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Editorial

The impact of the COVID-19 pandemic on children and young people

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In March 2020, the World Health Organization declared the spread of COVID-19 as a global pandemic, and youth worldwide were suddenly confronted with unprecedented consequences. The first line of concern was related to the direct effect of SARS-CoV-2 viral infection. While severe physical health symptomatology including death following infection was found to be less common in children than in adults,¹ long-COVID has been identified in the pediatric population with the most prevalent manifestations involving mood symptoms, sleep difficulties, and fatigue.² Secondly, the measures against COVID-19 carried their own set of risks. Many governments imposed national lockdowns, schools closed, remote learning started operating and social distancing measures prevented families from visiting public places or meeting people from other households. Isolation, disruption of everyday routines, and a sharp and dramatic decrease in physical activity and social interaction levels became the new reality experienced by children and adolescents of all age groups.³ Cross-sectional community studies on children and adolescents conducted early in the course of the pandemic indicated elevated levels of loneliness, anxiety, and behavioral problems in youth samples, even during the initial phases of the outbreak.⁴ Systematic reviews of mainly cross-sectional studies that followed indicated a significant rise in clinically significant anxiety and depression symptoms among children and adolescents compared to pre-pandemic levels⁵ and high prevalence estimates for depression, anxiety, posttraumatic stress symptomatology, and sleep disorders.⁶ A recent systematic review that included data from 55,000 children and adolescents from many countries of the world (mean age 11.3 years) reported that anxiety (range = 1.8–49.5%), depression (range = 2.2–63.8%), irritability (range = 16.7–73.2%) and anger (range = 30.0–51.3%) were frequently reported by children and adolescents during the pandemic.⁷

However, the experience of the pandemic was not homogenous among all youth. Possible risk factors included the presence of mental health problems before the pandemic, excessive exposure to media, and high COVID-19 caseload in the community, while the presence of any kind of family routines and good parent-child communication were identified as protective factors.⁷ Females and older adolescents were also reported to be at greater risk for adverse mental health outcomes. In most countries, the spread of the infection, on one hand, and the enforcement of lockdowns and other containment measures, on the other, have put health care under tremendous pressure, leaving families with children with mental health disorders with minimal or inadequate support. Nevertheless, differences were also observed within the group of children with psychiatric or developmental disorders diagnosed before the pandemic. Numerous studies that have investigated the impact of the COVID-19 pandemic and related containment measures on children and adolescents with autism spectrum disorders reported a significant increase in parental stress, as well as high levels of anxiety, irritability, hyperactivity, stereotypical behavior, and other behavioral problems among children and adolescents.⁸ Further studies that investigated the issue of neurodevelopmental disorders showed that the COVID-19 pandemic has disproportionately and adversely affected children with attention-deficit/hyperactivity disorder (ADHD) with a recent meta-analysis pointing to a global increase in ADHD symptoms.⁹ Finally, early concerns about a possible significant increase in suicidality among youth during the pandemic were followed by contradicting findings from relevant studies. On the whole, though, it is suggested that during the pandemic, as previously, higher rates of suicidal ideation than of suicidal behaviors and suicide events were reported among children and adolescents.¹⁰

Similar patterns of mental health difficulties to those described above have also been identified in youth in Greece. During the early stages of the pandemic, one-third (35.1%) of the parents reported that their child's psychological health was considerably affected,¹¹ while a study of final-year high-school students found that the rates of severe depression and anxiety increased significantly during the lockdown.¹² Among children and adolescents with pre-existing mental health problems from different parts of the country, no change was found in mood state scores pre- and post-pandemic onset, while several of their daily behaviors worsened during the lockdown, such as reduced sleep or time spent outdoors.¹³

Such research findings related to the effects of the COVID-19 pandemic and its containment measures should guide the follow-up of children and young people affected by it and inform the design of effective health strategies and policies in the post-pandemic era with the aim to prevent and mitigate further mental health crises.

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Η επίδραση της πανδημίας COVID-19 στα παιδιά και τους εφήβους

ΙΣΤΟΡΙΚΟ ΑΡΘΡΟΥ: Παραλήφθηκε 16 Οκτωβρίου 2023/Δημοσιεύθηκε Διαδικτυακά 14 Νοεμβρίου 2023

Τον Μάρτιο του 2020 ο Παγκόσμιος Οργανισμός Υγείας κήρυξε την έξαρση της νόσου COVID-19 ως πανδημία, γεγονός που έφερε τους νέους διεθνώς αντιμέτωπους με πρωτοφανείς συνέπειες. Σε ένα πρώτο επίπεδο, οι συνέπειες αυτές αφορούσαν στην καθαυτό λοίμωξη με τον ιό SARS-CoV-2. Παρά το γεγονός ότι η σοβαρή οργανική συμπτωματολογία, συμπεριλαμβανομένου του θανάτου, ήταν λιγότερο συχνή στα παιδιά και τους εφήβους σε σχέση με τους ενήλικες,¹ οι μακροχρόνιες συνέπειες της νόσου COVID-19 («Long-COVID») αναγνωρίστηκαν και σε νεαρότερες ηλικίες, με συνέπειες που περιλάμβαναν συναισθηματικές δυσκολίες, προβλήματα ύπνου και κόπωση.² Σε ένα δεύτερο επίπεδο, τα μέτρα για την αντιμετώπιση της πανδημίας COVID-19 ενείχαν τους δικούς τους κινδύνους. Πολλές κυβερνήσεις επέβαλαν εθνικά μέτρα περιορισμού των μετακινήσεων («lockdowns»), τα σχολεία έκλεισαν και τα μαθήματα αντικαταστάθηκαν με εξ αποστάσεως εκπαίδευση, ενώ μέτρα «κοινωνικής απόστασης» («social distancing») δεν επέτρεπαν στις οικογένειες να επισκέπτονται δημόσια μέρη και να συναντούν ανθρώπους εκτός αυτών που έμεναν στο ίδιο σπίτι. Η απομόνωση, η διατάραξη της καθημερινής ρουτίνας, καθώς και η οξεία και σοβαρή μείωση της σωματικής δραστηριότητας έγινε η νέα πραγματικότητα των παιδιών και των εφήβων όλων των ηλικιών.³ Συγχρονικές μελέτες σε πληθυσμούς παιδιών και εφήβων στην κοινότητα που διενεργήθηκαν νωρίς στην πορεία της πανδημίας, κατέδειξαν αυξημένα επίπεδα μοναξιάς, άγχους, και συμπεριφορικών προβλημάτων.⁴ Επιπρόσθετα, συστηματικές ανασκοπήσεις κυρίως συγχρονικών μελετών κατέδειξαν μια σημαντική αύξηση κλινικά σημαντικών συμπτωμάτων άγχους και κατάθλιψης σε αυτές τις ηλικιακές ομάδες συγκριτικά με τα επίπεδα πριν την πανδημία,⁵ καθώς και υψηλή υπολογιζόμενη επίπτωση κατάθλιψης, άγχους, συμπτωματολογίας μετατραυματικού στρες και διαταραχών ύπνου.⁶ Μια πρόσφατη συστηματική ανασκόπηση που συμπεριέλαβε δεδομένα από 55.000 παιδιά και εφήβους από πολλές χώρες με μέση ηλικία τα 11,3 έτη, παρουσίασε υψηλά ποσοστά αναφερόμενου άγχους (εύρος = 1.8–49.5%), κατάθλιψης (εύρος=2.2–63.8%), ευερεθιστότητας (εύρος = 16.7–73.2%) και θυμού (εύρος = 30.0–51.3%) από παιδιά και εφήβους κατά τη διάρκεια της πανδημίας.⁷

Παρόλα αυτά, το βίωμα της πανδημίας δεν ήταν ίδιο για όλα τα παιδιά και τους εφήβους, Πιθανοί παράγοντες που συνέβαλαν σημαντικά σε αυτό περιλαμβάνουν την παρουσία ψυχιατρικών προβλημάτων πριν την πανδημία, υπερβολική έκθεση στα μέσα μαζικής επικοινωνίας και υψηλό επίπεδο νόσησης στην κοινότητα, ενώ οικογενειακές ρουτίνες οποιουδήποτε τύπου, καθώς και καλή επικοινωνία μεταξύ γονέων και παιδιών αναγνωρίστηκαν ως προστατευτικοί παράγοντες.⁷ Επιπρόσθετα, τα κορίτσια και οι μεγαλύτεροι έφηβοι φάνηκε, ότι ίσως ήταν πιο ευάλωτοι όσον αφορά τις επιπτώσεις της πανδημίας στην ψυχική τους υγεία. Στις περισσότερες χώρες, τα συστήματα υγείας βρέθηκαν κάτω από σοβαρή πίεση, λόγω της διασπορά της λοίμωξης αφενός, και των εθνικών μέτρων περιορισμού των μετακινήσεων αφετέρου, με αποτέλεσμα την ανεπαρκή ή ελάχιστη υποστήριξη των οικογενειών που είχαν παιδιά με προβλήματα ψυχικής υγείας. Επιπλέον, διαφορές παρατηρήθηκαν ως προς την επίπτωση της πανδημίας μεταξύ των διαφορετικών ομάδων των παιδιών με ψυχιατρικές ή νευροαναπτυξιακές δυσκολίες, οι οποίες είχαν διαγνωσθεί πριν την πανδημία. Ένας μεγάλος αριθμός μελετών που ερεύνησαν τον αντίκτυπο της πανδημίας και των σχετικών περιοριστικών μέτρων σε παιδιά και εφήβους με διαταραχές φάσματος αυτισμού ανέφεραν σημαντική αύξηση στο γονεϊκό στρες, καθώς και υψηλά επίπεδα άγχους, ευερεθιστότητας, υπερκινητικότητας, στερεοτυπιών και άλλων συμπεριφορικών προβλημάτων στα παιδιά και τους εφήβους.⁸ Άλλες μελέτες σε νέους με νευροαναπτυξιακές διαταραχές κατέδειξαν ότι η πανδημία COVID-19 επηρέασε αρνητικά και δυσανάλογα πολύ παιδιά με διαταραχές ελλειμματικής προσοχής και υπερκινητικότητας (ΔΕΠΥ) ενώ μια πρόσφατη μετά-ανάλυση σημείωσε αύξηση των συμπτωμάτων ΔΕΠΥ παγκοσμίως.⁹ Τέλος, η ανησυχία που εκφράστηκε ιδιαίτερα κατά τα αρχικά στάδια της πανδημίας σχετικά με σημαντική αύξηση της αυτοκτονικότητας των νέων ακολουθήθηκε από μελέτες με αντικρουόμενα αποτελέσματα. Συνολικά, φαίνεται ότι κατά τη διάρκεια της πανδημίας, όπως και πριν από αυτή, σημειώθηκαν υψηλότερα ποσοστά αυτοκτονικού ιδεασμού παρά αυτοκτονικών συμπεριφορών και αποπειρών αυτοκτονίας μεταξύ των νέων.¹⁰

