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Short communication

Maladaptive daydreaming and emotional regulation difficulties: A network analysis

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ABSTRACT

This study explored the network structure of Maladaptive Daydreaming (MD), and links between MD and emotional regulation difficulties. Participants (n = 542) completed an online survey on MD and emotional regulation difficulties. Two network models were estimated. In the MD-only network, items clustered in three communities, most items were positively connected, and difficulty controlling the daydream was most central. In the expanded network, there were many cross-construct associations, and limited emotional regulation strategies and difficulty controlling the daydream were most central. These findings indicate that difficulties with control is central to MD, and that MD may be related to dysfunctional emotional regulation.

1. Introduction

Maladaptive Daydreaming (MD) is a condition in which individuals feel a strong compulsion to engage in daydreaming so often and intensively that it interferes with functioning and/or causes distress (Somer, 2002). MD typically involves the creation of elaborate internal worlds with multiple characters and storylines. Repetitive movements often accompany MD, and music can both trigger and maintain the condition (Somer et al., 2016b). While no study has yet assessed MD prevalence in the general population, it is gaining increasing attention in online communities among individuals identifying with the condition (Bershtling and Somer, 2018).

While it has been found that individuals report experiencing positive emotions while daydreaming (Bigelsen and Schupak, 2011), a daily diary study revealed an association between the intensity and amount of daydreaming on a given day with increases in negative emotions that same day (Soffer-Dudek and Somer, 2018). Furthermore, MD has associations with emotional relation difficulties, specifically with engagement in impulsive behaviors when distressed, and low levels of emotional clarity, as well as weaker emotional regulation abilities (Wen et al., 2017; West and Somer, 2019). However, the specific links between distinct MD symptoms and various types of difficulties with emotional regulation have not been investigated.

Network theory proposes that psychopathology can be understood as a system of interacting components, which can lead to mental disorders as emergent phenomena (Borsboom, 2017; Bringmann et al., 2013; Fried et al., 2017), and has been increasingly used to investigate the relations between different symptoms and behaviors (Birkeland et al., 2020). Network analysis has also been used to explore comorbidity between disorders by identifying 'bridge' connections through which different diagnostic constructs or phenomena are associated with each other, such as obsessive compulsive disorder and depression (Jones et al., 2018), and PTSD and negative emotions (Greene et al., 2019).

The current study aims to: 1) conduct an exploratory network analysis of MD symptoms and identify central elements; 2) identify symptom clusters; 3) explore an expanded network structure that includes both MD symptoms and emotional regulation difficulties and identify central items.

2. Methods

Participants aged 18 and over responded to announcements posted on online forums and websites related to MD and other social media, and through word of mouth (for more details see [edited out for blind review]. These announcements called for individuals who engage in frequent and intense daydreams to participate in a study about how daydreaming is related to emotions. We informed participants before commencing the survey that their consent was implied by proceeding. Ethical approval for the study was received from the University of Haifa

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Ethics Committee. The sample consisted of all 542 participants who completed the full survey (416 female, 82 male, and 44 participants that identified themselves as "other"). Participants had an average of 14.30 years of education, 78% of the sample was younger than 30 years, and 40% reported having been diagnosed with another mental health condition. Fifty-six countries were represented, with the majority of participants located in North America (48.5%), and Europe/UK (30.6%).

We used the MDS-16 (Somer et al., 2017), a 16-item self-report scale that measures different aspects of MD behavior, on a Likert-type interval scale ranging from 0% (never) to 100% (extremely frequent), with 10% increments. The instrument has been shown to discriminate between self-identified individuals with and without MD, using a cutoff score of 50 (Somer et al., 2017). In the present study, Cronbach's alpha = 0.90.

The Difficulties in Emotion Regulation Scale (DERS; Gratz and Roemer, 2004) consists of 36 items in six subscales: 1) Non-acceptance of emotional responses; 2) Difficulty engaging in goal-directed behavior; 3) Impulse control difficulties; 4) Lack of emotional awareness; 5) Limited access to emotion regulation strategies; 6) and Lack of emotional clarity. Responses are specified on a 5-point ordinal Likert-type scale (1 = rarely; 5 = almost always), with some items reverse-scored. Subscale scores are summed separately. Higher scores on the DERS suggest more impairment. In the present study, Cronbach's alpha = 0.94.

Data analysis was conducted using the qgraph, bootnet, and EGA packages in R. All items were rescaled to be on a 0–4 scale. The estimated network model contains variables (nodes), and the estimated links between them (edges). We used the bootnet package in R to estimate a regularized partial correlation network, known as a Gaussian Graphical Model (Epskamp and Fried, 2018), using Spearman correlations, and graphical *least absolute shrinkage and selection operator* (Tibshirani, 1996) and extended Bayesian information criterion to select the optimal regularization parameter. The network layout is based on the Fruchterman-Reingold algorithm which forces strongly correlated nodes closer together (Fruchterman and Reingold, 1991).

