# Longitudinal associations between maladaptive daydreaming and psychological distress during the COVID-19 health crisis

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## ABSTRACT

*Background and aims:* Maladaptive Daydreaming (MD) is a suggested syndrome where individuals become addicted to fantasizing vividly for hours on end at the expense of engaging in real-world relationships and functioning. MD can be seen as a behavioral addiction. However, a paucity of longitudinal research means that there is no empirical evidence confirming the stability of this alleged addiction. Moreover, the direction of its association with psychopathology is unclear. *Methods:* We examine, for the first time, long-term stability and longitudinal associations between MD, psychological distress (stress, anxiety, and depression symptoms) and COVID-19 related exposure. *Results:* Participants ($N = 814$) completed an online survey twice, with a lag of 13 months. A two-wave structural equation model demonstrated high MD stability and positive cross-lagged pathways from MD to psychological distress. COVID-19 related exposure was not a longitudinal predictor. *Discussion and conclusions:* MD is a stable condition and a risk factor for an increase in psychological distress.

## INTRODUCTION

Maladaptive daydreaming (MD) is a suggested syndrome characterized by immersing oneself in compulsive or addictive structured fictional narratives that are vivid and fanciful, and which replace human interaction (Somer, Soffer-Dudek, Ross, & Halpern, 2017; Somer, Lehrfeld, Bigelsen, & Jopp, 2016). MD differs from mind wandering which is a universal phenomenon of consciousness characterized by a shift of attention from present activity to self-generated thoughts (Valkenburg & van der Voort, 1994); turning to MD is often more purposeful, with increased awareness and intent (Theodor-Katz et al., 2022). Several studies have pointed out the benefits related to mind wandering or daydreaming (McMillan, Kaufman, & Singer, 2013), such as constructive planning, engendering creativity and providing mental breaks to relieve boredom (Mooneyham & Schooler, 2013; Smallwood & Schooler, 2015). While many scholars use the terms daydreaming and mind-wandering interchangeably, our focus is on a unique type of self-generated thoughts, which is vivid fantasizing. A minority of individuals, labeled as maladaptive daydreamers, excessively

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engage in this mental activity and have difficulty in controlling or taming it, which significantly interferes with their functioning, including daily, family, social and work activities. Engaging in MD is enjoyable in the short run, yet detrimental in the long run, which is why it has been conceptualized as a behavioral addiction (Pietkiewicz, Nęcki, Bańbura, & Tomalski, 2018; Soffer-Dudek, Somer, Abu-Rayya, Metin, & Schimmenti, 2020). Notably, maladaptive daydreamers often use kinaesthetic or stereotyped movements (e.g., shaking one's hands, swinging, pacing) and expose themselves to evocative music to facilitate and maintain the absorption in fictional narratives (Schimmenti, Sideli, La Marca, Gori, & Terrone, 2020; Somer, Lehrfeld, et al., 2016). These are tools that help the individual deliberately activate the desired state, implying again that there is a compulsive-addictive component to MD, different from general mind-wandering, dreaminess, or inattention (Theodor-Katz et al., 2022).

Although MD has not yet been recognized as a psychiatric nosology by major psychiatric diagnostic systems, a growing body of research is demonstrating its clinical significance (Schimmenti, 2019). MD is strongly associated with a range of psychopathological symptoms, such as anxiety and depression (Somer, Soffer-Dudek, & Ross, 2017). In a 2-week daily diary study among maladaptive daydreamers, days with heightened levels of MD were associated with elevated psychological distress and negative emotion on the same day and on the following one (Soffer-Dudek & Somer, 2018). This was explained by the guilt and shame that stem from MD. However, psychological distress is also probably an antecedent of MD. For example, many maladaptive daydreamers may use their innate tendency toward waking fantasy to escape stressful or adverse life events (Soffer-Dudek & Somer, 2018). Indeed, there is evidence that COVID-19 related exposure (e.g., self-quarantine) was associated with heightened MD levels during the COVID-19 outbreak (Metin, Somer, Abu-Rayya, Schimmenti, & Göçmen, 2021). However, to our knowledge, no study has examined MD and its associations with stressful events in long-term longitudinal designs. Addressing this gap is relevant because recent cross-sectional studies have suggested the plausible stability of MD in relation to underlying structures, such as defense styles (Musetti et al., 2022) or attachment styles (Mariani et al., 2022), or dysfunctional patterns of emotion regulation (Chirico et al., 2022; Soffer-Dudek & Somer, 2022). Moreover, although previous research has established a positive association between MD and psychological distress (Soffer-Dudek & Somer, 2018), the long-term direction of this effect needs further examination. Thus, it is still unclear: (1) whether MD represents a stable condition. Addictions are characterized by difficulty in overcoming them spontaneously. Thus, we should ask: is MD persistent? And (2) to what extent it is influenced by exposure to stressors, or conversely, to what extent it predicts the increase in psychological distress over time. On these grounds, in this study we adopted a structural equation modelling (SEM) approach to disentangle the longitudinal pathways between MD, psychological distress, and COVID-19 related exposure (Musetti et al., 2021). Such an exploration is critical for establishing the clinical significance of this construct. A SEM framework allows to differentiate shared from non-shared variance which will allow us to better understand the longitudinal link with different, inter-related, symptoms and stressors.

