 13.21 | 10.51 | 9.07 | 70.07 | <.001 | 1.79** |
| Amnesia | 9.72 | 13.57 | 2.04 | 3.58 | 4.09 | 56.52 | <.001 | .93** |
| Depersonalization | 17.81 | 22.51 | 4.96 | 10.41 | 4.00 | 63.96 | <.001 | .83** |
| Psychosis Screener | .31 | .64 | .10 | .30 | 2.39 | 64.05 | .020 | .48 |

*Note*. SPD = Sense of Presence in Daydreaming; CEQ = Creative Experiences Questionnaire; ASRS = ADHD (Attention Deficit/Hyperactivity Disorder) Self-Report Scale; OCI-R = Obsessive-Compulsive Inventory–Revised; H-DES = Hebrew Dissociative Experiences Scale. Noninteger *df*s were due to the use of the Welch–Satterthwaite (Satterthwaite, 1946; Welch, 1947) equation for *df* when the assumption of homogeneity of variances was violated.
[a] Diagnosed by a Maladaptive Daydreaming Scale score >20.
* $p < .0029$. ** $p < .0006$ (Bonferroni-adjusted alpha levels).

but illustrating key characteristics of MD, it is of note that the strongest differences between MDers and non-MDers existed for sense of presence, as assessed by the SPD scale ($g$ = 1.91). A very strong difference between MDers and non-MDers was also found for proneness to fantasy measured by the CEQ ($g$ = 1.20).

## Discussion

Our study provides further evidence regarding individuals suffering from a compulsion to excessively engage in complex and fanciful daydreams, adding to the growing literature on MD. Extending prior work with English speaking individuals (e.g., Somer, Lehrfeld, et al., 2016), we confirmed that MD was also present among Hebrew-speaking Israelis, complementing findings from a prior qualitative MD study with six respondents (Somer, 2002). The sound psychometric performance of the MDS in Hebrew, a language that does not share a common etymological root or lexical system with English, provides some confidence that MD may be a universal phenomenon.

Using the largest group of Hebrew-speaking individuals tested to date, we introduced and validated the newly developed MDS-H, the Hebrew version of the MDS (Somer, Lehrfeld, et al., 2016), which was originally developed in English and represents the only available assessment tool to capture MD. We found that the MDS-H possesses a similar factor structure as the original MDS and good psychometric properties, suggesting that the MDS-H is appropriate for future studies with the larger Hebrew-speaking population. Our study represents an important step toward expanding access to MD populations worldwide and will hopefully encourage the development of MDS versions in other languages to allow assessment of different, non-English speaking populations using this tool.

### MDS-H Factor Structure and Psychometric Properties

In line with previous results based on the original MDS (Somer, Lehrfeld, et al., 2016), our present findings confirm that the 14 items of the MDS-H can be represented by a three factorial structure differentiating key affective, behavioral, and functioning aspects that characterize MD: *yearning*, reflecting individuals' feelings of being strongly drawn into their daydreaming world, described as an addiction-like attraction; *kinesthesia*, capturing repetitive movement and other ritual-like behaviors that MDers use to initiate and to enhance their daydreaming; and *impairment*, representing individuals' distress and perceptions of being hindered in normal everyday life functioning by their time-consuming and excessive daydreaming behavior.

Comparing the Hebrew data with the original English language MDS validation data (Somer, Lehrfeld, et al., 2016), we were also able to confirm configural invariance, metric invariance, and scalar invariance. Thus, the MDS-H seems to be similar to the original MDS with respect to factor structure, loadings, and intercepts, implying that the MDS is comparable across different languages and cultures and, furthermore, that MD can be characterized by the same key dimensions. The more conservative types of invariance, latent mean variance and strict invariance, were not confirmed, indicating that latent means and residuals differed across samples. This finding is very likely a product of differences between samples rather than due to language or culture: Many of the MDers in the original MDS validation study (Somer, Lehrfeld, et al., 2016) were recruited via Internet sites dedicated to MD, whereas MDers in the present study were identified among college students and Facebook users interested in general health and psychology issues. Thus, the MDers in the present sample were, overall, less impaired, as indicated by both their MDS scores and their scores on other measures of psychopathology. Nevertheless, the cut-off score identified as best discriminating between MDers and non-MDers in the present study was quite comparable with our prior work (Somer, Lehrfeld, et al., 2016), although slightly lower given our sample included fewer individuals with severe issues. Given that both studies were based on convenience samples, future studies that rely on more rigorous sampling methods are of high importance to further test potential linguistic and cultural differences.