Παρόμοια ήταν η εικόνα που προέκυψε και από μελέτες σχετικά με τις δυσκολίες ψυχικής υγείας παιδιών και εφήβων στην Ελλάδα κατά τη διάρκεια της πανδημίας. Κατά τα πρώιμα στάδια της πανδημίας, το ένα τρίτο (35.1%) των γονέων ανέφεραν ότι η ψυχική υγεία του παιδιού τους είχε επηρεαστεί σημαντικά,¹¹ ενώ μια μελέτη μαθητών Γ΄ Λυκείου κατέδειξε σημαντικά αυξημένα ποσοστά σοβαρής κατάθλιψης και άγχους κατά τη διάρκεια των περιοριστικών μέτρων στην πρώτη φάση της πανδημίας.¹² Μεταξύ παιδιών και εφήβων με προϋπάρχοντα προβλήματα ψυχικής υγείας από διάφορες περιοχές της χώρας, δεν βρέθηκε δια-

φορά στα αναφερόμενα συναισθηματικά προβλήματα πριν και μετά την πανδημία, αλλά αρκετές από τις καθημερινές συμπεριφορές τους, όπως η συνολική διάρκεια ύπνου ή ο δαπανώμενος χρόνος εκτός σπιτιού, επιδεινώθηκαν σημαντικά κατά τη διάρκεια των περιοριστικών μέτρων.¹³

Τα επιστημονικά ευρήματα σχετικά με τις επιπτώσεις της πανδημίας COVID-19 και των σχετιζόμενων περιοριστικών μέτρων είναι απαραίτητο αφενός μεν να κατευθύνουν κατάλληλα την παρακολούθηση των παιδιών και των εφήβων που επηρεάστηκαν από αυτά, και αφετέρου να καθοδηγήσουν αποτελεσματικά το σχεδιασμό στρατηγικών και πολιτικών υγείας στην εποχή μετά την πανδημία, με σκοπό την πρόληψη και τον περιορισμό των αρνητικών επιπτώσεων περαιτέρω κρίσεων ψυχικής υγείας.

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Research article

Investigating predictors of well-being in type 2 diabetes mellitus patients: The role of undiagnosed depression

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ABSTRACT

Type 2 diabetes mellitus (T2DM) is a common metabolic disorder with various medical and psychological adverse effects. Well-being in patients with T2DM is often compromised. The aim of the present study was to investigate clinicodemographic predictors of well-being in patients with T2DM with no known psychiatric history and explore the mediatory role of undiagnosed anxiety and depression. We recruited 175 outpatients with T2DM (54.3% males, aged 34–79 (mean 59.9) years) followed up at the Diabetes Center of the General Hospital of Nikaia-Piraeus in Athens. Patients included had no severe diabetes-related complications or known psychiatric history. Well-being was measured with the Mental Health Continuum Short-Form (MHC-SF), a novel 14-item tool measuring the emotional (EWB), social (SWB), and psychological (PWB) dimensions of well-being, as well as a total score of well-being (WBT). Hospital Anxiety and Depression Scale (HADS) was used for screening for undiagnosed anxiety (HADS-A) and depression (HADS-D). Patients' demographics, Body Mass Index (BMI), glycemic control (HbA1c), T2DM duration, comorbid hypertension or dyslipidemia, and type of antidiabetic medication were investigated as predictors of well-being or its dimensions in stepwise linear regression models, also including or excluding HADS-A and HADS-D. Mediation effects of HADS-A and HADS-D were explored in structural equation models through path analyses. Results showed that 21.1% of participants had comorbid depression (HADS-D \geq 11) and 5.1% comorbid anxiety disorder (HADS-A \geq 11). In the models without HADS, higher WBT as well as EWB and PWB were significantly predicted by lower HbA1c (all $p=0.001$) and lower BMI ($p=0.015$, 0.019 , and 0.030 , respectively). After being included in the model, HADS-A and HADS-D significantly predicted WBT and every dimension of well-being, but the effects of HbA1c and BMI were no longer statistically significant. In path analyses, the indirect effects of HbA1c and BMI on well-being via HADS-D were statistically significant, while the direct and indirect effects via HADS-A were not. Therefore, the effects of HbA1c and BMI on EWB, PWB, and WBT were completely mediated by HADS-D. Concludingly, this is the first study using MHC-SF to measure well-being in patients with T2DM. High levels of undiagnosed depression were recorded, in agreement with other studies. Depression was predicted by HbA1c and BMI and finally predicted well-being. Undiagnosed depression fully explained the effects of HbA1c and BMI on well-being. The interplay of glycemic control and positive mental health should be further investigated.

KEYWORDS: Anxiety, depression, HbA1c, glycemic control, BMI, type 2 diabetes mellitus, HADS, MHC-SF, well-being.

Introduction

Diabetes mellitus (DM), a chronic metabolic disorder characterized by various severe long-term complications, is one of the most common diseases worldwide. In 2021, DM's prevalence in adults was 10.5%, but by 2045 it is projected to be 12.2%.¹ DM has often been the focus of psychological research. Patients with diabetes have 20% higher rates of lifetime anxiety-related diagnoses in the USA.² Comorbid anxiety leads to an increased likelihood of developing diabetes-related complications, ineffective glycemic control, and higher BMI.^{2,3} The two-way relationship between DM and depression is also well-known. Depression affects 20% of patients with type 2 diabetes mellitus (T2DM) and it is 15–24% more likely for these patients to develop a major depressive disorder;⁴ at the same time, depression is associated with a 60% increased risk of developing T2DM.⁵ Therefore, depression is a risk factor for DM's onset and vice versa. Patients with T2DM and comorbid depression are at a higher risk of developing medical complications and have higher mortality rates than those without.⁶ Yet, despite its impact, comorbid depression is often underdiagnosed in T2DM. About 45% of patients with diabetes and depression were undiagnosed in the USA.⁷

However, not only depression and anxiety have been studied with respect to DM; since 1986 researchers have studied the role of mental well-being in patients with T2DM.⁸ The World Health Organization (WHO) defined positive mental health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”.⁹ This definition indicates that mental health is not characterized only by the absence of psychopathology, but by positive attributes, as well, like optimism, coping with life stress and contributing to the society. Various questionnaires exist for the evaluation of well-being, many of which have been used in populations with T2DM.^{10–12}

The roots of the modern conceptualization of well-being can be traced back to Aristotle's philosophy, hence a great number of researchers nowadays focus on its hedonic and eudemonic aspects. Specifically, hedonic well-being denotes a person's feelings of happiness and satisfaction with life [emotional well-being (EWB)]. In contrast, eudemonic well-being refers to overall positive functioning both at the individual level [psychological well-being (PWB)] and in societal contexts [social well-being (SWB)].^{13,14} The model that approaches most WHO's definition of well-being and positive mental health is the three-dimensional model suggested by Keyes, including all three aforementioned dimensions.^{13,15,16} Adults with high levels of well-being are

flourishing in life, i.e., have positive emotions and are socially and psychologically functional. Flourishing has been correlated with greater resilience against mental illness, fewer workdays lost, and reduced all-cause mortality.¹⁵ Adults with lower levels of well-being are languishing in life. Languishing has been correlated with a higher incidence of depressive disorders, more workdays lost, and more limitations in everyday activities.¹⁵ The three dimensions of well-being are measured by a novel tool developed by Keyes in 2008 named “Mental Health Continuum- Short Form” (MHC-SF).¹³ Well-being in patients with T2DM has never been studied in the past using the MHC-SF.

The aim of the current study is to investigate clinicodemographic predictors of well-being, as measured with the MHC-SF, in patients with T2DM, the far most prevalent form of DM, and no known psychiatric history as well as the potential mediatory role of undiagnosed anxiety and depression.

Materials and Method

Participants and procedures

A total number of 180 patients with T2DM were recruited from the Diabetes Center of the 3rd Internal Medicine Department, General Hospital of Nikaia – Piraeus, Attica. All participants were informed in writing about the aim of the study and provided signed consent to participate, but due to important missing data, 5 patients were excluded from the study. No patient refused to participate. The study has been approved by the local Ethics Committee and has been carried out in accordance with the Declaration of Helsinki.

Inclusion criteria for the study were age 18–80 years old, speaking Greek and being able to understand the informed consent sheet, having a diagnosis of T2DM for at least six months according to the American Diabetes Association's guidelines,¹⁷ and having a full medical record at the Diabetes Center. Patients with previously diagnosed comorbid psychopathology, as evidenced by their medical records and/or the use of psychiatric medication lifetime, were excluded. Patients with type 1 DM or chronic and serious comorbid medical conditions, such as cancer, HIV infection, dementia, multiple sclerosis, and other neurological and endocrine disorders, as well as patients with severe disabilities or complications caused by DM, were also excluded.

Demographic data and clinical variables were extracted from patients' medical records including the most recent HbA1c levels, T2DM duration, BMI, comorbid dyslipidemia or hypertension, and type of therapy. Dyslipidemia and hypertension were defined by the use

of hypolipidemic and anti-hypertensive drugs, respectively.