We extracted the strength centrality index which refers to the sum of the absolute strength of all the connections a symptom has with all other symptoms in the network. We used the bootnet R package to investigate the accuracy and stability of the estimated networks (Epskamp et al., 2018).

Exploratory graph analysis was conducted using the EGA package, which uses *walktrap,* a random walk algorithm (Golino and Epskamp, 2017; Pons and Latapy, 2006). By repeatedly 'stepping' from each node to the neighboring nodes, the algorithm detects more densely related clusters or communities of nodes. The supplementary material contains code for the analyses, edge weights matrices, strength centrality graphs, and stability/accuracy graphs.

3. Results

There was large variability in MDS scores, ranging from 4.06 to 100 (M = 58.09, SD = 19.39). In total, 379 individuals (70%) scored above the cutoff score of 50. Network analysis showed that most items were positively connected (see Fig. 1 for network visualizations). The strongest pairwise connections were: daydreaming hinders life goals–interferes with work (regularized partial correlation edge weight =0.41); needing music to trigger the daydream–needing music to maintain the daydream (0.40); and urge to return to daydream–getting annoyed if interrupted' (0.34). The exploratory graph analysis detected three communities (Fig. 1), representing: 1) a kinesthesia and music-related factor, 2) a yearning factor, and 3) an impairment factor. Strength centrality was sufficiently stable with a CS-coefficient of 0.44. Difficulty controlling the daydream was the most central item.

Next, we estimated an MD-DERS network that comprised the 16 MD items modeled together with the six DERS subscales. All of the MD items had associations with DERS subscales, although some edges were weak. The strongest bridge edge was finding daydreaming enjoyable–emotional clarity difficulties, which was negative (−0.06). All but one of the other significant bridge associations were positive. The next strongest edges (all with edge weight 0.05) were difficulties with goal-directed behaviors–interferes with daily chores and difficulties with goal-directed behaviors–interferes with work; non-acceptance of emotional responses–being annoyed if a daydream is interrupted; and having impulse control difficulties–needing music to maintain the daydream. Strength centrality had a high CS-coefficient (0.75). The two nodes in the expanded network with the highest strength centrality were limited emotional regulation strategies and difficulty controlling the daydream.

4. Discussion

This study aimed to explore the network structure of the emerging MD construct, and to explore links between MD and various aspects of emotional dysregulation. In the MD network, most items were positively connected, and difficulty controlling the daydream was most central. This finding supports research indicating that individuals with MD identify difficulties with control as their biggest concern about their daydreaming habits (Somer, 2002; Somer et al., 2016a). We identified three communities in the network: 1) kinesthesia and music-related, 2) yearning factor, and 3) impairment. These are in line with some previous studies (Somer et al., 2016; Jopp et al., 2019). However, a study on the psychometric properties of the Italian 16-item Maladaptive Daydreaming Scale found two factors for the MDS-16 (Schimmenti et al., 2019).

There was abundant interconnectedness between emotion regulation difficulties and MD symptoms from all three MD clusters. Associations were mostly positive, suggesting that in general, poorer emotion regulation ability was linked with a higher degree of MD symptoms. Regarding cross-construct associations, the strongest bridge edge was a negative association between finding daydreaming enjoyable and lack of emotional clarity - in other words, more enjoyable daydreaming was associated with higher emotional clarity. It may be that enjoyment of daydreaming allows for better processing of emotional content and therefore leads to greater emotional clarity. However, further research is needed to explore directionality and causality in this relationship.

The two nodes in the expanded network with the highest strength centrality were limited emotional regulation strategies and difficulty controlling the daydream. Joormann (2010) argued that individuals with deficits in cognitive control find it challenging to disengage their thoughts and refocus their attention, and thus fail to switch to more adaptive strategies for emotional regulation. This may be compounded if individuals start to ruminate on this maladaptive process, leading to further emotional difficulties (Joorman & Quinn, 2014), which may in turn cause persistent daydreaming. Interventions that help individuals develop alternative flexible strategies for responding to emotional distress, such as emotional regulation therapy (Renna et al., 2017), may be beneficial.

There are several limitations. First, the participants were a self-selecting convience sample and the majority of the participants were female, which limits generalizability; further studies should be conducted across different populations and by other research groups to investigate whether the current findings replicate. Second, these analyses use cross-sectional data, therefore we cannot infer directionality. Third, high centrality is not necessarily equivalent to high clinical importance, nor is there substantial evidence suggesting that targeting central nodes will lead to symptom reduction overall (Bringmann et al., 2019; Fried and Cramer, 2017). Finally, positive associations between MD items does not mean that all items are necessarily characteristic of MD, or that unmeasured symptoms may not contribute.