As MD has been suggested to represent a clinical disorder (Somer, Soffer-Dudek, Ross, et al., 2017), deserving of appropriately tailored psychological treatment (Herscu, Somer, Federman, & Soffer-Dudek, in press), it is important to establish its associations with other clinical symptoms, and to establish that it does not disappear spontaneously over the course of a year or so, i.e., it is stable. Thus, the aim of this study was to test these longitudinal associations at 13 months follow up. Based on previous theoretical and clinical knowledge (Bigelsen, Lehrfeld, Jopp, & Somer, 2016; Soffer-Dudek & Somer, 2018), we hypothesized that:

H1: MD will be a stable construct, i.e., higher MD levels at T1 would predict greater MD levels at T2.

H2: Stress and psychopathological symptoms would be etiological factors affecting MD levels, i.e., higher psychological distress at T1 would predict greater MD levels at T2.

H3: Because MD is maladaptive it will generate further difficulties, i.e., higher MD levels at T1 would predict greater psychological distress at T2.

## METHODS

### Participants and procedure

Data reported in the current study were collected between March and May 2020 (T1) and between April and June 2021 (T2) as a part of a larger multipurpose project on the impact of the COVID-19 pandemic on the Italian population (Musetti et al., 2021). An online survey was disseminated through university communication systems and social media. All participants were informed about the purpose of the study, as well as the questionnaires being used in the study, before completing the survey. Participation was voluntary whereas giving informed consent was mandatory. Only after expressing written consent, participants provided a subject-generated identification code to link their data across two time points. The inclusion criteria were: to be 18 or older, to be an Italian speaker, to have lived in Italy during the COVID-19 lockdown. Participants did not receive any compensation for their involvement in the study.

We surveyed a snowball sample of 6277 respondents at T1 (their data were reported in a different publication; Musetti et al., 2021). Of them, 814 participants (635 females) aged 18 to 74 ($M = 32.15$ years, $SD = 13.10$) completed the two waves of the study.

### Measures

*Maladaptive Daydreaming*: We used the Maladaptive Daydreaming Scale-16 (MDS-16) (Schimmenti et al., 2020;

Somer, Lehrfeld, et al., 2016) to assess participants' levels of MD. This questionnaire consists of 16 items ranging from 0 (*never/none of the time*) to 100 (*extremely frequent/all the time*) in increments of 10. Higher mean scores indicate higher levels of MD. In the present study, Cronbach's alpha of the total scale was 0.92 at T1 and 0.93 at T2, and McDonald's omega was 0.91 at T1 and 0.92 at T2.

*Psychological distress*: The Depression Anxiety Stress Scale-21 (DASS-21) (Bottesi et al., 2015; Lovibond & Lovibond, 1996) consists of 21 items comprising three subscales: 1) depression (Cronbach's alpha T1 = 0.89; Cronbach's alpha T2 = 0.91; McDonald's omega T1 = 0.89; McDonald's omega T2 = 0.91); 2) anxiety (Cronbach's alpha T1 = 0.81; Cronbach's alpha T2 = 0.82; McDonald's omega T1 = 0.81; McDonald's omega T2 = 0.82); 3) and stress (Cronbach's alpha T1 = 0.89; Cronbach's alpha T2 = 0.91; McDonald's omega T1 = 0.89; McDonald's omega T2 = 0.91). Responses are rated on a 4-point Likert scale ranging from 0 (*never*) to 3 (*almost always*), with higher scores indicating more severe symptoms. In the present study, for each time point we created a latent construct representing psychological distress from these three indicators, but also allowed for the prediction of their uniquenesses. In keeping with the scale's overall purpose and structure, we found correlations which were high, but not undifferentiated, between the subscales at each time point (0.61, 0.68, 0.71 at T1 and 0.63, 0.71, 0.77 at T2, for anxiety-depression, stress-anxiety, stress-depression, respectively), suggesting that they tap onto general psychopathological distress to a great extent, but also, may carry specific variances. This justified our decision to compute a single distress latent variable per wave defined by these three indicators, yet also model relationships with specific components.