Measures

Well-being

Well-being was measured by the MHC-SF, which is a 14-item questionnaire measuring three dimensions of well-being: EWB, SWB, and PWB.¹⁵ Each item is rated on a 6-point Likert scale, representing the frequency of the experiences linked with well-being during the past month (0=never–5=every day). In our sample, Cronbach's alphas were adequate for both the total scale (WBT) and the subscales (WBT $\alpha=0.89$, EWB $\alpha=0.87$, SWB $\alpha=0.70$ and PWB $\alpha=0.85$). Equally satisfactory results have been reported in the literature, with $\alpha=0.70 - 0.88$ for WBT and $\alpha=0.67-0.82$ for the subscales.^{13,14,16} The MHC-SF has been recently validated in the Greek population.¹⁸

Anxiety and depression

Anxiety and depression were evaluated with the 14-item self-reported Hospital Anxiety and Depression Scale (HADS).¹⁹ It is rated on a 4-point Likert scale, where higher scores indicate more frequent and more intense symptoms of anxiety and depression. It consists of two subscales, HADS-A for anxiety and HADS-D for depression, measured with 7 items each. HADS-A or HADS-D scores ≥ 8 or ≥ 11 suggest that it is possible or highly probable, respectively, that patients suffer from an anxiety disorder or depression.¹⁹ The scale has been validated in the Greek population and shows satisfactory psychometric properties (Cronbach's alpha >0.80 for both subscales and the total scale).²⁰

Statistical analysis

The sample's sociodemographic characteristics, clinical and treatment-related features, as well as well-being, anxiety, and depression scores were explored with descriptive statistics; the normality of continuous variables was checked with the Kolmogorov-Smirnov test. Comparison between binary groups on continuous variables was conducted with Student's t-test. Pearson's correlations were performed between all self-report measures. Statistical analyses were implemented using the statistical software STATA 14.0 and significant were values with $p<0.05$.

Four backward stepwise multiple linear regressions were then performed, using WBT, EWB, SWB, and PWB as dependent variables and clinical and demographical characteristics as independent variables. Subsequently, four new multiple linear regressions were performed

adding anxiety (HADS-A) and depression (HADS-D) as independent variables to significant predictors from the previous sets of regressions. A comparison of the results of these two sets of models informed us whether it would be useful to further proceed to path analyses in order to explore the mediatory effect of HADS-A and HADS-D in the relationship between significant clinico-demographic predictors with WBT and its dimensions.

To this end, structural equation models (SEM/path analyses) were constructed using Mplus v.721 (with a maximum likelihood estimator and bias-corrected confidence intervals by performing bootstrapping in 1000 samples to calculate standard errors), allowing us to decompose the total effect of significant predictors of well-being and its dimensions into direct and indirect (via HADS-A and HADS-D) effects.

Results

The socio-demographic and clinical data of the participants are shown in table 1. No statistically significant difference regarding well-being between sexes was noticed. 24% of our sample were considered as possible cases of anxiety disorder and 5.1% as probable cases. Possible and probable cases of depression were found in 20.6% and 21.1% of the sample, respectively. Anxiety levels were higher in women (6.97 ± 3.46) than in men (4.88 ± 2.50) ($p<0.001$). Depression levels were also higher in women (7.08 ± 4.57) than men (6.09 ± 4.14), but this difference was not statistically significant ($p=0.137$).

Pearson's correlations of WBT and its dimensions with HADS-A and HADS-D are displayed in the correlation matrix of table 2 (all $p<0.0001$). Among well-being dimensions, PWB had the strongest correlation with WBT, as expected (PWB included 6/14 items of the scale). In intercorrelations among well-being dimensions, SWB and PWB had the highest one while EWB and SWB had the lowest. Correlations of all well-being measures were stronger with HADS-D than with HADS-A. Among all well-being measures, EWB had the strongest correlation with HADS-D while SWB was the weakest.

Multiple linear regression models

A backward stepwise multiple linear regression was performed using sex, age, marital status, education level, BMI, HbA1c levels, T2DM duration, type of medication and comorbid hyperlipidemia and hypertension as independent variables, while WBT was used as dependent variable. Model 1 (table 3) showed that only HbA1c ($p=0.001$) and BMI ($p=0.015$) significantly predicted (lower) WBT. However, in a new regression model including HbA1c, BMI as well as HADS subscales (Model 2, table 3), HADS-D was the strongest predictor

Table 1. Clinicodemographic characteristics and well-being, anxiety and depression scores of patients with T2DM (N = 175).

	Subgroups	Mean±SD (range) or N (%)
Sex	Males	95 (54.3%)
Age (years)		59.9±8.45 (34–79)
Education	Primary school	48 (27.4%)
	Secondary/High-school	107 (61.1%)
	University	20 (11.4%)
Marital status	Single	10 (5.7%)
	Married with children	133 (76.0%)
	Divorced/Widowed	32 (18.3%)
Occupation	Unemployed	60 (34.3%)
	Employed	41 (23.4%)
	Retired	74 (42.3%)
T2DM duration (years)		10.43±7.63 (1–35)
BMI		32.48±6.07 (20.18–53.35)
Hypertension		120 (68.6%)
Dyslipidemia		137 (78.3%)
Antidiabetic medication	Oral	81 (46.3%)
	Insulin	8 (4.6%)
	GLP-1	2 (1.1%)
	Oral and insulin	40 (22.9%)
	Oral and GLP-1	33 (18.9%)
	Oral, insulin and GLP-1	11 (6.3%)
HbA1c (%)		7.59±1.68 (5.30–14.0)
MHC-SF WBT		3.16±0.85 (0.64–4.71)
MHC-SF EWB		2.92±1.22 (0–5)
MHC-SF PWB		3.81±0.91 (0.33–5)
MHC-SF SWB		2.52±0.95 (0–4.40)
HADS-A		5.84±3.15 (0–17)
Possible anxiety cases (HADS-A ≥8 and <11)		42 (24%)
Probable anxiety cases (HADS-A ≥11)		9 (5.1%)
HADS-D		6.54±4.36 (0–17)
Possible depression cases (HADS-D ≥8 and <11)		36 (20.6%)
Probable depression cases (HADS-D ≥11)		37 (21.1%)

T2DM= Type 2 diabetes mellitus, BMI= Body Mass Index, GLP-1= Glucagon-like peptide-1 analogues, HbA1c= glycated hemoglobin, MHC-SF= Mental Health Continuum – Short Form, MHC-SF WBT= MHC-SF well-being total score, MHC-SF EWB= MHC-SF emotional well-being subscale, MHC-SF PWB= MHC-SF psychological well-being subscale, MHC-SF SWB= MHC-SF social well-being subscale, HADS= Hospital Anxiety and Depression Scale, HADS-A= HADS Anxiety subscale, HADS-D= HADS Depression subscale. For MHC-SF subscales (EWB, PWB, and SWB), mean scores are presented after being divided by the total number of items of each subscale. The mean MHC-SF total score (WBT) is presented after being divided by the total number of items (n=14)

($\omega^2=0.306$) of WBT followed by HADS-A ($\omega^2=0.074$; both $p<0.001$) while HbA1c and BMI were no longer significant, suggesting that the effects of HbA1c and BMI on WBT were probably completely mediated by HADS-A or HADS-D or both. A similar pattern was followed for EWB

(Models 1a, 2a; Suppl. table 1) and PWB (Models 1b, 2b; Suppl. table 2). SWB was an exception (Suppl. table 3), since HbA1c and BMI were the strongest but non-significant predictors of SWB in the backward stepwise model without HADS (Model 1c); HADS-A and HADS-D

Table 2. Pearson's correlations of well-being and its dimensions with HADS-A and HADS-D (N=175).

	WBT	EWB	SWB	PWB	HADS-A
EWB	0.794				
SWB	0.859	0.534			
PWB	0.899	0.596	0.642		
HADS-A	-0.620	-0.585	-0.517	-0.508	
HADS-D	-0.751	-0.788	-0.553	-0.626	0.635

MHC-SF= Mental Health Continuum – Short Form, WBT= MHC-SF well-being total score, EWB= MHC-SF emotional well-being subscale, SWB= MHC-SF social well-being subscale, PWB= MHC-SF psychological well-being subscale, HADS= Hospital Anxiety and Depression Scale, HADS-A= HADS Anxiety subscale, HADS-D= HADS Depression subscale
All correlations were statistically significant with $p < 0.0001$

Table 3. Results of multiple linear regressions using WBT as dependent variable and excluding (Model 1) or including HADS-A and HADS-D as predictors (Model 2) (N=175).

	Model 1 (stepwise)		Model 2		
	beta	p	beta	p	ω^2
HbA1c	-0.249	0.001	-0.020	0.695	0
BMI	-0.179	0.015	0.009	0.859	0
HADS-A	-	-	-0.242	<0.001	0.074
HADS-D	-	-	-0.593	<0.001	0.306
Adjusted R ²	0.089		0.589		

WBT= Mental Health Continuum – Short Form well-being total score, HADS= Hospital Anxiety and Depression Scale, HADS-A= HADS Anxiety subscale, HADS-D= HADS Depression subscale, HbA1c= glycated hemoglobin, BMI= Body Mass Index
Standardized estimates (betas) are presented
Age, marital status, education level, type 2 diabetes mellitus duration, type of medication, and comorbid hyperlipidemia and hypertension were included as additional independent variables in backward stepwise regression Model 1

Table 4. Investigation of the direct, indirect (with the mediation of HADS-A and HADS-D) and total effect of HbA1c and BMI on WBT (N=175).

	Direct effect (D)		Indirect effect (I)		I/T	Total effect (T)	
	SE	p	SE	p		SE	p
HbA1c → (HADS-A) → WBT			-0.036	0.161	0.14		
HbA1c → (HADS-D) → WBT	-0.020	0.715	-0.192	0.001	0.77	-0.249	0.003
HbA1c → (HADS-A + HADS-D) → WBT			-0.228	0.001	0.91		
BMI → (HADS-A) → WBT			-0.037	0.055	0.21		
BMI → (HADS-D) → WBT	0.009	0.863	-0.151	<0.001	0.84	-0.179	0.011
BMI → (HADS-A + HADS-D) → WBT			-0.188	<0.001	1.05		

WBT= Mental Health Continuum – Short Form well-being total score, HADS= Hospital Anxiety and Depression Scale, HADS-A= HADS Anxiety subscale, HADS-D= HADS Depression subscale, BMI= Body Mass Index, HbA1c= glycated hemoglobin
Standardised estimates (SE) are presented

significantly predicted SWB when included in the model (Model 2c). In summary, HADS-D was the strongest predictor of WBT and its dimensions. Among well-being dimensions, EWB was most strongly predicted by HADS-D ($\omega^2=0.408$), followed by PWB ($\omega^2=0.164$) and SWB ($\omega^2=0.101$) (Suppl. tables 1–3).

