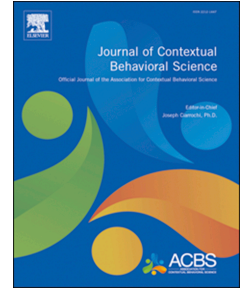


Journal Pre-proof

Mindfulness profiles in a sample of self-reported sleep disturbance individuals

Daniel Ruivo Marques, Ana Allen Gomes, Anabela Sousa Pereira



PII: S2212-1447(19)30127-9

DOI: <https://doi.org/10.1016/j.jcbs.2020.01.008>

Reference: JCBS 367

To appear in: *Journal of Contextual Behavioral Science*

Received Date: 3 May 2019

Revised Date: 28 November 2019

Accepted Date: 18 January 2020

Please cite this article as: Marques D.R., Gomes A.A. & Pereira A.S., Mindfulness profiles in a sample of self-reported sleep disturbance individuals, *Journal of Contextual Behavioral Science* (2020), doi: <https://doi.org/10.1016/j.jcbs.2020.01.008>.

This is a PDF file of an article that has undergone enhancements after acceptance, such as the addition of a cover page and metadata, and formatting for readability, but it is not yet the definitive version of record. This version will undergo additional copyediting, typesetting and review before it is published in its final form, but we are providing this version to give early visibility of the article. Please note that, during the production process, errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

© 2020 Published by Elsevier Inc. on behalf of Association for Contextual Behavioral Science.

Title:

Mindfulness profiles in a sample of self-reported sleep disturbance individuals

Authors:

Daniel Ruivo Marques

- University of Aveiro, Department of Education and Psychology, Campus

Universitário de Santiago, 3810-193 Aveiro, Portugal

- CINEICC - Center for Research in Neuropsychology and Cognitive Behavioral Intervention, Faculty of Psychology and Educational Sciences, University of Coimbra, Portugal

Ana Allen Gomes

- Faculty of Psychology and Educational Sciences, University of Coimbra, Rua do Colégio Novo, 3000-115 Coimbra, Portugal

- CINEICC - Center for Research in Neuropsychology and Cognitive Behavioral Intervention, Faculty of Psychology and Educational Sciences, University of Coimbra, Portugal

Anabela Sousa Pereira

- University of Aveiro, Department of Education and Psychology, Campus

Universitário de Santiago, 3810-193 Aveiro, Portugal

- Research Centre Didactics and Technology in the Education of Trainers (CIDTFF), University of Aveiro, Portugal

Corresponding author:

Daniel Ruivo Marques

University of Aveiro, Department of Education and Psychology

Campus Universitário de Santiago

3810-193 Aveiro, Portugal

Phone: +351 234 372 428

E-mail: drmarques@ua.pt

Conflict of Interest: The authors declare that they have no conflict of interest.

Title:

Mindfulness profiles in a sample of self-reported sleep disturbance individuals

Abstract

There is some evidence that insomnia seems to constitute a heterogeneous sleep disorder in which different psychological and neurophysiological variables may have differential roles. Mindfulness and acceptance-based approaches suggest new constructs for psychopathology and health sciences which can be useful to investigate in insomnia. In this paper, our aim was to explore eventual homogenous subgroups pertaining to mindfulness within a selected sample of self-reported sleep disturbance individuals drawn from general population. Data from 483 individuals were collected via an online survey. From these, 74 were selected according to a cut-off point given by the European Portuguese version of the Insomnia Severity Index [ISI > 15]. Overall, 2 clusters were generated: A “low mindfulness” and a “high mindfulness” clusters within the subsample of sleep-disturbed individuals identified by the ISI cut-off point. According to our data, it seems feasible to differentiate subgroups of self-reported “insomnia” individuals according to their mindfulness profile. Further studies comprising larger samples and clinical groups are needed in order to validate these findings and verify whether other groups may also emerge. Implications for research and clinical practice are discussed.

Keywords: Mindfulness; Sleep Disturbances; Insomnia; Profiles; Cluster Analysis.

Introduction

Mindfulness and acceptance-based approaches to psychotherapy have known striking developments over the last decades (Herbert & Forman, 2009). These approaches focus on the context, function and relationship that individuals have with their own thoughts and emotions rather than the disputing of irrational thoughts or interfering emotions as proposed by the traditional cognitive-behavioral therapies (CBT). Put simply, this new “wave” of CBT has outlined concepts such as meta-cognition, experiential avoidance, defusion, awareness, self-compassion, acceptance and mindfulness. Likewise, several assessment instruments were developed aimed at covering these constructs (cf. Flaxman, Blackledge, & Bond, 2011; Park, Reilly-Spong, & Gross, 2013). There are several approaches within this “third wave” of CBT (e.g., Mindfulness-based Cognitive Therapy, Acceptance and Commitment Therapy, Compassion-focused therapy). The mindfulness and acceptance approaches have been investigated in numerous psychopathological and physical conditions such as chronic pain and the results have been encouraging (Siegel, Germer, & Olendzki, 2009). Mindfulness have been defined in different ways and there is no consensus on how many dimensions covers. Some authors have suggested different organizations (Baer, 2019; Gerber, 2005); however, one may consider that it represents a multidimensional construct. Mindfulness is defined as purposeful, moment-by-moment, nonjudgmental attending to present experiences (Kabat-Zinn, 2003). It concerns to awareness of present experience with full acceptance. In other words, one’s attention should not be focused on the past or the future - the attention should be centered in what is occurring at the present moment (Germer, 2005).

