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ORIGINAL ARTICLE

Maladaptive Daydreaming and Its Relationship with Psychopathological Symptoms, Emotion Regulation, and Problematic Social Networking Sites Use: a Network Analysis Approach

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Abstract
The present study investigated the patterns of mutual associations between maladaptive daydreaming-related variables (MD, i.e., interference with life and somatosensory retreat), psychopathological symptoms (i.e., depression, anxiety, somatization, obsessive–compulsive, interpersonal sensitivity, psychoticism), emotion regulation strategies (i.e., cognitive reappraisal and expressive suppression), and problematic social networking sites use (PSNSU). A total of 531 young adults completed self-report measures through an online survey shared on social network groups. Two network models were performed on 297 young adults with probable MD (MDers) (M_{age} = 23.2, SD = 2.7) vs. 234 non-MDers (M_{age} = 23.4, SD = 2.6). Results showed that, compared to non-MDers, MDers showed significantly higher scores in all the study variables, except for cognitive reappraisal. Moreover, in the MDers network, the following patterns were identified: (i) no connections between the cluster of psychopathological symptoms, and neither cognitive reappraisal nor expressive suppression; (ii) a connection, through obsessive–compulsive (OC) symptoms, between the cluster of psychopathological symptoms and MD-interference with life; and (iii) a connection between PSNSU and MD-interference with life. Accordingly, the Network Comparison Test evidenced that the network structures of MDers vs. non-MDers were significantly different (M = .24; p = .01). Overall, higher scores on psychopathological symptoms in MDers provide support to the assumption that MD is a clinical condition, in which OC symptoms may play a critical role. Additionally, the association of PSNSU and MD-interference with life suggests that MDers might rely on PSNSU as a maladaptive emotion regulation strategy. Under this scenario, MD may be regarded as a potential vulnerability factor for PSNSU.

Keywords Maladaptive daydreaming · Young adults · Emotion regulation · Psychopathological symptoms · Problematic social networking sites use · Network analysis

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Maladaptive daydreaming (MD) is a recently proposed mental condition characterized by an excessive involvement in fantasy that replaces human interaction, thus significantly interfering with an individual's daily functioning and health (Bigelsen & Schupak, 2011; Somer, 2002). Differently from daydreaming, which is a mental activity that can occur frequently, MD is characterized by the following: (a) constant craving for fantasies, (b) high levels of experienced presence, and (c) stereotyped movements (e.g., swinging, pacing, shaking one's hands) and use of music to facilitate and maintain the absorption in fantasy (Schimmenti et al., 2020; Soffer-Dudek et al., 2020; Somer et al., 2016).

Although MD has not yet been recognized as a psychiatric disorder, research has increasingly highlighted its clinical significance (Bigelsen et al., 2016; Schimmenti et al., 2019). Empirical evidence on MD has shown that it is positively associated with a range of psychopathological domains, including attention-deficit hyperactivity disorder, anxiety, and depressive disorders (Mariani et al., 2021; Soffer-Dudek & Somer, 2018; Somer et al., 2017b; Zsila et al., 2019). Recently, MD has been proposed as a form of behavioral addiction, due to its rewarding nature and the individual's need to compulsively repeat the action to reduce MD-associated detrimental effects (Pietkiewicz et al., 2018; Soffer-Dudek et al., 2020). Relatedly, it has shown comorbidities with other addictive behaviors, such as problematic social networking sites use (PSNSU) (Costanzo et al., 2021).

PSNSU has been defined as the tendency to use social networking sites with intense motivation and urgency: individuals spend time and effort in this activity with negative consequences on their lives (Andreassen & Pallesen, 2014). Therefore, problematic social networking sites (SNSs) users may experience a range of addictive-like symptoms, such as salience, mood modification, tolerance, withdrawal, relapse, and conflict (Andreassen, 2015). Interestingly, it has been found that in the attempt to manage the distress experienced in close relationships, MDers (i.e., people with MD) may seek to restore and comfort fantasies by showing a fantasized identity on SNSs, thus leading to a higher risk in developing PSNSU (Costanzo et al., 2021).

Existing evidence suggests that behavioral addictions are associated with poor emotion regulation strategies, which in turn can result from childhood adverse events, such as child abuse and neglect (Lim et al., 2020). According to the model of compensatory internet use, vulnerable individuals may develop addictive-like symptoms (e.g., PSNSU), in an attempt to cope with negative emotions associated with psychosocial problems and/or unmet real-life needs (Kardefelt-Winther, 2014). Relatedly, there is evidence that poor emotion regulation abilities increase individual's risk to engage in MD and use dysfunctional coping strategies (Greene et al., 2020; Margherita et al., 2022).