Mediation analyses (Structural Equation Models)

For the investigation of the potential mediatory effects of anxiety and depression in the pathways from HbA1c and BMI to well-being, we proceeded to build Structural Equation Models (SEMs). As a first step, HADS-A and HADS-D were regressed on HbA1c and

BMI. HADS-D was significantly predicted (adj. $R^2=0.170$) by both HbA1c ($\beta=0.324$, $p<0.001$) and BMI ($\beta=0.255$, $p<0.001$); HADS-A was less strongly predicted (adj. $R^2=0.037$) by HbA1c ($\beta=0.150$, $p=0.046$) and BMI ($\beta=0.152$, $p=0.042$), as well (figure 1). Then, we calculated the direct, indirect - via HADS-A and HADS-D - and total effects of HbA1c and BMI on WBT. Results showed that the effects of both HbA1c and BMI on WBT were completely mediated by HADS-D, since their indirect effects were statistically significant ($p=0.001$ and $p<0.001$, respectively), while their direct effects were not ($p=0.715$ and $p=0.863$, respectively). Their indirect effects via HADS-A were not significant ($p=0.161$ and $p=0.055$, respectively) (table 4, figure 1). A similar pattern was found for EWB and PWB, as well. Specifically, the effects of both HbA1c and BMI on EWB or PWB were completely mediated by HADS-D but not by HADS-A (Suppl. tables 4 and 5). Investigation of HADS mediatory effects was not performed for SWB since the total effects of HbA1c and BMI on SWB were non-significant (Model 1c, Suppl. table 3).

Discussion

The MIDUS study, the first study investigating the relationship between hedonic and eudemonic well-being with metabolic syndrome in an adult population, found that several dimensions of well-being predicted a lower risk of metabolic syndrome.²² Moreover, positive affect has been linked with lower mortality rates in patients with T2DM, especially those over 65 years old.²³ Multiple guidelines of international diabetes associations refer to psychological well-being and quality of life as important factors in the effective management of blood glucose levels.²⁴ Therefore, the study of well-being and its predictors in patients with T2DM is highly important.

To the best of our knowledge, our study is the first to evaluate the well-being of patients with T2DM using

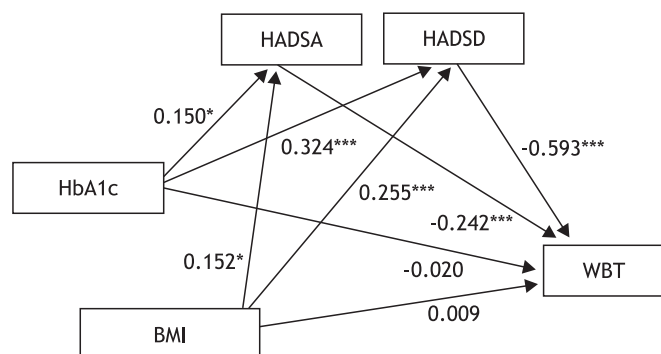


Figure 1. Structural Equation Model for the investigation of the mediatory effects of HADS-A and HADS-D in the relationship between HbA1c and BMI with WBT.

the MHC-SF questionnaire. This tool has been used in the past for assessing well-being mainly in non-clinical samples but also in patients with mental disorders, such as schizophrenia, mood and personality disorders,^{18,25,26} and physical illnesses, such as chronic subdural hematoma, psoriasis, and chronic pain.²⁷⁻²⁹ In our sample, the sizes and intercorrelations of MHC-SF dimensions were very similar to other non-clinical samples, including the Greek MHC-SF validation sample.¹⁸

Our results showed that glycemic control (HbA1c) and BMI are predictors of the well-being and affective (especially depressive) symptoms of patients with T2DM. Our findings on HbA1c agree with previous studies using different well-being questionnaires. Specifically, a Greek study found a negative correlation between HbA1c and well-being, as measured by the WHO-5.³⁰ In the BENCH-2 study, a higher HbA1c was correlated with a lower WHO-5 score and higher levels of depression.³¹ Moreover, difficulty in effective blood glucose level regulation was associated with diabetes-related distress and more depressive and anxiety symptoms.^{24,32}

On the other hand, findings in the literature are conflicting regarding the effect of obesity on well-being and their relationship has not been examined thoroughly in DM. Studies have shown that overweight people have lower levels of PWB,^{33,34} while adolescents and adults with high BMI have lower levels of life satisfaction, a dimension of EWB.^{35,36} However, other studies have not found a statistically significant correlation between well-being and BMI.^{37,38} Obese patients with T2DM often have more depressive symptoms and lower levels of quality of life.^{39,40}

To the best of our knowledge, previous studies recording well-being and self-reported depression in samples of patients with T2DM have either not reported previous psychiatric diagnoses or included subjects of mixed status. Diagnosed depression and other mental illnesses were exclusion criteria in our study but mental illness was determined by patients' medical history and the use of psychiatric medication. Therefore, we used a self-report questionnaire, such as the HADS, in order to evaluate the prevalence of undiagnosed anxiety and depression symptoms. Our study recorded high rates of undiagnosed affective (especially depressive) symptoms in a nominally 'mentally healthy' sample of patients with T2DM, in line with previous findings.⁷

Depressive symptoms are twice more common in patients with diabetes than in the general population.^{41,42} A study in Greek patients with T2DM found 33.4% more depressive symptoms than in the general population.⁴³ Depression has been correlated with

compromised well-being, lower quality of life, lower diabetes self-care and glycemic control, and higher risk of complications and mortality.^{44,45} In line with our findings, a study investigating the complex relationship between well-being, anxiety, and depression in patients with T2DM using HADS and WHO-5, showed that high levels of anxiety and depression negatively correlated with PWB.¹² Undiagnosed depression was a crucial predictor of total well-being in our supposedly 'mentally healthy' sample, much stronger than undiagnosed anxiety and other usual suspects (HbA1c, BMI). Among well-being dimensions, EWB was most strongly predicted by HADS-D, as expected, followed by PWB and SWB. Therefore, a major implication of our study is that, in patients with T2DM, MHC-SF might serve as an efficient surrogate marker of undiagnosed depression and subthreshold depressive symptoms.

Finally, path analyses showed that the effects of HbA1c and BMI on well-being were completely mediated by undiagnosed depressive symptoms. Undiagnosed depression was strongly predicted by HbA1c and BMI and, in turn, strongly predicted well-being. Therefore, undiagnosed depression fully explains the effects of HbA1c and BMI on well-being. Depression has repeatedly been shown to mediate the effect of physical symptoms, such as pain or fatigue, on quality of life or well-being outcomes in various diseases, such as fibromyalgia or multiple sclerosis.^{46,47} Of note, undiagnosed anxiety symptoms had no significant mediatory effect in our study since they were less strongly associated with HbA1c, BMI, and well-being, and possibly because they were endorsed by a smaller proportion of the sample than depressive symptoms.

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Concerning limitations, we did not perform formal diagnostic procedures with standard clinician-administered tools but only recorded depressive and anxiety symptoms with the HADS self-report questionnaire, which should not be used as a substitute for a validated diagnostic interview.⁴⁸ Finally, our cross-sectional study was not designed to investigate causal effects between variables. Future research (e.g., longitudinal studies) should focus on finding causal relationships and other potential predictors of well-being in patients with T2DM.

Concludingly, this is the first study using MHC-SF to measure well-being and investigate its predictors in patients with T2DM. We found that glycemic control (HbA1c) and BMI negatively correlated with well-being. Our study highlighted the problem of undiagnosed depression in this patient group; when taken into consideration, it was identified as the strongest predictor of well-being, suggesting that MHC-SF might serve as an efficient surrogate marker of undiagnosed or subthreshold depression. HbA1c and BMI were also associated with undiagnosed depressive symptoms, which fully explained the effect of HbA1c and BMI on well-being. Therefore, healthcare providers treating patients with T2DM should be vigilant for screening symptoms of depression. Finally, the interplay of glycemic control and positive mental health warrants further investigation in longitudinal studies.

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Ερευνητική εργασία

Διερεύνηση προβλεπτικών παραγόντων της ευεξίας σε ασθενείς με σακχαρώδη διαβήτη τύπου 2: Ο ρόλος της αδιάγνωστης κατάθλιψης