Insomnia is the most prevalent sleep disorder worldwide and one of the most reported health complaints in medical health settings and in the general population

(Lichstein, Taylor, McCrae, & Petrov, 2017). The interest between the association between mindfulness and sleep, specifically insomnia, is relatively recent (Lundh, 2005, 2011; Taylor, Hailes, & Ong, 2015; Teixeira, Simões, Marques, Espírito-Santo, & Lemos, 2016). Notwithstanding, a meta-cognitive model of insomnia was already suggested in the literature (Ong, Ulmer, & Manber, 2012) and some papers have focused on the application of Acceptance and Commitment Therapy (ACT) in insomnia as well (Baik, 2015; Dalrymple, Fiorentino, Politi, & Posner, 2010; Pelkonen & Puha, 2013). This focus on mindfulness-based approaches for insomnia has been incorporated in the standard CBT-I since the acceptance of automatic negative thoughts, for instance, seems to constitute a crucial therapeutic factor. For example, there is already randomized control trials on the effect of mindfulness meditation for chronic insomnia (cf. Ong, Xia, Smith-Mason, & Manber, 2018) Some authors have posited that insomnia constitutes a heterogeneous sleep disorder where important subgroups or profiles of insomnia individuals should be investigated (Benjamins et al., 2016; Crawford et al., 2017; Marques, Clemente, Gomes, & Azevedo, 2018; Marques et al., 2018b). Data analyses' techniques such as cluster analysis or latent profile analysis are adequate strategies to contribute to this goal. Some studies, albeit few until now, have used these techniques to explore insomnia profiles either with clinical samples or with community-based samples, inclusively self-reported "insomnia" individuals. Thus, mindfulness variables seem to be pertinent and useful to insomnia's conceptualization and clinical practice. In this line, it seems of utmost relevance to explore whether mindfulness variables may contribute to constitute disparate subgroups of self-reported sleep-disturbed individuals. It is theoretically and clinically plausible that might exist groups of insomnia patients who will be quite receptive to mindfulness and acceptance approaches, whereas other groups perhaps be more responsive to the standard

psychological techniques from CBT which may account for the high percentage of CBT-I success (Morin, Davidson, & Beaulieu-Bonneau, 2016).

According to this background, and assuming the heterogeneity in the insomnia (Benjamins et al., 2016; Blanken et al., 2019; Marques et al., 2018a), we hypothesized that high and low mindfulness profiles would emerge within individuals' group with high levels of insomnia, and these two profiles would differ on measures such as anxiety, depression and self-compassion.

Hence, the current study aimed at examining mindfulness profiles in a sample of self-reported sleep-disturbed individuals identified through a well-known and widely used measure (i.e., the Insomnia Severity Index) and exploring eventual differences among these clusters in other relevant variables.

Method

Participants

In this study, data from 74 self-reported sleep-disturbed individuals were collected from an initial pool of 483 participants from the general population. The participants were selected according to a cut-off point given by the ISI (scores ≥ 15). The mean age was 35.35 (14.08) years (Min: 18 – Max: 62). Sixty participants were female (81.1%) and 14 participants were males (18.9%). Pertaining to civil status, 56.8% were single, 31.1% were married or had a relationship in which they lived together, and 12.2% were divorced or separated. On average, the participants had 16 years of education. For a detailed description of the sample, see table 1. One should note that this study is integrated in a larger research project.

INSERT TABLE 1 HERE

Procedure

The data were collected online during the entire month of march 2018 using Google Forms platform. Since our aim was to include any individual with at least 18 years-old, the invitation and the link to the questionnaires were sent to universities (publics and privates) and publicized in social networks and local media. Before the filling out of the questionnaires, all participants had to agree to participate in the study by reading the informed consent and validate the option by checking a box. The participants were informed that confidentiality was assured and their data would be used strictly to scientific purposes. No monetary compensation or credit course for the participation in this study were offered.

Measures

Sociodemographic and clinical data

Participants reported sex, age, marital status, educational level, if they had some insomnia / sleep-related problem and how they assessed their overall well-being. The latter was a question developed by the authors based on an item presented in the WHOQOL-Bref instrument (cf. Skevington, Lotfy, O'Connell & WHOQOL Group, 2004). Scores for this question range between 1 (very good) and 5 (very bad).