To our knowledge, only one study (Greene et al., 2020) has explored the network structure of MD, though it specifically focused only on the association between MD and emotion regulation strategies among a sample of MDers. Findings have revealed that MDers, due to their deficits in cognitive control, have difficulties in disengaging thoughts and refocusing attention, thus failing to use adaptive emotion regulation strategies.

In relation to the afore-mentioned literature, the main aim of the present study is to build on Greene et al.'s (2020) results and expand their findings. To this purpose, a network analysis approach was employed to shed light on the interrelationship between MD, PSNSU, and psychopathological symptoms, in addition to emotion regulation strategies. To date, no study has explored the mutual relationship among all these variables. Furthermore, unlike Greene and colleagues' work (Greene et al., 2020), the present study specifically focused on young adults (i.e., people aged 18–30 years; Arnett et al., 2014), who were found to be particularly at risk of poor mental health and behavioral addictions (Amendola, 2022; Gibb et al., 2010; Moreno et al., 2022).

By relying on a network analysis' approach (Borsboom, 2017; Borsboom & Cramer, 2013; McNally, 2016), the findings from the present study are expected to provide insights useful to researchers and practitioners to better understand the emotion regulation strategies employed by MDers and their relationships with PSNSU and psychopathological symptoms.

Methods

Participants and Procedure

An online survey was administered between February 2021 and January 2022 to collect data through advertisements shared on social networks' groups. Before starting the survey, all participants received information about the study and gave their informed consent. The anonymity of the participants was guaranteed as no personal data or Internet Protocol addresses were collected. Participants received no compensation for participating in this study. A total of 531 young adults took part in the study, of whom 328 (61.8%) were females and 7 reported a non-binary identity. The sample comprised of individuals aged from 18 to 30 years old (M_{age} = 23.31; SD_{age} = 2.64), who were mostly Italian (n = 520; 97.9%).

The study was conducted according to ethical standards. Institutional Review Board's approval was granted by the Ethics Committee of the Department of Dynamic and Clinical Psychology and Health Studies of the Sapienza University of Rome (protocol code 0001210). The study was conducted following the 1964 Helsinki Declaration and its later amendments.

Measures

Psychopathological Symptoms

The Symptom Checklist-90 (Derogatis, 1992; Italian version by Prunas et al., 2012) is a self-report questionnaire used to evaluate multiple psychopathological symptoms and their severity. The 90 items are scored on a 5-point Likert scale (from 0 = not at all to 4 = extremely) which assesses psychiatric symptoms. A total score (Global Severity Index) indicates general psychological distress, and higher scores indicate higher symptom levels. The McDonald's ω of the subscales considered in the present study were somatization = 0.90, obsessive–compulsive (OC) = 0.86, interpersonal sensitivity = 0.88, depression = 0.92, anxiety = 0.89, and psychoticism = 0.84.

Emotion Regulation

The Emotion Regulation Questionnaire (ERQ; Gross & John, 2003), adapted to Italian by Balzarotti and colleagues (Balzarotti et al., 2010), is a 10-item self-report questionnaire for the evaluation of emotion regulation strategies. The 10 items are assessed on a 7-point Likert response scale (from 1 = strongly disagree to 7 = strongly agree). The ERQ consists of two subscales (cognitive reappraisal, expressive suppression), which represent two different strategies of emotional regulation. Higher scores indicate greater use of the

corresponding emotion regulation strategy. The McDonald's ω of the two subscales were cognitive reappraisal = 0.87 and expressive suppression = 0.74.

Problematic Social Networking Sites Use

An adaptation of the Italian version of the Bergen Social Media Addiction Scale (Monacis et al., 2017; original version by Andreassen et al., 2016) was used to assess PSNSU. In the present study, in each item, the term "social media" was replaced with "social networking sites." The present scale is a self-report questionnaire consisting of 6 items that assess the six components of PSNSU (i.e., salience, mood modification, tolerance, withdrawal, conflict, and relapse). Each question can be answered using a 5-point Likert scale (from 1 = very rarely to 5 = very often). Higher scores indicate higher levels of PSNSU. The McDonald's ω on this scale was 0.76.

Maladaptive Daydreaming

The Maladaptive Daydreaming Scale (MDS-16; Somer et al., 2016; Italian adaptation by Schimmenti et al., 2020) is a self-report measure assessing the degree of MD, referred as the amount of interference with life and kinaesthesia-related activities used to augment the immersion in fantasy. It is composed of 16 items measured on a scale ranging from 0 to 100%, with 10% intervals (0% = never/none of the time and 100% = all of the time/extreme amounts). The measure provides an MD total score and two subscales, i.e., interference with life and somatosensory retreat. Higher scores indicate higher levels of MD (probable MDers' total score cut-off: 51 or above; Schimmenti et al., 2020). The McDonald's ω of the two subscales were somatosensory retreat = 0.84 and interference with life = 0.93.