The current findings indicate that difficulties with control is central

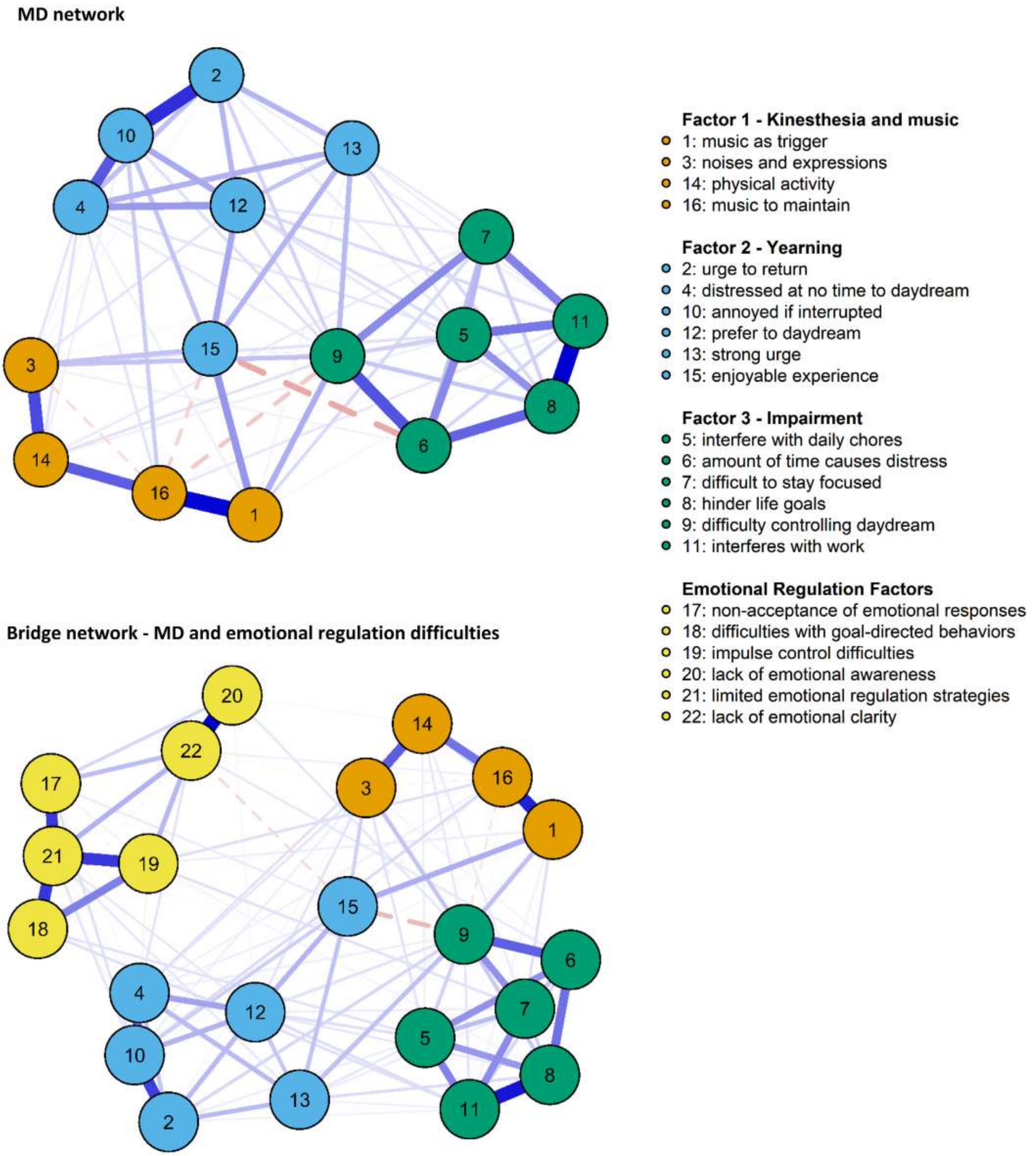

Fig. 1. Network visualizations.
Note – Blue solid lines (edges) indicate positive associations, red dashed lines (edges) indicate negative associations. The thickness of the edges indicates association strength. (For interpretation of the references to color in this figure, the reader is referred to the web version of this article.)

to the MD construct, and that MD may be related to dysfunctional emotional regulation. Strategies borrowed from evidence-based treatments for behavioral addictions and interventions targeting cognitive control and treatments that offer effective alternative strategies for managing emotions are likely to be beneficial for managing MD.

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CRediT authorship contribution statement

Talya Greene: Conceptualization, Writing - original draft, Formal analysis, Methodology. **Melina West:** Conceptualization, Writing - original draft, Investigation. **Eli Somer:** Conceptualization, Writing - original draft, Investigation, Supervision.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.psychres.2020.112799.

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