Insomnia Severity Index (ISI) – Morin (1993)

The ISI is one of the most used measures of insomnia (Bastien, Vallières, & Morin, 2001). It evaluates the severity of insomnia in the past 2 weeks. The questions are related to sleep onset, sleep maintenance, early awakening, level of satisfaction with sleep pattern, level of interference with daily functioning, perception of sleep difficulty by other people, and level of concern about current insomnia. It is constituted by 7 items

comprising a 5-point Likert scale (0 to 4) (Morin, 1993). The global score results from the sum of all the 7 items and ranges from 0 to 28 points. According to the most used guidelines, scores ranging between 0-7 denotes “no clinically significant insomnia”, 8-14 indicate “subthreshold insomnia”, 15-21 suggest “clinical insomnia (moderate severity)” and scores between 22-28 indicate “clinical insomnia (severe)”. In the current study, the Cronbach’s alpha was .83. The European Portuguese version was used (Clemente, 2007; Clemente et al., 2017).

Five Facet Mindfulness Questionnaire (FFMQ) - Baer, Smith, Hopkins, Krietemeyer, and Toney (2006)

The FFMQ is a measure of mindfulness trait comprising 39 items (Baer et al., 2006; Baer et al., 2008). which assesses five facets of a general tendency to be mindful in daily life: observing (e.g., “when I’m walking, I deliberately notice the sensations of my body moving”), describing (e.g., “I’m good at finding words to describe my feelings”), acting with awareness (e.g., “I don’t pay attention to what I’m doing because I’m daydreaming, worrying, or otherwise distracted”), nonreactivity to inner experience (e.g., “I perceive my feelings and emotions without having to react to them”), and nonjudging of inner experience (e.g., “I tell myself I shouldn’t be feeling the way I’m feeling”). Items are rated on a 5-point Likert-type scale ranging from 1 (never or very rarely true) to 5 (very often or always true). Higher scores denote higher levels of mindfulness (Baer et al., 2006). The European Portuguese version by Gregório and Pinto-Gouveia (2011) was used. The Cronbach alphas for observing, describing, acting with awareness, nonreactivity to inner experience, and nonjudging of inner experience facets were .81, .87, .81, .73 and .86, respectively.

Self-compassion Scale (SCS) – Neff (2003)

The SCS is a 26-item questionnaire aimed at evaluating six dimensions of self-compassion: self-kindness (e.g., “I’m kind to myself when I’m experiencing suffering”), self-judgment (e.g., “When I see aspects of myself that I don’t like, I get down on myself”), common humanity (e.g., “When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people”), isolation (e.g., “When I fail at something that’s important to me I tend to feel alone in my failure”), mindfulness (e.g., “When something painful happens I try to take a balanced view of the situation”), and over-identification (e.g., “When I’m feeling down I tend to obsess and fixate on everything that’s wrong”). Items are rated on a 5-point Likert-type scale ranging from 1 (almost never) to 5 (almost always). Higher scores denote higher levels of self-compassion. The European Portuguese version by Castilho and Pinto-Gouveia (2011) was used. For purposes of the current study, only self-kindness, common humanity and mindfulness scales and total SELFCS score were used (cf. Marques, Castilho, Gomes, & Pereira, 2019). The Cronbach alphas for self-kindness, common humanity, mindfulness, and total self-compassion were .87, .78, .81, and .93, respectively.

Hospitalar Anxiety and Depression Scale (HADS) - Zigmond and Snaith (1983)

The HADS is a widely recognized brief instrument to assess anxiety (HADS-A) and depression symptomatology (HADS-D) in health settings in the past week. It consists of 14 items (7 to measure anxiety and 7 to assess depression). Each item is answered on a 4-point scale (0-3). The scores range between 0-21 for each subscale. Despite its initial use in clinical settings, mainly directed to physical disorders, the HADS is actually a measure used across diverse populations - clinical and nonclinical.

We used the European Portuguese version by Pais-Ribeiro et al. (2007). The Cronbach alphas were .53 and .79 for anxiety and depression, respectively.