Data Analysis Approach

Analyses were performed using SPSS v.20 and R. Participants were divided into two groups: probable MDers (MDS-16 total score ≥ 51) and non-MDers (MDS-16 total score < 51). Exploratory analyses were performed for both discrete (*N*; %) and continuous (*M*, *SD*) variables. Bivariate Pearson's *r* correlations, as preliminary analyses useful to perform network analyses, were carried out separately for MDers vs. non-MDers ($p < 0.05$). The comparison of all the considered variables between the MDers vs. non-MDers group was performed through an independent sample *t*-test (two-tails $p < 0.05$).

Two network analyses were performed using the R package *qgraph* (Epskamp et al., 2012). The samples of MDers vs. non-MDers were considered separately. The visual representation of the weighted networks is composed of nodes (i.e., the variables included in the model) and edges (i.e., the regularized partial correlations connecting the nodes). The latter is red for negative partial correlations and green for positive partial correlations, and their thickness represents the strength of the connections (i.e., effect size). The networks were estimated through the Gaussian graphical model (GGM), using the graphical least absolute shrinkage and selection operator (GLASSO) algorithms, thus deriving a parsimonious network that optimizes the

number of edges between nodes reflecting the "true" model (i.e., a network with empirically relevant relationships) (Epskamp et al., 2017; Hevey, 2018). The extended Bayesian information criterion (EBIC; Glasso; Friedman et al., 2014) was applied. The EBIC allows the selection of the model that better identifies the "true" model; the tuning parameter was set to 0.25. Networks estimated using GLASSO in combination with EBIC were shown to optimize the ratio between the number of correctly identified edges and the total number of edges for sparse graphs (Epskamp & Fried, 2018). To investigate the relative importance of each node within each network, centrality indices (i.e., degree, strength, closeness, and betweenness) were assessed (Hevey, 2018). Centrality indices should be interpreted as *z*-points and thus should be higher than 1 to be considered central within the network. The *degree* index describes the total number of direct connections a node has. The *strength* index informs on the relative importance that a node has within the network independently of the number of connections it has. Accordingly, the greater the strength of a node, the greater its capacity to influence the other nodes. The *closeness* index regards the total amount of direct and indirect connections a node has, which allows the understanding of how quickly a node will be influenced by changes in other nodes. The *betweenness* index indicates how important a node is in the average pathway between two other nodes. Taken together, the higher these indices are, the higher the centrality of a node and thus, the higher its capacity to influence the overall network.

To compare the two networks (probable MDers vs. non-MDers), the Network Comparison Test (NCT; van Borkulo et al., 2017) was performed. The NCT is based on permutations and assesses three invariance measures, namely global strength invariance (i.e., the weighted absolute sum of all edges in the network), network structure invariance, and individual edge invariance. In the present study, 2500 permutations were performed, and significance was assessed by comparing the reference distribution with the original test statistics ($p < 0.05$). Finally, the stability of the two networks was assessed by calculating the centrality stability coefficient (CS) derived by a case-dropping subset non-parametric bootstrapping, which was set at N boots = 2500, and applied to the weighted edges. Thus, CS represents the maximum drop considered acceptable to maintain a minimum correlation strength of 0.7 when comparing the newly estimated indices with the original indices. CS is considered good when above 0.50 and ideal when above 0.70.

Results

Preliminary Exploratory Analyses

The total sample is composed of 530 participants, aged 18 to 30 ($M_{age} = 23.21$; $SD = 2.65$; 61.8% female; 1.3% non-binary), of which 234 were non-MDers (59.4% females; 1.3% non-binary), and 297 were probable MDers (63.6% females; 1.3% non-binary). Additional descriptive information of the sample is reported in Table 1.

Descriptive statistics of the study variables were computed on probable MDers vs. non-MDers, and the independent sample *t*-tests results, displaying the significant differences between these two groups, are reported in Table 2. Results showed that

Table 1 Demographic characteristics of the sample

Variable(s)	Non-MDers ($n=234$)		MDers ($n=297$)	
	n	%	*n*	%
Education				
Middle school diploma	6	2.6	17	5.7
High school diploma	94	40.2	136	45.8
Bachelor's degree	93	39.7	104	35.0
Master's degree	40	17.1	38	12.8
Postgraduate level	1	0.4	2	0.7
Occupational status				
Student	135	57.7	175	58.9
Working student	38	16.2	65	21.9
Employed	50	21.4	44	14.8
Unemployed	11	4.7	13	4,4
Relational status				
Single	113	48.3	152	51.2
Engaged	112	47.9	137	46.1
Married	9	3.8	8	2.7

Table 2 Descriptive statistics (*M* (*SD*)) of the study variables between MDs vs. non-MDs and independent sample *t*-test results