*COVID-19 related exposure*: We assessed COVID-19 related exposure with six ad hoc items based on existing literature: COVID-19 diagnosis (yes, no), forced quarantine (yes or no), someone close was positive for COVID-19 (yes or no), mourning related to COVID-19 (yes or no), face-to-face and online social relationship changes (decreased, stable, increased). We included a manifest variable that captured the extent of COVID-19 related exposure. Because the items had different response scales, we computed one composite score by summing up the first four dichotomous items and multiplying that sum by the average of the last two items reversed (i.e., decreasing relationships corresponded theoretically with higher stress). We assumed an additive effect where more positive answers on these six different COVID-19 related items would imply more COVID-19 related stress.

### Statistical analysis

Analyses were performed using M-PLUS, v. 8.1 statistical package (Muthén & Muthén, 2017). To test our hypotheses, we used a SEM framework to test stability paths, intra-wave associations and cross-lagged effects between COVID-19 related exposure, psychological distress (general and components), and MD. As the variables distributed normally with no significant deviations in skewness and kurtosis

except for the COVID-19 related exposure variables, we did not use bootstrapping procedures. In our model, we specifically tested: stability paths (e.g., COVID-19 related exposure at T1 predicting COVID-19 related exposure at T2, stress, anxiety and depression at T1 predicting stress, anxiety and depression at T2, MD at T1 predicting MD at T2), within-time covariations among all variables at both T1 and T2, and MD cross-lagged paths (e.g., MD at T1 predicting COVID-19 related exposure, stress, anxiety, and depression at T2). In addition, autocorrelations were specified, i.e., indicators (MD parcels and distress components) were allowed to covary between T1 and T2. As far as MD parcels, we used the random parcelling technique (Little, Cunningham, Shahar, & Widaman, 2002). Specifically, we computed the first parcel by the average of six randomly selected items, and the second and the third parcel by the average of five randomly selected items. The composition of the parcels was: parcel 1 was composed by items: 13, 6, 11, 15, 1, 14; parcel 2 was composed by items: 3, 7, 4, 5, 16; parcel 3 was composed by items: 12, 9, 8, 2, 10.

### Ethics

The study procedures were carried out in accordance with the Declaration of Helsinki. The Ethics Committee of the Center for Research and Psychological Intervention (CERIP) of the University of Messina approved the study. All subjects were informed about the study and all provided informed consent.

## RESULTS

### T1-T2 paired comparisons

As far as differences between T1 and T2, results of paired *t*-tests showed that all variables significantly changed over time (see Table 1). Specifically, COVID-19 related exposure significantly decreased from T1 to T2. On the other hand, both stress, anxiety, and depression significantly increased from T1 to T2. Lastly, as far as MD, it significantly decreased from T1 to T2.

### Descriptive statistics

Pearson's correlations among manifest variables are presented in Table 2. As evident in the table, the T1-T2 stability correlation for MD was very high ($r = 0.68$, $p < 0.001$). Psychological distress was also stable ($r = 0.55$–$0.56$ for all scales), whereas COVID-19 related exposure was unstable ($r = 0.02$, $p = 0.636$). All symptom scales and MD were significantly interrelated whereas COVID-19 related exposure was mostly unrelated to other variables, except for a weak correlation between T2 COVID-19 related exposure and T2 anxiety.