The MDS-H also evidenced satisfactory psychometric properties with high internal consistency and high temporal stability for the total scale as well as its subscales, with the exception that the subscale Kinesthesia was somewhat

lower regarding internal consistency and stability, a finding which is in line with results from the original MDS validation study (Somer, Lehrfeld, et al., 2016). The psychometric properties of this scale are probably associated with the fact that it includes only two items that address distinct characteristic behaviors performed while daydreaming, namely one item that captures physical activity (e.g., walking and pacing) and the second item that captures talking noises and facial expressions (e.g., laughing and talking). The strong correlations among the subscales furthermore suggest substantial links between MDers' yearning for daydreaming, kinesthetic features and experienced impairment. These high correlations may imply that MD can actually be explained by a higher level factor. Nevertheless, the imperfect relations between the factors also indicate that these aspects represent distinct facets of MD as a clinical phenomenon. Taken together, the psychometric findings support the conclusion that the MDS-H appears to be appropriate for use in subsequent studies and clinical work.

### Discriminatory Power of the MDS-H

The MDS-H was found to be useful in discriminating MDers and non-MDers, supporting its value as a diagnostic screening instrument. The cut-off score determined by ROC curves permitted the delineation of well-defined groups that differed in terms of MD dysfunction and comorbidity profiles: MDers, identified on the basis of their MDS-H scores, were much more likely to report daydreams that were enhanced with respect to visual, auditory, or other sensory qualities, as well as by the sense of presence in the daydream. MDers were also much more likely to report impairments in everyday life functioning, including social relations and health, underscoring the pathological essence of MD, corroborating our prior findings (e.g., Somer, Lehrfeld, et al., 2016). Not only are maladaptive daydreams different in terms of enhanced quality, fanciful content, and addiction-like compulsiveness compared to "normal daydreaming," but MDers also spend a much more substantial percentage of their waking time daydreaming compared to non-MDers: Specifically, MDers reported to spend, on average, 40% to 45% of their waking time daydreaming, which generally paralleled findings from our prior study, in which MDers had reported to devote 57% to 69% of their waking time to daydreaming (Bigelsen et al., 2016). This difference in findings across studies seems again associated with characteristics of the respective samples. Not surprisingly, MDers reported that the substantial amount of their daydreams hindered important aspects of everyday life, including doing chores, sleeping, and social activities. Although participants reported to daydream for a smaller percentage of their day compared to our previous studies (Bigelsen et al., 2016), MDers were significantly more often hindered by their daydreams than individuals with "normal" daydreams. Thus, the present study replicates findings showing that MD is clearly associated with psychological burden and everyday maladaptation, in contrast with daydreaming that is rightfully considered as a "normal behavior."

### Pathology Profile of MD

Given that MD is not yet established as a distinct mental health diagnosis, its relation with other mental disorders is of key importance (see Bigelsen et al., 2016; Somer, Lehrfeld, et al., 2016; Somer et al., 2017; Somer, Soffer-Dudek, Ross, & Halpern, 2017). Regarding the pathology profile of MDers, the present findings among Israeli respondents confirm our prior work. Overall, individuals diagnosed with MD on the basis of the MDS-H scored higher on indices of psychopathology than individuals who do not qualify as MDers. Probable MDers scored higher on all clinical measures employed, yet, effect sized varied, corroborating prior findings (Somer, Lehrfeld, et al., 2016).