	Non-MD ($N=234$)	MD ($N=297$)	*t* ($df=529$)	*p*
Age	23.41 (2.60)	23.24 (2.68)	0.71	0.48
Obsessive–compulsive	1.03 (0.70)	1.62 (0.79)	−8.99	<0.00
Somatization	0.62 (0.53)	0.99 (0.82)	−6.15	<0.00
Interpersonal sensitivity	0.80 (0.65)	1.30 (0.85)	−7.56	<0.00
Depression	1.02 (0.74)	1.50 (0.85)	−6.86	<0.00
Anxiety	0.82 (0.63)	1.32 (0.84)	−7.66	<0.00
Psychoticism	0.50 (0.48)	0.99 (0.70)	−9.20	<0.00
Cognitive reappraisal	4.59 (1.33)	4.63 (1.16)	−0.34	0.74
Expressive suppression	3.40 (1.35)	3.83 (1.27)	−3.82	<0.00
Problematic social networking sites use (PSNSU)	12.89 (4.37)	16.64 (5.21)	−8.84	<0.00
Somatosensory retreat	22.24 (10.72)	48.48 (10.40)	−28.47	<0.00
Interference with life	6.77 (6.40)	34.47 (15.82)	−25.21	<0.00

probable MDers, compared with non-MDers, scored significantly higher in all the considered variables except for cognitive reappraisal, which did not differ between the two groups.

Bivariate Pearson's correlations assessed in probable MDers and non-MDers are shown in the Supplementary Materials (Table S1).

Network Analysis[1]

The regularized partial correlations matrix is reported in the Supplementary Materials (Table S2).

Network Structure in Probable MDers

The network structure of probable MDers is shown in Fig. 1. The strongest connections (i.e., regularized partial correlations) were identified between anxiety and somatization symptoms (0.55), followed by a positive connection between PSNSU and interference in life (0.22) and a positive association between OC symptoms and interference with life (0.13).

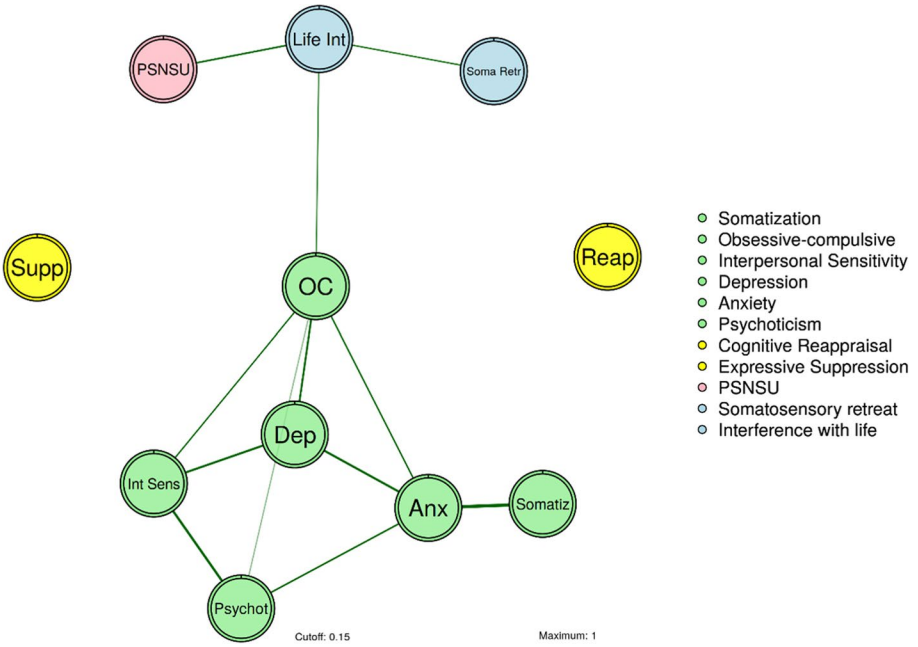

Fig. 1 Network structure in probable MDers (cut-off ≥ 51). Note: PSNSU = problematic social networking sites use

[1] Glossary: Definition of the network analysis terminology.
Betweenness: Informs on the importance of a node in the average pathway between two nodes (i.e., how many times a certain node needs to be crossed by two other nodes to influence each other).
Centrality indices: A set of indices, namely, degree, strength, closeness, and betweenness, which altogether inform on the influence of each node within the network.
Closeness: The amount of direct and indirect connections each node has. It describes how quickly changes in a node influence other nodes within the network.
Degree: The number of direct connections each node has.
Edges: The lines connecting the nodes within the network. Edges are the regularized partial correlations.
Nodes: The variables included within the network.
Strength: It describes the "capacity" of a node to influence another node and, as such, informs on the importance of a node with the network.