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ΠΕΡΙΛΗΨΗ

Ο σακχαρώδης διαβήτης τύπου 2 (ΣΔΤ2) αποτελεί μία συχνή μεταβολική νόσο με ποικίλες δυσμενείς σωματικές και ψυχολογικές επιπτώσεις. Η ευεξία των ασθενών με ΣΔΤ2 συχνά υποβαθμίζεται. Σκοπός της παρούσας μελέτης ήταν η αναζήτηση κλινικοδημογραφικών προβλεπτικών παραγόντων της ευεξίας ασθενών με ΣΔΤ2 χωρίς γνωστό ψυχιατρικό ιστορικό και η διερεύνηση του διαμεσολαβητικού ρόλου τυχόν αδιάγνωστου άγχους και κατάθλιψης. Συμμετείχαν 175 εξωτερικοί ασθενείς με ΣΔΤ2 (54.3% άνδρες, ηλικίας 34-79 (μέση τιμή 59.9) έτη) που παρακολουθούνταν στο Διαβητολογικό Κέντρο του Γενικού Νοσοκομείου της Νίκαιας-Πειραιά. Οι ασθενείς που συμπεριλήφθηκαν στη μελέτη δεν είχαν σοβαρές επιπλοκές οφειλόμενες στον ΣΔΤ2 ούτε γνωστό ψυχιατρικό ιστορικό. Η ευεξία των ασθενών αποτυπώθηκε με το εργαλείο Mental Health Continuum Short-Form (MHC-SF), ένα ερωτηματολόγιο 14 λημμάτων, το οποίο μετρά τόσο τη συνολική ευεξία, όσο και την κοινωνική, ψυχολογική και συναισθηματική διάστασή της. Η Hospital Anxiety and Depression Scale (HADS) χρησιμοποιήθηκε για την μέτρηση αδιάγνωστης αγχώδους (HADS-A) και καταθλιπτικής συμπτωματολογίας (HADS-D). Τα δημογραφικά χαρακτηριστικά των ασθενών, ο Δείκτης Μάζας Σώματος (ΔΜΣ), η γλυκοζυλιωμένη αιμοσφαιρίνη (HbA1c), η διάρκεια της νόσου, η παρουσία συννοσηρής υπέρτασης ή δυσλιπιδαιμίας, καθώς και ο τύπος της αντιδιαβητικής αγωγής διερευνήθηκαν ως προβλεπτικοί παράγοντες της συνολικής ευεξίας και των επιμέρους διαστάσεων της σε πολλαπλές γραμμικές παλινδρομήσεις με ή χωρίς την ταυτόχρονη επίδραση των HADS-A και HADS-D. Οι διαμεσολαβητικές επιδράσεις του άγχους και της κατάθλιψης διερευνήθηκαν μέσω μοντέλων δομικών εξισώσεων. Τα αποτελέσματα έδειξαν ότι το 21.1% των συμμετεχόντων παρουσίαζε συννοσηρή κατάθλιψη (HADS-D \geq 11) και το 5.1% συννοσηρή αγχώδη διαταραχή (HADS-A \geq 11). Στα μοντέλα παλινδρόμησης χωρίς την HADS, υψηλότερη βαθμολογία της συνολικής, συναισθηματικής και ψυχολογικής ευεξίας προέβλεπαν στατιστικώς σημαντικά η χαμηλή HbA1c ($p=0.001$) και ο χαμηλός ΔΜΣ ($p=0.015$, 0.019 and 0.030 , αντίστοιχα). Όταν προστέθηκαν στα μοντέλα, η HADS-A και η HADS-D προέβλεπαν στατιστικώς σημαντικά τη συνολική ευεξία, καθώς και κάθε διάστασή της, αλλά η HbA1c και ο ΔΜΣ έπαυσαν να είναι στατιστικώς σημαντικοί παράγοντες. Στα μοντέλα δομικών εξισώσεων, η έμμεση επίδραση της HbA1c και του ΔΜΣ στην ευεξία μέσω της HADS-D ήταν στατιστικώς σημαντική, ενώ η άμεση και η έμμεση επίδραση μέσω της HADS-A δεν ήταν. Επομένως, η επίδραση της HbA1c και του ΔΜΣ στη συναισθηματική, την ψυχολογική και τη συνολική ευεξία διαμεσολαβείται πλήρως από την HADS-D. Συμπερασματικά, η μελέτη μας είναι η πρώτη που χρησιμοποιεί το MHC-SF για την αξιολόγηση της ευεξίας των ασθενών με ΣΔΤ2. Παρατηρήθηκαν υψηλά επίπεδα αδιάγνωστης κατάθλιψης, η οποία εξηγεί πλήρως την επίδραση της HbA1c και του ΔΜΣ στην ευεξία. Κρίνεται σκόπιμη η περαιτέρω διερεύνηση της αλληλεπίδρασης του γλυκαιμικού ελέγχου και της θετικής ψυχικής υγείας.

ΛΕΞΕΙΣ ΕΥΡΕΤΗΡΙΟΥ: Άγχος, ευεξία, γλυκοζυλιωμένη αιμοσφαιρίνη, γλυκαιμική ρύθμιση, δείκτης μάζας σώματος, κατάθλιψη, MHC-SF, σακχαρώδης διαβήτης τύπου 2.

Research article

Dimensionality and psychometric properties of the Greek version of the Type 1 Diabetes Stigma Assessment Scale (DSAS-1-Gr)

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ABSTRACT

Type 1 Diabetes Mellitus (T1D) is one of the most common chronic diseases affecting children and adolescents. The daily management of T1D requires continuous insulin therapy, as well as the inevitable adjustment of daily activities according to glycaemic control, both of which may result in experiencing T1D-related stigma. A significant proportion of people with T1D have been shown to experience social discrimination and stigma, which can lead to emotional distress and act as a barrier to help-seeking behavior. This study presents the psychometric properties of the Greek translation of the Diabetes Stigma Assessment Scale-1 (DSAS-1), which assesses self-perceived stigma in people with T1D. A sample of 105 adults with T1D, mostly females (70.5%), with a mean age of 34.3 years (± 11.1), and mean disease duration of 19.4 years (± 10.5), completed the translated in Greek DSAS-1 (DSAS-1-Gr). Exploratory and confirmatory factor analyses were used to investigate the construct validity of the scale. In line with the original version, the results of the present study supported the three-factor model of the scale 'identity concerns', 'different treatment', 'blame and judgment'. The internal consistency indices (Cronbach alpha) of the three subscales were above $\alpha = .80$ and $.88$ for the whole scale. Moderate correlations were found between the DSAS-1-Gr and the Diabetes Distress scale for type 1 Diabetes (T1-DDS), the Rosenberg self-esteem scale, and the DASS-21 subscales (depression, anxiety, and stress), which is indicative of convergent validity. DSAS-1-Gr correlated negatively with the diabetes duration (in years), which was indicative of discriminant validity. Finally, females presented higher total DSAS-1-Gr scores than males. DSAS-1-Gr is a valid and reliable tool to be used in clinical practice to assess stigma in Greek people with T1D.

KEYWORDS: Type 1 diabetes mellitus, stigma, validity, reliability, factor analysis.

Introduction

The incidence of diabetes mellitus (DM) has rapidly increased in recent decades, with the global prevalence rate estimated to be about 10.5%.¹ Type 1 diabetes mellitus (T1D) is a chronic disease with increasing rates, which accounts for 5% to 10% of the total DM

incidence.^{2,3} The main cause of T1D is the autoimmune destruction of β -pancreatic cells.² Exogenous insulin administration is the only treatment for T1D patients.⁴ Lifelong glycaemic control is one of the main goals in the management of T1D in order to avoid diabetic ketoacidosis and to prevent future macrovascular and

microvascular complications of the disease, which can lead to disability or even premature death.⁵ The social and psychological burden on people with T1D is significant, regardless of the type of DM (type 1 or 2) and the method of therapy used, whether it is multiple daily injections (MDI) or continuous subcutaneous insulin injection (CSII).⁶⁻⁹

Social discrimination is an aspect of the broad and complex construct of stigma experienced by 14% to 28% of the T1D patients.¹⁰ Weiss and Ramakrishna¹¹ suggested that health-related stigma can be understood as an “a social process characterized by exclusion, rejection, blame, or devaluation, which involves a person or group identified with a particular health problem, resulting in an experience of an adverse social judgment”. Studies have revealed that T1D patients reported perceiving and experiencing aspects of stigma, such as feelings of being judged negatively when they fail to fully control their glycaemic levels, as well as diabetes-related discrimination.^{10,12} The discriminatory social judgment related to the disease or designated health problem is a form of stigma that results from adverse social judgments (such as race, ethnicity, and sexual preferences), which may also affect the health of the affected person.¹³ Discrimination and chronic stress have been suggested to influence health outcomes and self-management of chronic diseases.¹⁴ Perceived discrimination may define the behavioral management of the disease by leading to particular health behaviors that can lead to unhealthy behaviors, such as failure to seek preventative services like hemoglobin A1c testing.¹⁵ Stigma has been studied in relation to epilepsy, weight, mental illness, and other health conditions.^{16,17}

To date, there is no instrument in Greek to measure diabetes-related stigma among people with type 1 diabetes. Thus, the aim of this study is to translate and examine the dimensionality and the psychometric properties of the DSAS-1 in Greek (hereafter referred to as DSAS-1-Gr).

Material and Method

Participants

Participants were recruited from the Diabetes Center of the “AHEPA” General University Hospital of Thessaloniki in Greece. One hundred and five adults with T1D mellitus, aged 34.3 (± 11.1) years, mostly females (70.5%), with a mean diabetes duration of 19.4 (± 10.5) years, completed the survey. Exclusion criteria were 17 years or younger and non-Greek-speaking type 1 diabetes mellitus patients. A subsample of 15 participants was interviewed for the cognitive debriefing procedure and re-tested four weeks later to assess the

test-retest reliability of the scale. The detailed socio-demographic characteristics of the whole sample and subsample can be seen in table 1.

Measures

The *Type 1 Diabetes Stigma Assessment Scale (DSAS-1)* is a 19-item self-report scale of T1D patients' perceptions and experiences of T1D stigma. DSAS-1 is scored using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). It has three subscales: “treated differently” (six items), “blame and judgment” (six items), and ‘identity concerns’ (seven items). The total score ranges from 19 to 95, with higher scores indicating more perceived and/or experienced diabetes stigma.^{18,19} In this study, Cronbach alpha coefficient for the unidimensional structure of DSAS-1-Gr was $\alpha_{\text{total score}}=0.88$, and for the subscales were $\alpha_{\text{identity concerns}}=0.89$, $\alpha_{\text{treated differently}}=0.84$, and $\alpha_{\text{blame and judgment}}=0.8$.

The *Diabetes Distress Scale for type 1 Diabetes (T1-DDS)* is a 28-item self-report questionnaire used to identify the specific sources of diabetes-related distress for adults with T1D.^{20,21} The T1-DDS is scored using a 6-point Likert scale ranging from 1 (not a problem) to 6 (a very significant problem). The Greek version includes 23 items and is both reliable and valid.²⁰ In this study, the Cronbach alpha coefficient of the T1-DDS was $\alpha=0.95$.

The *Rosenberg Self-Esteem Scale (RSES)* is a 10-item self-report, one-dimensional questionnaire that measures both positive and negative feelings about self. RSES is scored using a 4-point Likert scale ranging from 1 (strongly agree) to 4 (strongly disagree). The negative statements (2, 5, 6, 8, 9) are reverse scored. Higher scores indicate higher self-esteem.²² The Greek translation is both reliable and valid.²³ In this study, the RSES Cronbach alpha coefficient was $\alpha=0.80$.