Particularly strong differences between MDers and non-MDers were found for the dissociation scales, indicating that dissociation seems to be of prime importance for MD. In line with this, the overall score of the H-DES was highly associated with the MDS-H, and this link was based, in part, on the large association between the H-DES Absorption subscale and the MDS-H, which reflects MDers' reports of feeling completely immersed in their daydreams. The MDS-H showed also substantial relations with respect to the Amnesia and the Depersonalization subscales, implying that spending many waking hours in fantasy might be at the expense of memory function or the

sense of reality. The higher correlation between MDS and Absorption compared to the link between MDS and Depersonalization was consistent with the validation of the English version (Somer et al., 2016); that the difference between the correlations MDS–Absorption versus MDS–Amnesia was not statistically reliable seems due to the smaller sample in the present study in combination with conservative adjustment of the alpha level due to multiple testing; thus the extent to which MD is indeed more strongly linked to immersion (as key symptom) rather than amnesia (as secondary symptom) needs further replication. Still, there is no doubt that amnesia is associated with MD pathology, as shown by the significant link between MDS and amnesia we found here and in the earlier validation study: Prior research has shown that people suffering from MD were often not able to remember whether they did certain things in real life or only in fantasy, as well as not being aware of bodily states such as thirst or hunger (Bigelsen & Schupak, 2011).

Of further note, MDers and non-MDers differed strongly with respect to obsessive-compulsive behaviors. MDers' OCI-R scores were substantially higher than those of the non-MDers, suggesting that MD may not only have some overlap with dissociation experiences and perhaps disorders but also with obsessive-compulsive symptomatology. Comparing the effect sizes for all OCI subscales, the strongest differences between both groups existed for the Obsessing subscale, which seems to capture the yearning that MDers experience and their need to return to this mental behavior after interruptions. Other behavioral obsessive-compulsive symptoms seem to be less important for characterizing MD, including ordering and neutralizing, where we found no significant differences between MDers and non-MDers. These results are also consistent with our former study (Somer, Lehrfeld, et al., 2016) and highlight the possible similarity with OCD in terms of urge to engage in a specific and problematic behavior. Concerning correlations between MDS-H subscales and the OCI-R, it is further of note that there were consistent correlations for MDS Yearning and Impairment, but weaker and non-significant links for the MDS Kinesthesia subscale, which suggests that kinesthesia may represent a defining MDS dimension with less overlap with obsessive-compulsive symptomatology.

In line with assumptions regarding divergent validity, we found no difference between MDers and non-MDers for the Psychosis Screener, which was in line with our observation that MDers seem to be aware of the fact that they are in their daydreaming world when fantasizing. That there was nevertheless a significant correlational link between MDS-H score and Psychosis Screener, a relationship we also observed in the initial validation study (Somer, Lehrfeld, et al., 2016), may be due to respondents' awareness of their highly unusual and intractable behaviors and hallucinatory-like symptoms. Still, such interpretations need to be considered with caution, given that the reliability of Psychosis Screener was weak in the present sample.

To complement the picture on MD by considering specific characteristics such as fantasy proneness and sense of presence experienced while daydreaming, we confirmed a number of distinct features of MDers: As expected, MDers scored substantially higher on fantasy proneness, as assessed by the CEQ, which parallels prior qualitative reports (Bigelsen et al., 2016; Somer, Somer, et al., 2016a, 2016b) and findings from the initial MDS validation study (Somer, Lehrfeld, et al., 2016). Furthermore, MDers and non-MDers differed strongly in their sense of presence during daydreaming; higher scores for the MDers are in line with their reports to experience their daydreams as visually and sensually enhanced. Supporting our previous studies, MD seems to be not only characterized by pathological features but also by an innate capacity for creating particularly vivid fantasy (see also Somer et al., 2016a). In sum, the findings regarding convergent and discriminant validity of the MDS-H suggest that MDers are more likely to be affected by other psychological issues such as dissociation, but that they are not more likely than non-MDers to present with psychotic or behavioral obsessive-compulsive symptoms such as neutralizing or ordering.

## Limitations

Several limitations deserve mention. In the absence of an established diagnostic criterion, we relied on self-reported MD status to determine a

useful cut-off on the MDS-H. Ideally, this subjective criterion should be verified by an independent expert rating, for example, such as the recently developed Structured Clinical Interview for Maladaptive Daydreaming (SCIMD; Somer, Soffer-Dudeck, Ross, et al., 2017). A more objective criterion such as the SCIMD can help to further investigate the accuracy of the MD classification using MDS cut-off scores. Also, the present study used a convenience sample as a first step to examine the MDS-H. In comparison with the original validation study of the MDS (Somer, Lehrfeld, et al., 2016), fewer individuals with manifest MD issues were sampled, which is likely due to recruiting students and via social media instead of recruiting via self-help websites dedicated to MD, as was done in our prior study. Lower levels of reported MD-related psychopathology and fewer restrictions in functioning may have compromised confirming latent means invariance.