Statistical Analysis

To characterize the sample, absolute frequencies, means and standard deviations were computed. To investigate associations among the variables, Pearson's correlation coefficients were calculated. In order to identify eventual distinct subgroups within the sample, two-steps were performed: First, a hierarchical cluster analysis were carried out to give an exploratory idea of the hypothetical clusters' constitution. This analysis is frequently used when there is a small sample size and the researcher have no predefined idea of how many clusters may be extracted. To this purpose, the Ward's method was used as a cluster method and Squared Euclidean Distance was used as measure. The variables were also standardized (z notes). Then, a k -means cluster analysis was carried out. This type of cluster analysis is appropriate when all the variables are continuous (Meyers, Gamst, & Guarino, 2013; Mooi & Sarstedt, 2014). After the standardization of the variables (z notes), different cluster solutions were tried: 2 and 3 clusters based on dendrogram. Despite the possibility of 3 clusters solution, we chose to retain only two clusters due to the reduced sample size (in order to extract balanced clusters). After the final solution is established, the differences between obtained clusters regarding self-compassion, anxiety and depression and overall well-being were analyzed recurring to Student's t -tests (Field, 2013). The Cohen's effect size measure (d) was reported as an effect size measure. The interpretation of the values followed Cohen's (1988) guidelines: $d = 0.20$ (small), $d = 0.50$ (medium), and $d = 0.80$ (large). All the analyses recurred to IBM SPSS Statistics version 23 and a p value $< .05$ was considered statistically significant.

Results

Cluster analysis

All five facets of mindfulness were used as clustering variables: observing, describing, acting with awareness, nonreactivity to inner experience, and nonjudging of inner experience. None of the variables showed high correlations ($r > .80$) with the other clustering variables, thus, no multicollinearity was observed. After hierarchical cluster analysis and further validation with k -means cluster technique, two clusters were retained as a final solution. It was noticed that all mindfulness dimensions were significant for discrimination of both groups except “nonjudging of inner experience”. Thus, two groups were considered: a cluster constituted by self-reported “insomnia” individuals with significantly low mindfulness traits and a cluster composed by self-reported “insomnia” individuals with significantly high mindfulness traits (cf. Table 2). All differences were large in magnitude.

INSERT TABLE 2 HERE

In Figure 1, it is displayed a chart bar with standardized z -scores of the clustering variables.

One should note that both groups [low mindfulness ($M = 16.94$; $SD = 2.33$) and high mindfulness ($M = 17.85$; $SD = 2.00$)] did not differ regarding insomnia severity [$t(72) = -1.577$; $p = .11$].

INSERT FIGURE 1 HERE

Comparison of subgroups regarding self-compassion, affect measures (anxiety and depression) and general well-being

As to self-compassion, affect measures and general well-being, the two groups showed different results. Overall, the “low mindfulness” group presented lower levels of self-kindness, common humanity, mindfulness, and general self-compassion than the “high mindfulness” group. Additionally, the first group presented also higher levels of anxiety and depression. All differences were large in magnitude. In terms of general well-being, no difference was observed between the groups (cf. Table 3).

INSERT TABLE 3 HERE

Discussion

The study of mindfulness is being an increasingly studied topic in sleep medicine (Blak et al., 2015; Sato et al., 2018; Taylor et al., 2015). Accordingly, the current study aimed at observing the influence of mindfulness dimensions on the eventual constitution of sleep-disturbed individuals groups, particularly, those who endorsed high levels of insomnia – as suggested by the ISI.

Overall, and according to our theoretical hypothesis, two distinct profiles of mindfulness in self-reported “insomnia” were identified. These profiles show large effect sizes when compared in several variables. Hence, it seems that at least in individuals prone to insomnia disturbance, the mindfulness traits may have a differential profile. A cluster of sleep-disturbed individuals who endorse higher mindfulness traits may be considered highly receptive for third-wave CBT-I once they have high levels of mindfulness-related traits that might be useful to respond to this therapy (in terms of

adherence to techniques privileged in this modality). Further research should investigate more deeply this subject. On the contrary, individuals which presented low levels of mindfulness traits and a history of unsuccessful treatments for insomnia based in a standard protocol intervention for insomnia may benefit with the integration of mindfulness and acceptance approaches in their treatment, particularly, strategies that may develop their mindfulness and acceptance stance.

The fact that both clusters/groups do not differ in average ISI scores is somehow not surprising. In fact, we are analyzing a specific group that surpass a specified cut-off point. The major topic here was to examine the variability / heterogeneity in mindfulness measures in a highly prone to insomnia sample. Thus, homogeneity in insomnia severity concerning both clusters is expected. However, it worth mentioning that both clusters differ on anxiety and depression. Therefore, while mindfulness profiles did not differ in insomnia severity, what may distinguish these two profile groups from each other is that there may tend to be a greater likelihood of other co-occurring problems in those with lower mindfulness skills.

The observed variability considering mindfulness variables enhances the idea that mindfulness and acceptance-based variables should be considered when broad instruments of insomnia (profiles' inventory) are developed (Marques et al., 2018a).

The current results seem to enhance the idea that mindfulness-based constructs may be variables of interest to include in a profiles' measure of insomnia to be developed in the future (Marques et al., 2018a). Of course, the strategy of using FFMQ may be discussed; however, this is one of the most comprehensive and widely used measures of mindfulness and other published studies have recurred to this measure to attain similar aims (e.g., Gu et al., 2017). Also important is the role of prevention. To teach (individual and group format) acceptance and mindfulness strategies in schools and

health centers fostering personal development, for example, in order to cope with stress and adversity in individuals' lives may prevent sleep disturbance and consequently insomnia (Carsley, Khoury, & Heath, 2018).