The *Depression Anxiety Stress Scale (DASS-21)* is a 21-item self-report scale that assesses depression, anxiety, and stress. It is scored on a 4-point Likert scale ranging from 0 (did not apply to me at all) to 3 (applied to me very much, or most of the time) and each scale contains seven items. Higher scores indicate a higher frequency of symptoms.²⁴ The Greek translation is both reliable and valid.²⁵ In this study, Cronbach alpha coefficients were: $\alpha_{\text{depression}}=0.81$; $\alpha_{\text{anxiety}}=0.77$; $\alpha_{\text{stress}}=0.89$.

Procedure

The DSAS-1 was translated into Greek using the translation guidance by Mapi Research Trust (2018), which necessitated the following four steps: forward translation by two bilingual persons, backward translation, cognitive interview, and proofreading. Permission to access and use DSAS-1 is granted by Mapi Research Trust <https://>

Table 1. Demographic characteristics of the participants.

Characteristics	Total sample (n=105) Mean±SD/N (%)	Re-test sample (n=15) Mean±SD/N (%)
Age (years)	34.3±11.1	33.3±9.5
Diabetes duration (years)	19.4±10.5	17±9.8
Gender		
Male	31 (29.5)	3 (20)
Female	74 (70.5)	12 (80)
Educational Level		
Primary and secondary	26 (24.8)	7 (46.7)
University	79 (75.2)	8 (53.3)
Family status		
Unmarried	50 (47.6)	10 (66.7)
Married	33 (31.4)	4 (26.7)
Divorced	5 (4.8)	0 (0)
Other	17 (16.2)	1 (6.7)
Treatment: insulin pump	44 (41.9)	9 (60)
Employment	74 (70.5)	10 (66.5)
Paid work (employed)		
Unemployed	17 (16.20)	4 (26.7)
Retired	3 (2.9)	0 (0)
Other	11 (10.5)	1 (6.7)
Income status		
Low	16 (15.2)	0 (0)
Average	71 (67.6)	13 (86.7)
High	18 (17.1)	2 (13.3)
Psychosocial characteristics		
T1-DDS (Total score)	76.5±29.3	N/A
RSES	29.4±4.3	N/A
DASS-21		
Depression	4.4±4.6	N/A
Anxiety	4.3±4.2	N/A
Stress	6.7±4.6	N/A

Note: T1-DDS: Diabetes Distress Scale for Type 1 Diabetes (23-138); RSES: Rosenberg Self-Esteem Scale (10-40); DASS-21(0-21): Depression Anxiety and Stress Scale; N/A: Not Applicable

eprovide.mapi-trust.org. Initially, two bilingual persons (Greek and English) carried out two independent forward translations. Then, a native English-speaking psychologist proceeded with the backward translation. Cognitive debriefing was assessed through interviews with 15 adult patients with T1D. Participants first completed the translated DSAS-1-Gr and were then interviewed to assess the clarity and comprehensiveness of the scale instructions and items. The cultural adaptation process was reviewed by all authors. Face validity was carried out by two experts, a psychologist and a psychiatrist, who, based on their expertise, were asked to examine the degree to which the items of the DSAS-1-Gr reflected the construct of stigma in relation to T1D mellitus. The study has

been approved by the Ethics Committee of the Aristotle University of Thessaloniki with reference number: 5.585 12/04/2022 and has been carried out in accordance with the Declaration of Helsinki.

Statistical analysis

For assessing the content validity of the DSAS-1-Gr, the translated version was sent to a panel consisting of three independent experts (specialized physicians in diabetes mellitus), who were asked to evaluate each item of the DSAS-1-Gr for content equivalence on a three-response Likert scale (1=necessary, 2=useful but not necessary, and 3=unnecessary). A total content validity index (CVI) was calculated by dividing the total number

of items ranked as 1 (necessary) by the total number of items. A forced three-factor exploratory factor analysis (EFA) with principal axis factoring and varimax rotation was conducted to investigate the construct validity of the 19-item DSAS-1-Gr. The adequacy of the sample was assessed with the Kaiser-Meyer-Olkin test (KMO) and Bartlett's test of sphericity.²⁶ A confirmatory factor analysis (CFA) with maximum likelihood was carried out to determine whether the three-dimensional or the unidimensional model proposed by EFA provided a good fit. Model fit was assessed with the chi-square (χ^2), the root mean square error of approximation (RMSEA), the standardized root mean square residual (SRMSR), the Tucker-Lewis Index (TLI), and the comparative fit index (CFI).²⁷ Test-retest reliability was assessed with the intraclass correlation coefficient (ICC) 2-way mixed-effects model for measurements. In addition, the internal consistency of the unidimensional structure of DSAS-1-Gr and its subscales was assessed with Cronbach's alpha coefficient, composite reliabilities, and average variance extracted (AVE) reliability of the final CFA model. The construct validity was examined by calculating the two-tailed Spearman's correlation coefficient among the DSAS-1-Gr and its three subscales with T1-DDS, DASS-21 and its subscales (depression, anxiety, and stress), RSES, and years of diabetes duration. Medium-to-large correlations ($r_s > \pm 0.4$) were taken as evidence for convergent validity, and small correlations ($r_s < \pm 0.3$) were taken as evidence of discriminant validity, according to Cohen's guidelines.²⁸ Finally, a t-test for independent samples was used to assess differential validity (known groups method) between genders.²⁹⁻³¹ The significance level was set at $p < 0.05$. All analyses were conducted using SPSS statistical software version 26 (SPSS Inc., Chicago, IL, USA). The confirmatory factor analysis (CFA) was carried out using AMOS version 20 and the parallel analysis was carried out using Monte Carlo PCA for Parallel Analysis.

Results

Translation, face validity, cognitive debriefing, and cultural adaptation

During the translation process, jargon was replaced, a few discrepancies were resolved, and a consensus was reached between the three translators. Based on their knowledge of theory and practice, experts who conducted face validity found that the items of DSAS-1-Gr reflected the construct of stigma in relation to T1D. All participants who were interviewed during the cognitive debriefing phase replied that the scale was readily understandable.

Descriptive statistics and gender differences

The mean scores for the total DSAS-1-Gr scale and its subscales "identity concerns", "treated differently", and 'blame and judgment' were 44.9 (SD=12.5), 12.7 (SD=5.9), 16.2 (SD=5.8) and 15.9 (SD=4.5) respectively. Gender differences were found, with females scoring significantly higher than males in the DASS-21 anxiety subscale ($M=4.8$, $SD=4.4$ vs. $M=3.1$, $SD=3.3$; $U=864$, $z=-2.0$ $p=0.045$, $r=-0.19$) and in the unidimensional DSAS-1-Gr scale ($M=47$, $SD=11.7$ vs. $M=39.8$ $SD=13.3$; $t(103)=-2.7$, $p=0.007$, $d=0.57$), whereas males scored significantly higher than females in the RSES ($M=31.1$ $SD=4$ vs. $M=28.7$ $SD=4.3$; $t(103)=2.6$, $p=0.01$, $d=0.78$).

Content validity

An agreement of 84% was found among the panel of experts, which is an acceptable index.³² Items No.8 and No.17 were unanimously assessed as 'useful but not necessary'.

Structural validity

Exploratory Factor Analysis (EFA)

A cut-off of ≥ 0.40 to identify meaningful factor loadings resulted in the deletion of item No.16 due to low factor loading (< 0.4). The forced three-factor solution of the remaining 18-item DSAS-1-Gr was confirmed by the parallel analysis results. KMO coefficient was equal to 0.836 and the Bartlett χ^2 value was 992.6 ($p < 0.001$). The final communality estimates after rotation were high for all items, except item No.1 (< 0.30). The proportion of the total variance explained was 60.1%. Finally, the rotated component pattern demonstrated a cross-loading of item No.4 in both 'Treated differently' and 'Blame and judgment' factors. A forced one-factor, unidimensional solution, was also conducted and all factor loadings were ≥ 0.40 . Both the unidimensional and three-dimensional structures of DSAS-1-Gr are presented in table 2. The 18 items were allocated in three factors, similar to those of the original version of DSAS-1: "identity concerns" (2,5,7,10,13,18); 'treated differently' (3,4,6,8,12,15,19) and 'blame and judgment' (1,9,11,14,17).

Confirmatory Factor Analysis (CFA)

Both the three-dimensional and unidimensional models were examined with CFA to assess which one provided the better fit. After the improvements suggested by modification indices, the three-dimensional model provided a better fit ($\chi^2=144.8$ (121), $p=0.06$, CMIN/DF=1.197, RMSEA=0.043, SRMR=0.0744, TLI=0.967 and CFI=0.974). Despite the improvements by modification indices, the unidimensional structure did not

Table 2. Factor analysis and internal consistency reliability of the 18-item DSAS-1-Gr.

Item wording (item No.)	Three-factor solution ^a						Diabetes stigma (unidimensional) ^b	
	Identity concerns		Treated differently		Blame and judgment		EFA	CFA
	EFA	CFA	EFA	CFA	EFA	CFA		
I feel embarrassed when I have to manage my type 1 diabetes in public (e.g., check blood glucose, inject/bolus insulin, refuse food, eat extra food) (10)	0.85	0.9					0.69	0.77
I worry about what people will think if they see me injecting/bolus insulin or checking my blood glucose in public (13)	0.85	0.86					0.61	0.44
I feel self-conscious about all the tools I need to manage my type 1 diabetes (e.g., insulin pen, pump, blood glucose meter) (7)	0.82	0.8					0.6	0.75
I feel worried about telling people I have type 1 diabetes in case they react negatively (18)	0.80	0.74					0.63	0.78
To avoid negative reactions, I don't tell people I have type 1 diabetes (2)	0.79	0.70					0.55	0.68
I feel embarrassed about what people might think if I need help with a hypo (5)	0.65	0.67					0.57	0.63
Some people think I'm unreliable because I have type 1 diabetes (15)			0.72	0.67			0.61	0.49
Some people see me as a lesser person because I have type 1 diabetes (3)			0.72	0.81			0.69	0.68
I have been discriminated against in the workplace because I have type 1 diabetes (6)			0.71	0.67			0.51	0.63
I have been rejected by others (e.g., friends, colleagues, romantic partners) because of my type 1 diabetes (12)			0.70	0.57			0.59	0.23
Some people expect less of me because I have type 1 diabetes (19)			0.69	0.65			0.62	0.52
Because I have type 1 diabetes, I have been excluded by others from certain social events (8)			0.62	0.5			0.49	0.38
Some people think I'm irresponsible when my diabetes management isn't 'perfect' (4) †			0.61	0.68	0.47	N/A	0.4	0.42
Some people assume that it is my fault I have type 1 diabetes (e.g., I ate too much sugar, I could have prevented it) (9)					0.88	0.85	0.6	0.48
Some people think I need insulin because I haven't looked after myself (11)					0.78	0.73	0.59	0.39
Some people think that I brought type 1 diabetes on myself (17)					0.77	0.89	0.63	0.78
Because I have type 1 diabetes, some people judge me if I eat sugary food or drinks (e.g., cakes, lollies, soft drink) (14)					0.54	0.49	0.57	0.49
Some people make unfair assumptions about what I can and cannot do because of my type 1 diabetes (1)					0.46	0.42	0.45	0.37
Score range	6–30		7–35		5–25		18–90	
Mean±sd	12.7±5.9		16.2±5.8		15.9±4.5		44.9±12.5	
Eigenvalue	6.35		2.8		1.6		N/A	
% variance explained	35.3		15.5		9.2			
Composite reliability (CFA)	0.9		0.84		0.82		0.87	
AVE (CFA)	0.61		0.43		0.50		0.3	
Cronbach's alpha	0.89		0.84		0.80		0.88	