Although all the SCL-90 variables have clustered on the one side, and interference with life, somatosensory retreat, and PSNSU have sparsely clustered on the other side, these two clusters were connected through the association between the OC symptoms and interference with life.

Regarding the centrality indices (Fig. 3), OC symptoms showed the greatest betweenness index followed by interference with life, while the closeness index did not provide relevant results, which is given by the sparsity of the overall network. Despite this, centrality indices showed that anxiety symptoms had the greatest strength index within the network ($M = 1.80$), followed by depressive symptoms ($M = 0.92$) and interpersonal sensitivity ($M = 0.77$). Expressive suppression and cognitive reappraisal showed no connection with any of the investigated variables, meaning that they do not present a contribution to the network, thereby suggesting that probable MDers do not rely on the use of these regulatory strategies.

In other words, the network structure of probable MDers showed that, although the considered psychopathological symptoms are strongly influenced by each other and, therefore, are highly interconnected, they are minimally linked to the MD-related variables. However, the results showed that these psychopathological symptoms influence MD-related variables, particularly, interference with life, as a function of OC symptoms. The latter seems to act as a link between the two clusters of nodes (i.e., psychopathological symptoms, on the one hand; MD-related variables and PSNSU, on the other hand). Together with OC symptoms, PSNSU also emerges as a relevant variable among probable MDers. Despite having small values in the centrality indices, PSNSU showed a direct connection with MD-interference with life, thus underling the mutual direct influence between the two nodes, both increasing detachment from reality.

Network Structure in Non-MDers

The network structure of non-MDers is shown in Fig. 2. In this sample, the strongest connections were observed between depression and anxiety symptoms (0.39), followed by a positive association between depressive symptoms and interpersonal sensitivity (0.38). Furthermore, a positive association between interpersonal sensitivity and symptoms of psychoticism (0.38) has been displayed, altogether with a negative association between the latter and cognitive reappraisal (-0.13). The associations between these nodes have created a cluster of their own, and, indeed, results showed the greatest strength (Fig. 3) of depressive symptoms ($M = 2.02$) within the network, followed by interpersonal sensitivity ($M = 1.06$), and anxiety symptoms ($M = 0.80$). In this regard, depressive symptoms also showed the greatest betweenness index, followed by interpersonal sensitivity, anxiety symptoms, and symptoms of psychoticism. Closeness did not provide relevant results, given the sparsity of the overall network. It is worth noting that the variables related to MD, together with PSNSU and expressive suppression, have a marginal position within the network, showing no connection with any other nodes.

In other words, the sparsity of the network adequately describes the characteristics of the non-MDers group, whereby neither the MD-related variable nor PSNSU provide any contribution to the network. This result emphasizes that among non-MDers, these variables are not relevant in the presence of psychopathological symptoms, which are instead connected only with each other and with cognitive reappraisal.

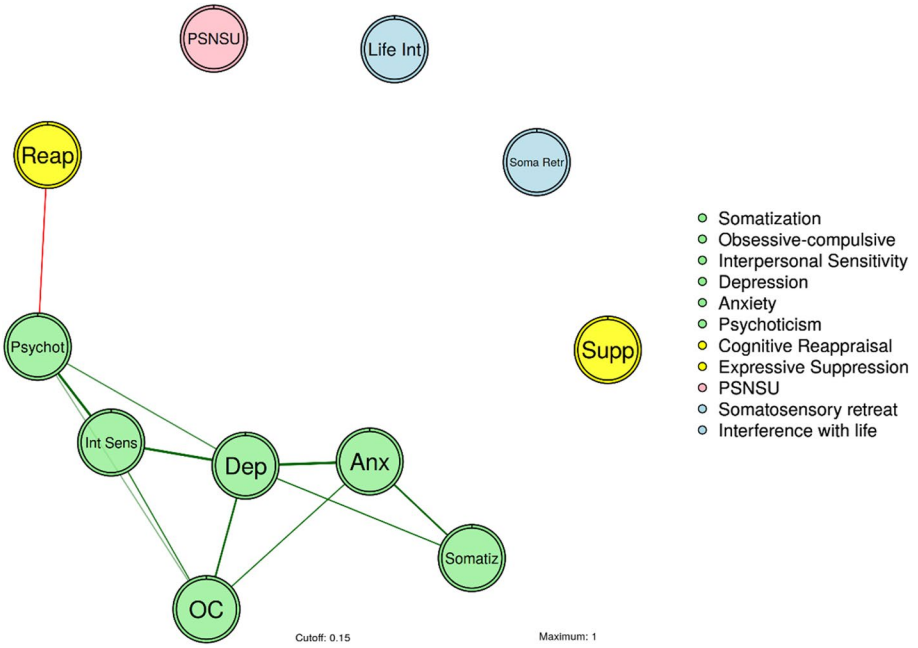

Fig. 2 Network Structure in non-MDers (cut-off < 51). Note: PSNSU = Problematic Social Networking Sites Use