The current research has some significant limitations: First, it is a cross-sectional study, therefore, we do not know if these groups are stable across the time; second, we recognize that this is not a well-defined clinical group of insomnia patients and our sample may not represent adequately what may happen in a real sample of clinically diagnosed individuals; third, this is an online study comprising data collected through the Internet (Tuten, 2010; Wyatt, 2000), thus, some groups of the population (e.g., elderly people) are probably underrepresented; finally, it is worth mentioning the low Cronbach's alpha of the HADS-A ($\alpha = .53$) whose results should be analyzed with caution. This value is below the recommended acceptable value of 0.7. Among other factors, this may have been due to the small sample size.

Future studies should replicate this research strategy in a group of patients diagnosed with insomnia disorder and even in other samples (clinical and nonclinical). It is also essential to test these clusters pertaining to other variables beyond anxiety, depression, and self-compassion. Further, with a larger sample size, the using of advanced statistical techniques such as profile latent analysis will bring more comprehension pertaining to this issue and more evidence of the subgroups stability.

Informed consent: “Informed consent was obtained from all individual participants included in the study.”

The authors would like to express their gratitude to all participants who took part in this study. This study is part of a postdoctoral research at the University of Aveiro (Portugal) that the first author carried out with supervision of the remaining co-authors.

References

- Baer, R. (2019). Assessment of mindfulness by self-report. *Current Opinion in Psychology*, 28, 42-48. doi:10.1016/j.copsyc.2018.10.015
- Baer, R., Smith, G., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment*, 13(1), 27-45. doi:10.1177/1073191105283504
- Baer, R., Smith, G., Lykins, E., Button, D., Krietemeyer, J., Sauer, S., & Walsh, E. (2008). Construct validity of the Five Facet Mindfulness Questionnaire in meditating and nonmeditating samples. *Assessment*, 15(3), 329–342. doi:10.1177/1073191107313003
- Baik, K. (2015). *Evaluating acceptance and commitment therapy for insomnia: A randomized controlled trial*. (Doctoral dissertation). Graduate College of Bowling Green State University.
- Bastien, C., Vallières, A., & Morin, C. (2001). Validation of the Insomnia Severity Index as an outcome measure for insomnia research. *Sleep Medicine*, 2(4), 297-307. doi:10.1016/S1389-9457(00)00065-4
- Benjamins, J., Migliorati, F., Dekker, K., Wassing, R., Moens, S., Blanken, T., ... Van Someren, E. (2016). Insomnia heterogeneity: Characteristics to consider for data-driven multivariate subtyping. *Sleep Medicine Reviews*, 36, 71-81. doi:10.1016/j.smrv.2016.10.005
- Black, D., O'Reilly, G., Olmstead, R., Breen, E., & Irwin, M. (2015). Mindfulness meditation and improvement in sleep quality and daytime impairment among older adults with sleep disturbances: A randomized clinical trial. *JAMA Internal Medicine*, 174(4), 494-501. doi:10.1001/jamainternmed.2014.8081

- Blanken, T., Benjamins, J., Borsboom, D., Vermunt, J., Paquola, C., Ramautar, J., ... Van Someren, E. (2019). Insomnia disorder subtypes derived from life history and traits of affect and personality. *The Lancet*, *6*(2), 151-163. doi:10.1016/S2215-0366(18)30464-4
- Carsley, D., Khoury, B., & Heath, N. (2018). Effectiveness of mindfulness interventions for mental health in schools: A comprehensive meta-analysis. *Mindfulness*, *9*(3), 693-707. doi:10.1007/s12671-017-0839-2
- Castilho, P., & Pinto-Gouveia, J. (2011). Auto-Compaixão: Estudo da validação da versão portuguesa da Escala da Auto-Compaixão e da sua relação com as experiências adversas na infância, a comparação social e a psicopatologia [Self-compassion: Validation of the Portuguese version of the Self-compassion Scale and its relation with an adverse childhood experiences, social comparison and psychopathology]. *Psychologica*, *54*, 203–230.
- Clemente, V. (2007). *Insomnia Severity Index – ISI, European Portuguese Version*. Coimbra University Hospital Centre, Sleep Medicine Centre, Portugal.
- Clemente, V., Gomes, A., Mendes, M., Marques, D., Russo, B., Serra, J., ... Moita, J. (2017). The European Portuguese version of the insomnia severity index (ISI): reliability, validity and diagnostic accuracy. *Sleep Medicine*, *40* (Suppl 1), e67.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Crawford, M., Chirinos, D., Iurcotta, T., Edinger, J., Wyatt, J., Manber, R., & Ong, J. (2017). Characterization of patients who present with insomnia: Is there room for a symptom cluster-based approach? *Journal of Clinical Sleep Medicine*, *13*(7), 911-921.
- Dalrymple, K. L., Fiorentino, L., Politi, M.C., & Posner, D., (2010). Incorporating principles from acceptance and commitment therapy for insomnia: A case example. *Journal of Contemporary Psychotherapy*, *40*, 209-217. doi:10.1007/s10879-010-9145-1
- Field, A. (2013). *Discovering Statistics using IBM SPSS Statistics* (4th ed.). London: Sage Publications.
- Flaxman, P., Blackledge, J., & Bond, F. (2011). *Acceptance and commitment therapy: Distinctive features*. New York: Routledge.
- Germer, C. (2005). Mindfulness: what is it? What does it matter? In Germer, C., Siegel, R., & Fulton, P. (Eds). *Mindfulness and Psychotherapy* (pp.3-27). New York, NY: Guilford Press.
- Gregório, S., & Pinto-Gouveia, J. (2011). Facetas de mindfulness: Características psicométricas de um instrumento de avaliação [Mindfulness facets: Psychometric characteristics of an assessment instrument]. *Psychologica*, *54*, 259-280.