Note: ^a Forced three-factor solution with principal components analysis and varimax rotation, loadings less or equal to 0.40 are not shown, variables are sorted by highest loading; ^b Forced one-factor solution with principal components analysis; † not included in the scoring of the "Blame and judgment" subscale; N/A: Not Applicable; AVE: Average Variance Extracted.

provide an adequate fit ($\chi^2=125.2$ (84), $p=0.002$, CMIN/DF=1.491, RMSEA=0.069, SRMSR=0.0972, TLI=0.917 and CFI=0.955).

Test-retest reliability

ICC was 0.923 ($p<0.001$), which indicates excellent reliability³³ for the DSAS-1-Gr.

Internal consistency, split-half, and composite reliability

Cronbach's alpha coefficient of the 18-item DSAS-1-Gr was 0.88 (whereas for the 19-item DSAS-1 was 0.89) and for its subscales "identity concerns", "treated differently", and "blame and judgment", 0.89, 0.84, and 0.80 respectively. The Guttman Split-half coefficient was 0.90. Composite reliabilities and AVEs of the final CFA model were low for the total score (0.3) and the 'treated differently' subscale (0.43). Internal consistency reliabilities are presented in table 2.

Construct validity

The unidimensional DSAS-1-Gr showed moderately positive correlations with the three subscales of DASS (i.e., depression, anxiety, stress) and the T1-DDS total score, while it moderately negatively correlated with the Rosenberg Self-Esteem Scale. Finally, it negatively correlated, though low, with the years of diabetes duration. The correlations are presented in table 3.

Discussion

This study reports the translation, cultural adaptation, and psychometric validation of the DSAS-1¹⁸ in the Greek language (i.e., DSAS-1-Gr). Furthermore, this is the first study that investigates the stigma among people with type 1 diabetes mellitus in Greece. The DSAS-

1-Gr was rigorously validated, and the 18-item scale with three subscales was proved to be an acceptable, reliable, and valid tool for the assessment of stigma among people with T1D in Greece. Consistent with the English and Danish versions, the overall score can also be used.^{18,19}

Consistent with the original release and the Danish validation,^{18,19} EFA supported the three-factor structure of the DSAS-1-Gr scale, which was also confirmed by the parallel analysis. The three factors included the same items as the English and Danish versions and were named similarly "identity concerns", "treated differently", and "blame and judgment". The subscale "identity concerns" (with six items) describes identity threats, such as worries about being erroneously considered an illicit drug user when injecting insulin, and feelings of embarrassment about what others might think if one has a hypoglycaemic episode in public.¹⁸ The "treated differently" subscale (with seven items) includes items relative to stigma and discrimination experienced in the workplace, social exclusion, and social/romantic rejection. The 'blame and judgment' subscale (with five items) includes items about perceived inabilities, irresponsible diabetes self-management, and judgments about eating too much sugar.¹⁸ However, item No.16 ("If I were to inject insulin in public, people would think I was taking drugs") was excluded, due to the strict cut-off scores of the loadings enacted. Excluding No.16 did not significantly decrease Cronbach's alpha coefficient of the unidimensional scale (it only decreased by 0.01 points), whereas it slightly increased Cronbach's alpha coefficient of the best-fitting subscale "identity concerns" (i.e., 0.01 point). Furthermore, EFA results suggested that item No.4 fitted better on the "treated different" subscale than "blame and judgment", where it was included in both versions.^{18,19} CFA supported the

Table 3. Correlations of the DSAS-1-Gr and its subscales with validity measures.

	Identity concerns	Treated differently	Blame and judgment	DSAS-1-Gr unidimensional
DASS-21				
Depression	0.31**	0.30*	0.39**	0.41**
Anxiety	0.39**	0.33**	0.40**	0.46**
Stress	0.37**	0.37**	0.48**	0.51**
Total distress (T1-DDS)	0.35**	0.29**	0.28**	0.42**
RSES	-0.38**	-0.38**	-0.30**	-0.43**
Diabetes duration (years)	-0.21*	-0.10	-0.34**	-0.29**

Note: DASS: Depression Anxiety and Stress Scale; T1-DDS: Diabetes Distress Scale for Type 1 Diabetes; RSES: Rosenberg Self-Esteem Scale. * $p<0.05$, ** $p<0.01$

three-factor model with adequate fit indices, whereas the single-factor model (i.e., the unidimensional scale) was not confirmed. The findings of poor single-factor model indices align with those of both the original release of the DSAS-1¹⁸ and the Danish validation.¹⁹ We agree with the authors of these studies that stigma is a complex and multifaceted construct, which is best represented by three latent factors, rather than a single one.^{18,19} Poor indices of the single-factor model were also found in the validation of the ISMI questionnaire, which measures the subjective experience of stigma related to mental illness.¹⁷

The moderately positive correlations with DASS-21 and T1-DDS were indicative of the convergent validity of DSAS-1-Gr. Stigmatization has been found to be strongly and consistently associated with negative psychological conditions, and it has been suggested that DM stigma is likely to have pervasive emotional, social, and cognitive impacts.^{8,34} Also, as expected,^{18,19} small negative correlations were found with the years of diabetes duration, which was evidence of the discriminant validity. In addition, the internal consistency of the scale was satisfactory, ranging from 0.80 to 0.89, and is in line with that of the original DSAS-1¹⁸ and the Danish version of it.¹⁹ Furthermore, the DSAS-1-Gr showed differential validity as overall females scored significantly higher than males. Similar results have shown that women experience higher stigma related to obesity^{35,36} and psoriasis³⁷ than men. Women also had higher scores on depression and anxiety than men.^{38,39} Since studies have found depression and anxiety to be associated with stigmatization,⁴⁰⁻⁴² and perceptions of diabetes are associated with more guilt, shame, embarrassment, and isolation,⁴³ it can be assumed that females' high scores on DSAS-1-Gr, depression, and anxiety are intercorrelated. Further research is needed to identify any potential gender-related or biosocial risk factors. Finally, the 18-item unidimensional structure of the DSAS-1-Gr presented a slightly higher mean score than the Danish validation (M=43.33),¹⁹ both of which are lower than the one (M=53) found in the original version,¹⁸ suggesting potential cultural differences.

The findings of the present study suggest that the DSAS-1-Gr is a valid and reliable measure for assessing

stigma among people with type 1 diabetes mellitus. Key strengths of the present study are the rigorous validation process, the longitudinal design that allowed test-retest reliability, and the use of validated psychometric instruments that allowed the examination of convergent and discriminant validity. There are, however, several limitations that need to be acknowledged, such as the relatively small sample size comprising patients of relatively young age with advantageous backgrounds (e.g., high educational level), and the fact that more women with T1D than men responded to the survey.

The consequences of stigma among people with T1D span many domains such as the emotional, behavioral, and social, leading to unhealthy behaviors and contributing to poorer diabetes control and management. The validated DSAS-1-Gr is an important assessment tool for monitoring and research in T1D, which can be used to improve people-centered health care and reduce negative self-care. A practitioner can promptly identify elevated scores and seek additional support for T1D people who need it. In addition, it can be used to improve diabetes-related outcomes among more vulnerable subgroups that are more likely to perceive or experience diabetes-related stigma.

Conclusion

In conclusion, this study resulted in the linguistic translation and rigorous psychometric validation of the DSAS-1 for use in Greek. Psychometric validation of the DSAS-1-Gr indicated that both the 18-item unidimensional structure and three-factor construct ("treated differently", "blame and judgment" and "identity concern") was valid, had high internal consistency reliability, and satisfactory convergent and discriminant validity. Whereas the single-factor model showed poor fit indices, it can be timidly used for research purposes. Overall, the DSAS-1-Gr meets the psychometric requirements of a valid and reliable self-report measure of type 1 diabetes mellitus stigma in Greece.