Comparison Between Probable MDers *vs.* Non-MDers

The NCT showed that the network structure (i.e., the way variables are connected and organized) was significantly different between the two groups ($M = 0.24$, $p = 0.01$). However, the overall global strength (i.e., the strength of the overall connections composing the network) invariance was not significant ($S = 0.29$, $p = 0.37$). The results of both networks suggest that even if the strength of the connections within the networks is not significantly different between the two, the way the nodes are arranged and connected as a whole is significantly different. More specifically, while in probable MDers, neither cognitive reappraisal nor expressive suppression was connected with any node, and cognitive reappraisal was negatively correlated with symptoms of psychoticism in non-MDers. Moreover, all the variables investigated through the SCL-90 have clustered together, as can be observed also in the network related to probable MDers. However, within this group, OC symptoms were connected with interference with life. This pattern was not observed among non-MDers. As previously highlighted, while in the network of probable MDers the MD-related variables and PSNSU were connected, the same variables had no connections with any node in the network of non-MDers. Taken together, these findings underline the significant difference observed in the organizational structure of the two networks.

The stability coefficient (CS) was evaluated using a case-dropping subset non-parametric bootstrapping in both networks. The network of probable MDers showed a highly satisfactory CS (CS = 0.75) for the edges and so did the network of non-MDers (CS = 0.67). Regarding the strength of the centrality index, both networks showed the same value (CS = 0.67).

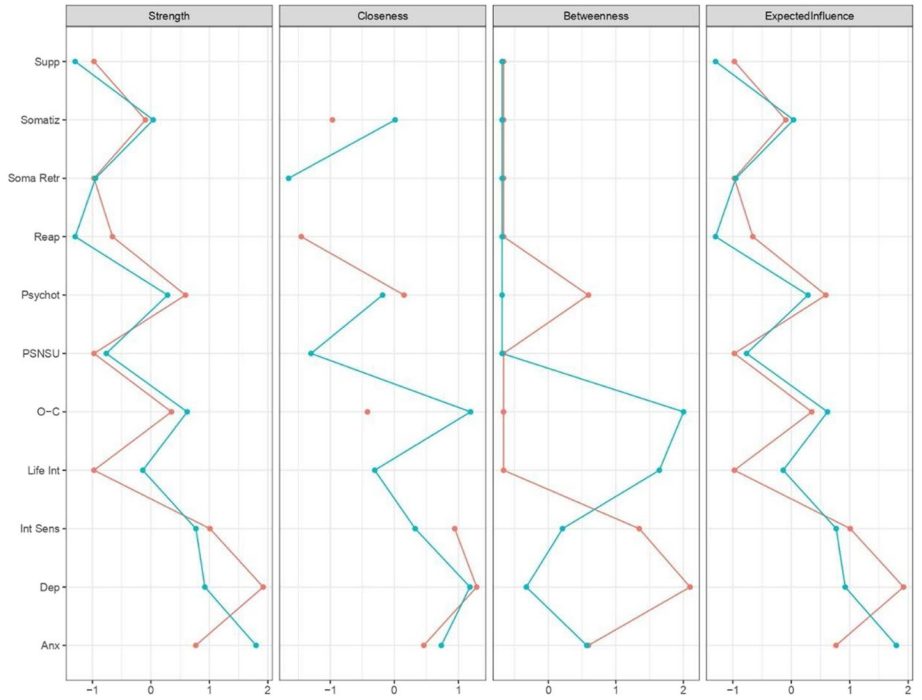

Fig. 3 Centrality indices of multidimensional variables. Note: Blue line, young adults with MD; red line, young adults without MD; Supp, expressive suppression; Somatiz, somatization; Soma Retreat, somatosensory retreat; Reap, cognitive reappraisal; Psycot, psychoticism; OC, obsessive–compulsive; PSNSU, problematic social networking sites use; Life Interf, interference with life; Int Sens, interpersonal sensitivity; Dep, depression; and Anx, anxiety

Discussion

The main aim of the present study was to expand the knowledge of probable MDers-specific emotion regulation strategies and their relationships with PSNSU and psychopathological symptoms, building on the existing research which evidences the relationship between emotional regulation difficulties and MD (Greene et al., 2020). This is the first study that investigated whether emotion regulation strategies, psychopathological symptoms, and PSNSU, taken together, might be related with MD. Although one emotion regulation strategy (i.e., cognitive reappraisal) did not statistically differ among groups, psychopathological symptoms were significantly higher in probable MDers vs. non-MDers. Findings overall showed an MD-specific network of associations among emotion regulation strategies, psychopathological symptoms, and PSNSU.