An additional methodological concern is that we cannot disentangle whether MDers' higher overall morbidity is associated with the tendency of fantasy-prone individuals to more likely agree with any items proposed (e.g., Eisen & Lynn, 2001; Lynn & Rhue, 1988). If a relationship between MD and suggestibility exists, it could have contributed to the impression that MDers exhibit a higher psychiatric morbidity. Future studies should address this issue by adding control measures for bias, which allow capturing such potential response tendencies. Moreover, the construct validity measures were administered in the same test context, which might have inflated the observed correlations via context effects (see Council, Kirsch, & Hafner, 1986).

Having established the MDS-H as useful tool, future studies may now address more specific populations such as clinical samples to further examine the MDS-H structure in these groups. In addition, given that the sample consisted of volunteers with the usual gender bias overrepresenting females, we also suggest studying more representative samples, which would secure additional evidence regarding the usefulness of the MDS and provide more reliable information on the prevalence of MD among the general population within and across various cultures.

## Conclusions

Besides confirming the usefulness of the Hebrew language version of the MDS as a measure of abnormal fantasizing, and its similarity to the original questionnaire, we provided evidence for the existence of a group of MDers among the more general Hebrew-speaking population in Israel. Findings from the present study lent support to identifying MD as a fantasy activity characterized by a strong sense of presence and associated with intense yearning, kinesthesia, and dysfunction, which needs to be clearly differentiated from "normal" daydreaming. That MD can be assessed successfully in a non-English speaking population suggests that MD is a more global, nonculture-specific phenomenon. We are encouraged by the validity of the translated measure and hope that it will inspire additional translations and subsequent exploration of MD in the context of other languages and cultures. Adding to prior evidence, MDers in the present study also reported substantial interference of MD with daily functioning and related illness burden. This finding underscores the psychopathological properties of this mental activity and highlights the importance of further investigation of MD as an underacknowledged mental health condition. While much more empirical research is needed with the MDS in different populations, our findings are highly encouraging. Creating additional language-specific versions of the MDS will hopefully stimulate research activities across the globe, and accumulated data on the psychopathological properties of MD will decrease the reported misunderstanding and dismissal of the phenomenon by family members and professionals (Somer, Somer, et al., 2016a). Ultimately, we hope to facilitate a more comprehensive understanding of MD and the development of treatment approaches to reduce MD-related suffering.

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## Appendix

## The Maladaptive Daydreaming Scale

| Label | Text of item |
|---|---|
| Qual1 | How often are your current daydreams accompanied by physical activity such as pacing, swinging or shaking your hands? |
| Qual2 | How often are your current daydreams accompanied by vocal noises or facial expressions (e.g., laughing, talking, or mouthing the words)? |
| Ctrl1 | How difficult has it been for you to keep your daydreaming under control? |
| Ctrl2 | 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? |
| Ctrl3 | When you first wake up in the morning, how strong was your urge to immediately start daydreaming? |
| Ctrl4 | When you know you had something important or challenging to pay attention to or finish, how difficult was it for you to stay on track and complete the goal without daydreaming? |
| Dis1 | 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? |
| Dis2 | 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? |
| Dis3 | 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? |
| Ben1 | 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? |
| Ben2 | Some people love to daydream. While you are daydreaming, to what extent do you find it comforting and/or enjoyable? |
| Func1 | For some people the experience of their daydreaming interferes with their daily chores or tasks. How much does your daydreaming interfere with your ability to get basic chores accomplished? |
| Func2 | For some people the experience of their daydreaming interferes with their academic/occupational success or personal achievements. How much does your daydreaming interfere with your academic/occupational success? |
| Func3 | For some people the experience of their daydreaming hinders the things that are most important to them. How much do you feel that your daydreaming activities interfere with achieving your overall life goals? |

*Note*. Qual = quality; Ctrl = control; Dis = distress; Ben = benefits; Func = functioning.

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