- Gu, J., Karl, A., Baer, R., Strauss, C., Barnhofer, T., & Crane, C. (2017). Latent profile analysis of the Five Facet Mindfulness Questionnaire in a sample with a history of recurrent depression. *Assessment*. doi:10.1177/1073191117715114. [Epub ahead of print]
- Herbert, J., & Forman, E. (2009). The evolution of cognitive behavior therapy: The rise of psychological acceptance and mindfulness. In J. Herbert & E. Forman (Eds.), *Acceptance and mindfulness in cognitive behavior therapy: Understanding and applying the new therapies* (pp. 17-36), New York: Springer.
- Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: Past, present, and future. *Clinical Psychology: Science and Practice*, 10(2), 144–156. doi:10.1093/clipsy.bpg016
- Lundh, L. (2005). The role of acceptance and mindfulness in the treatment of insomnia. *Journal of Cognitive Psychotherapy: An International Quarterly*, 19(1), 29-39. doi:10.1891/jcop.19.1.29.66331
- Lundh, L. (2011). Insomnia. In M. Lance McCracken (Ed.), *Mindfulness and acceptance in behavioral medicine: Current theory and practice* (pp. 131-158). Oakland, CA: New Harbinger Publications.
- Marques, D., Castilho, P., Gomes, A., & Pereira, A. (2019). Mindfulness and self-compassion along the chronotype: A cross-sectional study. *Chronobiology International*, 36(4), doi:10.1080/07420528.2018.1564323
- Marques, D., Clemente, V., Gomes, A., & Azevedo, M. H. (2018a). Profiling insomnia using subjective measures: Where are we and where are we going. *Sleep Medicine*. doi:10.1016/j.sleep.2017.12.006
- Marques, D., Gomes, A., Drake, C., Roth, T., Morin, C., & Azevedo, M. H. (2018b). *Typologies of individuals vulnerable to insomnia: A two-step cluster analysis*. Submitted for publication.
- Meyers, L., Gamst, G., and Guarino, A. (2013). *Performing data analysis using IBM SPSS®*. New Jersey: John Wiley & Sons, Inc.
- Mooi, E., & Sarstedt, M. (2014). *A concise guide to market research: The process, data, and methods using IBM SPSS Statistics* (2nd ed.). Berlin: Springer.
- Morin, C. (1993). *Insomnia: Psychological assessment and management*. New York, London: The Guilford Press.
- Morin, C., Davidson, J., & Beaulieu-Bonneau, S. (2016). Cognitive behavior therapies for insomnia I: Approaches and efficacy. In M. Kryger, T. Roth & W. Dement (Eds.), *Principles and Practice of Sleep Medicine* (6ed.), (pp. 804-813), Missouri: Elsevier Saunders.
- Neff, K. D. (2003). The development and validation of a scale to measure self-compassion. *Self and Identity*, 2(3), 223-250. doi:10.1080/15298860309027