### Testing the SEM model

Since the departure from normality was statistically significant, we performed Maximum likelihood estimation –

*Table 1.* T1-T2 paired comparisons ($n = 814$)

| | T1 | | T2 | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| | M | SD | M | SD | t(df) | p | Cohens' d |
| COVID-19 related exposure | 0.56 | 1.56 | 0.21 | 0.57 | 6.09 (793) | <0.001 | 0.22 |
| Stress | 16.65 | 9.78 | 17.39 | 10.23 | −2.25 (813) | <0.05 | −0.08 |
| Anxiety | 6.98 | 7.13 | 7.44 | 7.58 | −1.91 (813) | <0.05 | −0.07 |
| Depression | 11.95 | 9.66 | 12.85 | 10.69 | −2.69 (813) | <0.01 | −0.09 |
| Maladaptive Daydreaming | 31.16 | 18.55 | 28.89 | 18.83 | 4.33 (813) | <0.001 | 0.15 |

*Table 2.* Means, standard deviations and Pearson's correlations among variables ($n = 814$)

| | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. COVID-19 related exposure T1 | – | | | | | | | | |
| 2. COVID-19 related exposure T2 | *0.02* | – | | | | | | | |
| 3. Stress T1 | 0.06 | 0.05 | – | | | | | | |
| 4. Stress T2 | 0.03 | 0.06 | *0.56****** | – | | | | | |
| 5. Anxiety T1 | 0.05 | 0.06 | 0.68*** | 0.46*** | – | | | | |
| 6. Anxiety T2 | 0.00 | 0.07* | 0.46*** | 0.71*** | *0.55****** | – | | | |
| 7. Depression T1 | 0.03 | 0.03 | 0.71*** | 0.47*** | 0.61*** | 0.44*** | – | | |
| 8. Depression T2 | 0.04 | 0.03 | 0.46*** | 0.77*** | 0.38*** | 0.63*** | *0.56****** | – | |
| 9. Maladaptive Daydreaming T1 | 0.03 | 0.03 | 0.32*** | 0.28*** | 0.32*** | 0.29*** | 0.35*** | 0.28*** | – |
| 10. Maladaptive Daydreaming T2 | 0.00 | 0.02 | 0.24*** | 0.32*** | 0.25*** | 0.37*** | 0.28*** | 0.35*** | *0.68****** |

*Notes:* *$p < 0.05$; *** $p < 0.001$. Italicized correlations represent T1-T2 stability.

robust (MLR). To assess the goodness of fit of our model, we considered multiple indices, including Comparative fit index (CFI), Tucker Lewis index (TLI), Root mean square error of approximation (RMSEA) and Standardized root mean square residual (SRMR). Model results are reported in Table 3 and in Fig. 1.

The tested model showed a good fit (Byrne, 2012; Kenny, Kaniskan, & McCoach, 2015), with a statistically significant chi square ($\chi^2$ (60) = 134.416, $p < 0.001$, CFI = 0.99, TLI = 0.98, RMSEA = 0.04, $p = 0.980$, 90%CI [0.030, 0.048], SRMR = 0.025). The model explained 49.4% of the variance for MD, 84.8% for stress, 59.5% for anxiety, and 69.2% for depression.

We found stability paths to be significant and high for both the latent variable defined by stress, anxiety, and depression, and that defined by MD parcels, whereas COVID-19 related exposure at T1 did not predict COVID-19 related exposure at T2. Furthermore, cross-lagged effects indicated that MD at T1 predicted both stress, anxiety, and depression at T2, whereas distress variables did not longitudinally predict MD. As far as within-time covariations, the latent variable defined by stress, anxiety, and depression significantly and positively related to MD at both T1 and T2. No relations were found with COVID-19 related exposure, neither regarding cross-lagged effects nor regarding within-time covariations. Given the lack of relationships with COVID-19 related exposure, we re-tested the fit of our model while excluding COVID-19 related exposure variables. The fit of this alternative model was very similar to the fit of the presented one ($\chi^2$ (41) = 116.070, $p < 0.001$, CFI = 0.99, TLI = 0.98, RMSEA = 0.05, $p = 0.645$, 90%CI [0.037, 0.058], SRMR = 0.027).