As previously mentioned, group comparisons showed relevant differences in terms of clinical characteristics between the groups. In line with previous evidence (Mariani et al., 2021; Musetti et al., 2021a, b; Schimmenti et al., 2020; Somer et al., 2016), probable MDers had more psychopathological symptoms, compared to non-MDers. Specifically, probable MDers experienced higher levels of OC, somatization, interpersonal sensitivity, depression, and anxiety-related symptoms. Partially at odds with previous assumptions suggesting that MD has no impact on reality testing (Bigelsen et al., 2016), probable

MDers reported higher psychotic symptoms compared to non-MDers. This finding suggests that MD might represent a severe clinical condition that needs a prompt diagnosis and management. Findings further support the theory-conform evidence that probable MDers had limited emotion regulation strategies compared to non-MDers (Greene et al., 2020). In particular, results showed probable MDers to be characterized by higher levels of expressive suppression than non-MDers. This finding extends the current literature highlighting poor emotion regulation capacities in MDers. An emotion regulation strategy, such as expressive suppression, associated with negative psychological outcomes, may represent a maladaptive strategy (e.g., Megías-Robles et al., 2019) and a risk factor in MD. Crucially, cognitive reappraisal did not statistically differ between groups. It may be hypothesized that reappraisal plays a less important role than expressive suppression in MD-related difficulties. Specifically, in probable MDers, emotion regulation strategies may be initially adaptive, with cognitive reappraisal allowing for interpersonal behaviors to be appropriately focused during social interactions. As expressive suppression comes later in the emotion-regulation process, and their levels are higher in probable MDers, one can speculate that MDers could make a greater effort to manage emotional responses. These repeated efforts could trigger a sense of discrepancy between experienced emotions and outer expression leading, in the long term, to maladaptive responses (e.g., Meyer et al., 2012). On this light, clinicians might encourage MDers to develop more adaptive strategies to regulate emotions, thus decreasing the need to resort to MD.

Probable MDers had a higher level of PSNSU, supporting the association between MD and PSNSU, which has already been found in the literature (Costanzo et al., 2021). The authors showed that MD partially mediated the relationship between preoccupied attachment and PSNSU and fully mediated the relationship between fearful attachment and PSNSU. Alike excessive fantasies (Schimmenti et al., 2020), PSNSU could represent a pervasive response of probable MDers to the need to detach from the real world. Building on this evidence, a future avenue for research could be to further investigate whether different characteristics of MDers might engender different patterns of PSNSU. Further implications may be considered regarding the treatment of MD, which may benefit from decreasing the excessive and specific pattern of engagement in SNSs.

Considering that probable MDers were identified by self-reported measures, they may have been more aware of their psychological conditions and more inclined to sharing them, overall. However, these findings generally support the assumption that MD is related to psychopathological mechanisms, which negatively affect the well-being of individuals who are endowed with it. Therefore, the pattern of symptoms reported for probable MDers strengthens the idea that MD is a clinical phenomenon that hinders life functioning (Bigelsen et al., 2016), as supported by higher rates of probable MDers' feelings of MD-interference with life. These findings extend the current knowledge on the key elements characterizing MD and highlight the need to develop useful interventions for individuals suffering from MD.

Following the network perspective (Borsboom, 2017), this study showed a comprehensive and detailed pattern of associations among MD characteristics, PSNSU, emotion regulation strategies, and a specific cluster of psychopathological symptoms characterizing probable MDers vs. non-MDers. Differently from non-MDers, in which an adaptive emotion regulation strategy (i.e., cognitive reappraisal, McRae & Gross, 2020) is related to the cluster of psychopathological symptoms, these symptoms were only related to MD-interference with life via OC symptoms in probable MDers. These results are in line with findings showing a high comorbidity and co-occurrence between MD and OC-related disorders (e.g., Soffer-Dudek et al., 2018; Somer et al., 2017b). In this regard, it has been shown that,

although MD-related kinesthesia shares similarities with the compulsive component of OC symptoms, a closer relationship to the obsessive than the compulsive component of OC symptoms in MD is documented (e.g., Salomon-Small et al., 2021). Thus, MD has been argued to be mainly characterized by a mechanism of impaired control and enhanced intrusiveness of thoughts, thus sharing more similarities with thought rumination rather than ritualistic behavior (Bigelsen et al., 2016).