- Siegel, R., Germer, C., & Olendzki, A. (2009). Mindfulness: What is it? Where did it come from? In F. Didonna (Ed.), *Clinical handbook of mindfulness* (pp. 17-36), New York: Springer.
- Skevington, S., Lotfy, M., O'Connell, K., & WHOQOL Group (2004). WHOQOL-Bref quality of life assessment: Psychometric properties and results of the international field trial. A report from the WHOQOL group. *Quality of Life Research*, 13(2), 299–310. doi:10.1023/B:QURE.0000018486.91360.00.
- Ong, J., Ulmer, C., & Manber, R. (2012). Improving sleep with mindfulness and acceptance: A metacognitive model of insomnia. *Behaviour Research and Therapy*, 50(11), 651-660.
- Ong, J., Xia, Y., Smith-Mason, C., & Manber, R. (2018). A randomized controlled trial of mindfulness meditation for chronic insomnia: Effects on daytime symptoms and cognitive-emotional arousal. *Mindfulness*, 9(6), 1702-1712. doi:10.1007/s12671-018-0911-6
- Pais-Ribeiro, J., Silva, I., Ferreira, T., Martins, A., Meneses, R., & Baltar, M. (2007). Validation study of a Portuguese version of the Hospital Anxiety and Depression Scale. *Psychology, Health & Medicine*, 12(2), 225-237. doi:10.1080/13548500500524088
- Park, T., Reilly-Spong, M., & Gross, C. (2013). Mindfulness: A systematic review of instruments to measure an emergent patient reported outcome (PRO). *Quality of Life Research*, 22(10), 2639-2659. doi:10.1007/s11136-013-0395-8
- Pelkonen, S., & Puha, N. (2013). *Acceptance and commitment group therapy for treatment of insomnia*. (Doctoral dissertation). University of Jyväskylä.
- Sato, D., Yoshinaga, N., Nagai, E., Hanaoka, H., Sato, Y., & Shimizu, E. (2018). Randomised controlled trial on the effect of internet-delivered computerised cognitive-behavioural therapy on patients with insomnia who remain symptomatic following hypnotics: A study protocol. *BMJ Open*, 8(1), e018220. doi:10.1136/bmjopen-2017-018220.
- Taylor, H., Hailes, H., & Ong, J. (2015). Third-wave therapies for insomnia. *Current Sleep Medicine Reports*, 1(3), 166-176. doi:10.1007/s40675-015-0020-1
- Lichstein, K., Taylor, D., McCrae, C., and Petrov, M. (2017). Insomnia: Epidemiology and risk factors. In M. Kryger, T. Roth, & W. Dement (Eds.), *Principles and practice of sleep medicine* (6th Ed, pp. 761–768). Philadelphia, USA: Elsevier.
- Teixeira, I., Simões, S., Marques, M., Espírito-Santo, H., & Lemos, L. (2016). Self-criticism and self-compassion role in the occurrence of insomnia on college students. *European Psychiatry*, 33, e268. doi:10.1016/j.eurpsy.2016.01.702
- Tuten, T. (2010). Conducting online surveys. In S. Gosling, & J. Johnson (Eds), *Advanced methods for conducting online behavioral research* (pp. 179-192). Washington, DC: American Psychological Association.

Wyatt, J. (2000). When to use web-based surveys. *Journal of the American Medical Informatics Association*, 74(4), 426-429.

Zigmond, A., & Snaith, R. (1983). The Hospital Anxiety and Depression Scale. *Acta Psychiatrica Scandinavica*, 67(6), 361-370.

doi:10.1111/j.16000447.1983.tb09716.x

Journal Pre-proof

Table 1. Characterization of the overall sample ($N=74$)

	<i>n (%)</i>
Sex	
Men	14 (18.9)
Women	60 (81.1)
Civil status	
Single	42 (56.8)
Married / Living together	23 (31.1)
Divorced/Separated	9 (12.2)
	<i>M (SD)</i>
Age	35.3 (13.9)
Education level (years)	16.0 (3.56)
ISI	17.2 (2.26)
HADS-A	12.3 (2.37)
HADS-D	7.98 (3.91)
FFMQ_Nonreactivity to inner experience	2.79 (0.57)
FFMQ_Nonjudging of inner experience	2.76 (0.85)
FFMQ_Observing	3.25 (0.82)
FFMQ_Acting with awareness	2.88 (0.89)
FFMQ_Describing	3.11 (0.82)
SELFCS_Self-kindness	2.69 (0.78)
SELFCS_Common humanity	2.79 (0.78)
SELFCS_Mindfulness	3.19 (0.81)
SELFCS_total	2.95 (0.84)
Well-being	3.03 (0.79)

Note. HADS-A= Hospital Anxiety and Depression Scale (Anxiety); HADS-D = Hospital Anxiety and Depression Scale (Depression); FFMQ = Five Facet Mindfulness Questionnaire; SELFCS = Self-compassion Scale.