## DISCUSSION

This is the first long-term longitudinal study on the stability of MD and its associations with psychological distress and COVID-19 related exposure. As expected, our findings demonstrated strong longitudinal associations between MD levels across T1 and T2, demonstrating significant stability. This finding is consistent with previous studies showing that MD can be so rewarding that a person may be caught in an addictive vicious cycle (Pietkiewicz et al., 2018). Specifically, individuals with an innate tendency for intense absorption and imaginative fantasy are reinforced to progressively replace human interaction with an uncontrollably compulsive involvement in MD (Somer, Somer, & Jopp, 2016). More broadly, our results provide empirical support for the conceptualization of MD as a stable clinical function (Marcusson-Clavertz, West, Kjell, & Somer, 2019) which is characterized by a pervasive and persistent pattern of emotion dysregulation similar to other behavioral addictions (Chirico et al., 2022). This may support the idea that MD is a stable clinical condition or disorder/syndrome (Somer, Soffer-Dudek, Ross, et al., 2017), although we cannot rule out that MD is stable as a symptom which is part of a personality disorder or another clinical syndrome. Moreover, further longitudinal studies on samples of children at risk for MD are still needed to clarify the etiology of this suggested disorder.

In addition, we found that MD levels at T1 positively predicted psychological distress of all three subtypes at T2, while controlling for baseline psychological distress levels. In other words, MD predicted an increase in psychological distress over a 13-month period, over and above what could
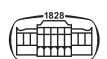
*Table 3.* Standardized estimates, standard errors, z-scores, and 95% confidence intervals for the structural equation model ($n = 814$)

|  | beta | SE | Z | 95%CI |
|---|---|---|---|---|
| Stability paths |  |  |  |  |
| COVID_T1 → COVID_T2 | 0.01 | 0.03 | 0.40 | −0.055, 0.083 |
| DASS_T1 → DASS_T2 | 0.61 | 0.03 | 18.62*** | 0.547, 0.675 |
| MD_T1 → MD_T2 | 0.70 | 0.02 | 29.26*** | 0.656, 0.750 |
| Intra-wave covariations |  |  |  |  |
| COVID_T1 with |  |  |  |  |
| DASS_T1 | 0.06 | 0.04 | 1.36 | −0.026, 0.143 |
| MD_T1 | 0.03 | 0.03 | 0.82 | −0.038, 0.092 |
| DASS_T1 with |  |  |  |  |
| MD_T1 | 0.41 | 0.03 | 11.48*** | 0.337, 0.476 |
| COVID_T2 with |  |  |  |  |
| DASS_T2 | 0.04 | 0.04 | 0.92 | −0.047, 0.130 |
| MD_T2 | −0.00 | 0.04 | −0.10 | −0.084, 0.076 |
| DASS_T2 with |  |  |  |  |
| MD_T2 | 0.27 | 0.04 | 5.93*** | 0.180, 0.357 |
| Cross-lagged effects |  |  |  |  |
| MD_T1 → COVID_T2 | 0.03 | 0.04 | 0.83 | −0.040, 0.099 |
| MD_T1 → STR_T2 | 0.07 | 0.03 | 2.06* | 0.003, 0.138 |
| MD_T1 → ANX_T2 | 0.19 | 0.04 | 2.94** | 0.036, 0.182 |
| MD_T1 → DEP_T2 | 0.08 | 0.04 | 2.26* | 0.011, 0.153 |
| COVID_T1 → MD_T2 | −0.02 | 0.02 | −0.89 | −0.068, 0.026 |
| STR_T1 → MD_T2 | −0.01 | 0.04 | −0.20 | −0.091, 0.074 |
| ANX_T1 → MD_T2 | 0.03 | 0.04 | 0.66 | −0.053, 0.107 |
| DEP_T1 → MD_T2 | 0.04 | 0.04 | 1.01 | −0.040, 0.126 |