Remarkably, only in probable MDers, MD-interference with life was related to somatosensory aspects of MD and PSNSU, with none of the emotion regulation strategies significantly associated with any of the considered symptoms. Overall, it can be argued that, unlike non-MDers, MDers fail in regulating their psychopathological symptoms and maladaptive behaviors due to an impaired control and poor flexibility in adaptively changing thoughts (Salomon-Small et al., 2021). In turn, the absence of a link between adaptive self-regulation capacities and psychopathological symptoms can favor the development of a clinically significant condition (Sheppes et al., 2015). While we found no associations between emotion regulation strategies and psychopathological symptoms in probable MDers, cognitive reappraisal was negatively correlated with symptoms of psychoticism in non-MDers. This evidence suggests the presence of important functional differences between the groups. Therefore, although the groups are characterized by comparable levels of cognitive reappraisal, probable MDers are not able to use this strategy in an effective way, thus possibly leading to dysregulated psychoticism-related processes (e.g., withdrawn, isolated lifestyle, and hallucinations). Those processes, in turn, may favor the development of MD.

In this scenario, using SNSs may represent a way to cope with negative effects and intrusive thoughts that characterize probable MDers. Accordingly, it has been recently argued that individuals who develop PSNSU are characterized by negative reinforcement mechanisms. In other words, the compulsive use of social media is motivated by the anticipation of a reduction in negative affect and by an expected increase in positive affective states, e.g., the desire to receive social recognition (Sherman et al., 2018; Wegmann & Brand, 2019). However, PSNSU has been more strongly related to using SNSs for mood regulation (i.e., negative reinforcement processes) than to preferences for online social interactions (i.e., positive reinforcement processes; Moretta & Buodo, 2018). Furthermore, the development of PSNSU has been associated with using SNSs as a way of coping with the consequences of childhood emotional abuse, attachment insecurities (Musetti et al., 2021a, b, 2022), and extreme social evaluation pressures (Casale et al., 2014). In the present study, the association between PSNSU and MD-interference with life corroborates the view of the development of PSNSU via compensatory mechanisms and suggests that MD may be a potential vulnerability factor for PSNSU. Future studies aimed at characterizing PSNSU-related targets for prevention and intervention programs should explore whether MD represents a mediator of the relationship between PSNSU and negative reinforcement processes.

This study has some limitations. First, the cross-sectional design of the study does not allow us to conclude the predictive nature of the relationships between the variables, and future studies should include longitudinal designs to overcome this limitation. Second, in our study, MD values were self-reported, and the single-informant nature of the study could be related to biases in the evaluations made by participants. Future studies should adopt a sounder methodology, by including a multi-informant, multi-method approach. On this note, the Structured Clinical Interview for Maladaptive Daydreaming (SCIMD; Somer et al., 2017a) could be regarded as the most solid measure in this research field. However, the measure used in the present study (MDS-16; Somer et al., 2016) has demonstrated to adequately discriminate between individuals that self-identify as with and without MD, and the level of agreement between the SCIMD and MDS-16 was reported as excellent in a previous study (Somer et al.,

2017a). Notwithstanding these limitations, the present study provides new insights into the specific nature of the psychopathological domains, emotion regulation strategies, and PSNSU vulnerability factors, which characterize emerging adults with high levels of MD.

In conclusion, results from the present study indicate that probable MDers and non-MDers present significant differences in their psychopathology network structures. The comprehension of the differences in the central nodes and edge connections between emotion regulation strategies, PSNSU, and psychopathological symptoms, not detected by traditional inferential statistical analyses, may be informative in understanding the core features of MDers. These findings, if replicated by larger longitudinal studies, should be considered for formulating an operational definition of MD and to better characterize PSNSU vulnerability factors. This may, in turn, help clinicians in tailoring specific interventions to the MDers' specific needs. In this regard, a broader assessment of clients with MD should include emotion-regulation strategies, psychopathological symptoms severity, and PSNSU. Given our results about the relationship between these core aspects in MD, clinical interventions could primarily focus on the development of adaptive emotion regulation strategies to deal with unpleasant feelings. This may prevent MDers from adopting maladaptive behaviors to cope with negative effects, including the need to resort to MD and the development of PSNSU via compensatory mechanisms. In light of our results, the severity of co-morbid psychological symptoms could hinder the life functioning of patients with MD and may involve dysregulated psychoticism-related processes, OC, somatization, interpersonal sensitivity, depression, and anxiety-related symptoms. Co-morbid psychopathological characteristics should be considered with attention in the clinical work with clients with MD, since they may contribute to the onset or the maintenance of the MD clinical condition. Overall, deepening the knowledge of the key factors that characterize MD could contribute to the improvement of psychological treatments and outcomes for clients with MD.

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Declarations

Conflict of Interest The authors declare no conflict of interest.

Ethical Approval The study was conducted according to ethical standards. Institutional Review Board's approval was granted by the Ethics Committee of the Department of Dynamic and Clinical Psychology and Health Studies of the Sapienza University of Rome (protocol code 0001210). The study was conducted following the 1964 Helsinki Declaration and its later amendments.

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