Table 2. Mean differences regarding clustering variables (FFMQ) for the two groups

	Cluster 1 Low mindfulness (<i>n</i> = 53)	Cluster 2 High mindfulness (<i>n</i> = 21)
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)
Nonreactivity to inner experience	2.64 (0.51)	3.19 (0.55)
Nonjudging of inner experience	2.71 (0.90)	2.88 (0.74)
Observing	2.93 (0.70)	4.04 (0.49)
Acting with awareness	2.58 (0.73)	3.65 (0.80)
Describing	2.76 (0.58)	3.98 (0.68)

Table 3. Mean differences among both mindfulness clusters regarding psychological variables

	Cluster 1	Cluster 2	<i>df</i>	Test <i>t</i>	Effect Size <i>d</i>
	Low mindfulness (<i>n</i> = 53)	High mindfulness (<i>n</i> = 21)			
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)			
SELFCS_Self-kindness	2.43 (0.60)	3.35 (0.80)	72	-5.295**	1.30
SELFCS_Common humanity	2.97 (0.72)	3.75 (0.77)	72	-4.090**	1.04
SELFCS_Mindfulness	2.66 (0.69)	3.70 (0.72)	72	-5.703**	1.47
SELFCS_total	2.66 (0.48)	3.39 (0.67)	72	-5.150**	1.25
HADS_anxiety	12.88 (2.36)	11.14 (1.93)	72	3.000*	0.80
HADS_depression	8.90 (3.68)	5.66 (3.56)	72	3.442*	0.89
Well-being	2.96 (0.80)	3.19 (0.75)	72	-1.117	0.27

* $p < .01$ ** $p < .001$

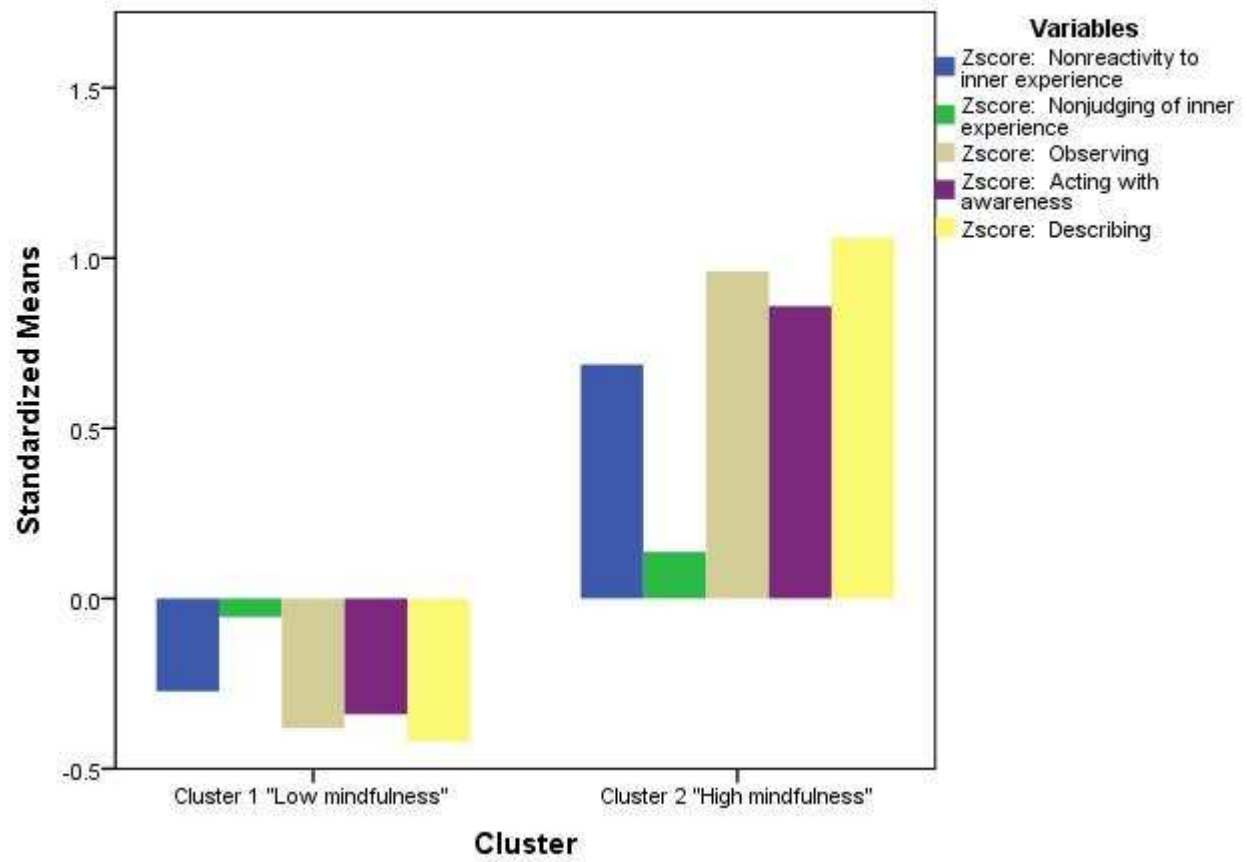


Figure 1. Profiles of the two mindfulness clusters

Highlights

- Insomnia may be conceptualized as a heterogeneous disorder.
- Mindfulness-based strategies may be useful in some insomnia profiles.
- Mindfulness models of insomnia should be further investigated.

Journal Pre-proof

Declarations of interest: none

Journal Pre-proof