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$
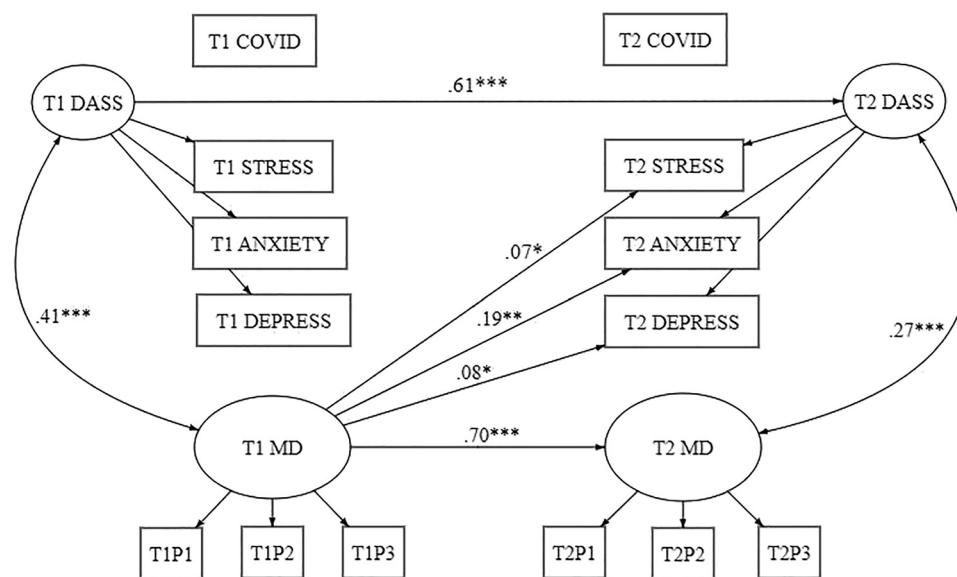


*Fig. 1.* Standardized estimates of the model: significant paths ($n = 814$)

*Note*: T1COVID, COVID-19 related exposure measured at T1; T2COVID, COVID-19 related exposure measured at T2; T1 STRESS, Stress measured at T1; T2 STRESS, Stress measured at T2; T1 ANXIETY, Anxiety measured at T1; T2 ANXIETY, Anxiety measured at T2; T1 DEPRESS, Depression measured at T1; T2 DEPRESS, Depression measured at T2; T1 DASS, latent variable defining both stress, anxiety and depression at T1; T2 DASS, latent variable defining both stress, anxiety and depression at T2; T1 MD, Maladaptive Daydreaming measured at T1; T2 MD, Maladaptive Daydreaming measured at T2

be predicted by psychological distress itself. This finding extends the directional results by Soffer-Dudek and Somer (2018), who found negative emotion that followed MD by

one day. The present study broadens that finding by showing that an adverse course following MD may manifest in the long term as well. Notably, although psychological

distress co-occurred with MD at the intra-wave level, it did not precede MD. These results may be explained by an inadequate time lag, as distress may have a more immediate effect on MD. Specifically, differently from normal daydreaming, which may serve as an adaptive emotion-coping strategy, MD may be used as a means to escape from psychological distress in the short term that results in long-term impairment of psychological functioning (Pietkiewicz et al., 2018).

Our findings showed no cross-lagged associations between COVID-19 related exposure at T1, and MD and psychological distress at T2. These results are in line with previous studies on psychopathological symptoms changes during the COVID-19 pandemic (Bendau et al., 2021) and suggest that most people were able to adapt to compulsory and challenging changes due to COVID-19 over time. In addition, this finding may be related to the distal, developmental roots of MD, in that proximal stressors may not play a significant role in the onset of this disorder (Somer, Somer, & Jopp, 2016).

There are several limitations to this study. We used a snowball sampling method which limits the ability to generalize our results to the larger population. Furthermore, the results of paired $t$-tests may have been partially biased by the large sample size. Also, the primarily female composition of the sample may have influenced the results. In addition, we administered solely self-report measures rather than the diagnostic "gold standard" structured clinical interview for MD (Somer, Soffer-Dudek, Ross, et al., 2017). This issue is especially important considering the high comorbidity of MD and psychiatric disorders. Also, COVID-19 related exposure was assessed with mostly binary items, which may have limited its variance, making it difficult to find effects. Finally, we included only two assessment points of MD, psychological distress, and COVID-19 related exposure, thus limiting our possibility to test more complex mediation pathways between the examined variables.

These limitations notwithstanding, we conclude that this is the first long-term longitudinal study that examined 1-year stability and the relationship between MD and psychopathological symptoms. Our findings support the notion that some individuals tend to develop an excessive and chronic involvement in daydreaming which seems to be resistant to change, as addictions tend to be, and results in long-term psychological impairment. These findings suggest the need for early and timely identification of individuals at risk of developing MD.

*Authors' contribution:* AM: conceptualization, writing – original draft, investigation; NS-D: conceptualization, writing – original draft, supervision – analysis; CI: Writing – original draft, formal analysis, methodology. AS: conceptualization, writing – original draft, supervision. CF: conceptualization, writing – original draft, investigation, supervision.

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