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Ερευνητική εργασία

Διαστάσεις και ψυχομετρικές ιδιότητες της ελληνικής έκδοσης της Κλίμακας Αξιολόγησης Στίγματος στον Διαβήτη τύπου 1 (DSAS-1-Gr)

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ΠΕΡΙΛΗΨΗ

Ο Σακχαρώδης Διαβήτης τύπου 1 (ΣΔ1) είναι μία από τις πιο συχνές χρόνιες παθήσεις που επηρεάζουν τα παιδιά και τους έφηβους. Η καθημερινή διαχείριση του ΣΔ1 απαιτεί συνεχή ινσουλινοθεραπεία, καθώς και την αναπόφευκτη προσαρμογή των καθημερινών δραστηριοτήτων των πασχόντων σύμφωνα με τον γλυκαιμικό έλεγχο, τα οποία πιθανόν επιδρούν στο στίγμα που σχετίζεται με τον ΣΔ1. Ένα μεγάλο ποσοστό ατόμων με ΣΔ1 έχει αποδειχθεί ότι βιώνουν αίσθημα κοινωνικής διάκρισης και στίγματος, τα οποία μπορεί να οδηγήσουν σε συναισθηματική δυσφορία και να λειτουργήσουν ως εμπόδιο στην αναζήτηση βοήθειας. Σε αυτή την εργασία παρουσιάζονται οι βασικές ψυχομετρικές ιδιότητες της ελληνικής μετάφρασης του ερωτηματολογίου Diabetes Stigma Assessment Scale-1 (DSAS-1), το οποίο αξιολογεί το αυτοαντιλαμβανόμενο στίγμα σε άτομα που πάσχουν από ΣΔ1. Ένα δείγμα 105 ενηλίκων με διαβήτη τύπου 1, ηλικίας 34.3 έτη ($\pm 11,1$), κυρίως γυναίκες (70,5%), με μέση διάρκεια νόσου τα 19.4 έτη ($\pm 10,5$), συμπλήρωσαν το μεταφρασμένο στα ελληνικά DSAS-1 (DSAS-1-Gr). Για τη διερεύνηση της εγκυρότητας εννοιολογικής κατασκευής της κλίμακας, χρησιμοποιήθηκαν η διερευνητική παραγοντική ανάλυση και η επιβεβαιωτική παραγοντική ανάλυση. Η επιβεβαιωτική παραγοντική ανάλυση υποστήριξε το μοντέλο των τριών παραγόντων, αντίστοιχα με την πρωτότυπη έκδοση στα αγγλικά: «ανησυχίες ταυτότητας», «διαφορετική αντιμετώπιση», «μομφή και κριτική». Οι δείκτες εσωτερικής συνοχής (Cronbach alpha) ήταν πάνω από $\alpha=0.80$ και για τις τρεις υποκλίμακες, ενώ η μονοδιάστατη δομή της κλίμακας είχε δείκτη εσωτερικής συνοχής $\alpha=0.88$. Η κλίμακα DSAS-1-Gr παρουσίασε συγκλίνουσα εγκυρότητα με το Diabetes Distress scale for type 1 Diabetes (T1-DDS), το ερωτηματολόγιο Rosenberg Self-Esteem scale, καθώς και με τις υποκλίμακες κατάθλιψη, άγχος και στρες του ερωτηματολογίου DASS-21. Η αποκλίνουσα εγκυρότητα αξιολογήθηκε και επιβεβαιώθηκε με τα χρόνια νόσησης από το ΣΔ1. Τέλος, οι γυναίκες παρουσίασαν υψηλότερη συνολική βαθμολογία στην DSAS-1-Gr σε σχέση με τους άνδρες. Το ερωτηματολόγιο DSAS-1-Gr είναι ένα έγκυρο και αξιόπιστο εργαλείο που μπορεί να χρησιμοποιηθεί στην κλινική πρακτική για την αξιολόγηση του στίγματος σε άτομα με ΣΔ1 στην ελληνική γλώσσα

ΛΕΞΕΙΣ ΕΥΡΕΤΗΡΙΟΥ: Σακχαρώδης διαβήτης τύπου 1, στίγμα, εγκυρότητα, αξιοπιστία, παραγοντική ανάλυση.

Research article

The impact of meteorological factors on involuntary admission in Attica, Greece

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ABSTRACT

Few studies in the literature have examined the effect of meteorological factors, especially temperature, on psychiatric hospitalization and even less on their association with involuntary admission. This study aimed to investigate the potential association of meteorological factors with involuntary psychiatric hospitalization in the region of Attica, Greece. The research was conducted at the Psychiatric Hospital of Attica “Dafni”. This was a retrospective time series study of 8 consecutive years of data (2010 to 2017) and included 6887 involuntarily hospitalized patients. Data on daily meteorological parameters were provided by the National Observatory of Athens. Statistical analysis was based on Poisson or negative binomial regression models with adjusted standard errors. Analyses were initially based on univariable models for each meteorological factor separately. All meteorological factors were taken into account through factor analysis and then, through cluster analysis, an objective grouping of days with similar weather types was performed. The resulting types of days were examined for their effect on the daily number of involuntary hospitalizations. Increases in maximum temperature, average wind speed, and minimum atmospheric pressure values were associated with an increase in the average number of involuntary hospitalizations per day. An increase of the maximum temperature above 23°C at lag 6 days before admission did not affect significantly the frequency of involuntary hospitalizations. Low temperature and average relative humidity above 60% levels had a protective effect. The predominant day type at lag 1 to 5 days before admission showed the strongest correlation with the daily number of involuntary hospitalizations. The cold season day type, with lower temperatures and a small diurnal temperature range, northerly winds of moderate speed, high atmospheric pressure, and almost no precipitation, was associated with the lowest frequency of involuntary hospitalizations, whereas the warm season day type, with low daily temperature and small daily temperature range during the warm season, high values of relative humidity and daily precipitation, moderate wind speed/gust and atmospheric pressure, was associated with the highest. As climate change increases the frequency of extreme weather events, it is necessary to develop a different organizational and administrative culture of mental health services.

KEYWORDS: Meteorological factors, weather variables, mental health, mental illness, psychiatric admissions, involuntary admissions.

Introduction

Hippocrates in his treatise "About Wind, Water and Places", mentions that whoever would study medicine right must learn of two important subjects. One of these is the warm and the cold winds, both of which are common to every country and peculiar to a particular locality.¹ More recently, the terms "meteoropathy" and "meteorosensitivity" are being increasingly used: meteoropathic people develop a specific disorder (group of symptoms and pathological reactions) or display worsening symptoms of an existing disease, resulting from the impact of climatic factors in a certain area; meteorosensitive persons are "biologically susceptible to feel the effect of particular atmospherical events on mind and body".²

The health impacts of weather exposure, particularly of temperature and humidity, have been of interest for centuries. There is a positive association between specific meteorological factors and calls to emergency services,³ emergency department visits,^{4,5} and hospital admission outcomes.^{6,7}

As regards the association between particular climatic factors and mental health, studies have demonstrated significant positive correlations with outpatients' visits for general psychiatric and psycho-consultation services,⁸ evaluations in the psychiatric emergency department,^{9,10} and psychiatric hospital admissions.^{11,12}

Mental health involuntary admissions in Greece are regulated by Law 2071/1992. The person is examined by two psychiatrists who are on call in a Psychiatric Emergency Department, in order to undergo a psychiatric evaluation. One of the following requirements must be met before a patient can be involuntarily admitted: i. the individual must suffer from a mental disorder, unable to judge what is best for his/her health whereas lack of hospitalization will deprive him/her of the treatment needed for his/her condition, or ii. the hospitalization of a patient suffering from a mental disorder is necessary in order to prevent acts of violence against himself or others.¹³ If at least one of these conditions is met, psychiatrists complete the medical report which is then sent by the police to the public prosecutor's office, where the order for involuntary admission is issued.

In this study, we aimed to investigate the influences of weather exposures on involuntary mental health admissions in Attica, Greece, using administrative data of the Psychiatric Hospital of Attica "Dafni" and to enlighten which meteorological parameters, individually or in combination, seem to be involved in exacerbating the psychopathology of involuntarily admitted patients.

Material and Method

Study area

The study was conducted in the Psychiatric Hospital "Dafni" in Attica region, Greece. Attica is located in the southern mainland of Greece, between 37°39' N and 38°20' N and between 23°07' E and 24°05' E. Generally, the climate of the area is characterized by long dry and short wet periods.¹⁴ Psychiatric Hospital of Attica "Dafni" is the largest psychiatric hospital in Greece, receiving annually the largest number of involuntary hospitalization¹⁵ from all over the country, as hospital's services are not sectorized.¹⁶

Procedure

The research proposal of the study was formally approved by the Hospital Board and the Ethics Committee of the Hospital. Patient demographic data and diagnoses were retrieved from the hospital's electronic registry. Data were anonymised before being included in the study's database and any member who took part in this procedure had no access to individuals' personal data.

Research design

This is a retrospective study of 8 years' (2922 days) time series data (from January 1st 2010 to December 31st 2017) on the daily numbers of involuntarily hospitalized patients. Data points correspond to days the hospital was on duty (882 days).

Meteorological data

Values of daily meteorological parameters were provided by eight meteorological stations of the National Observatory of Athens (NOA)¹⁷ and included temperature (°C), precipitation (mm), relative humidity (%), dew point (°C), atmospheric pressure (hPa), chill and heat index (°C),¹⁸ along with wind speed (Km/hr), wind gust (Km/hr) and dominant wind direction (N, S, E, W).

Meteorological data at the regional unit of residence level and during the day of hospitalization were available for 5578 (81.1%) cases whereas for the remaining 1299 (18.9%) cases, meteorological data were available only from other regional units (at least three) of the Peripheral Unit of Attica. In general, meteorological data for every day of the study period were available from meteorological stations in the regional units of East Attica (Lavrio), North Athens (Psychiko), and Central Athens (Athens). For the remaining regional units of West Attica (Aspropyrgos), West Athens (Ano Liosia), South Athens (Nea Smyrni), Islands of Attica (Spetses) and Piraeus (Korydallos), daily meteorological data were available from 1/1/2015, 18/6/2011, 21/2/2012,

12/6/2012 and 18/12/2014, respectively, until the end of the study period (31/12/2017).

Participants

During the study period, 6877 participants, residents of the Region of Attica, were examined and involuntarily hospitalized in the Psychiatric Hospital of Attica "Dafni" with a mental disorder diagnosis. Patients aged less than 18 years old and those with insufficient information on their residence (e.g. homeless, unknown of residence, migrants, and refugees) were excluded from the study (n=3302). Discharge diagnosis was assigned by the psychiatrist responsible for the care of the patient, using the ICD-10 criteria. The ICD10 codes of the diagnoses included in the study were: F00–F09, F10, F11–F19, F20–F29, F30–F39, F40–F48, F50–F59, F60–F69, F70–F79, F80–F89, G90–G99.

Statistical analysis

Categorical variables are summarized through their absolute (N) and relative (%) frequencies while for continuous ones mean and standard deviations (SD) are used unless their distribution deviates from normality in which case medians and interquartile ranges (IQR) are used.

Associations between the daily number of hospitalizations and meteorological parameters were investigated using Poisson regression or negative binomial regression (in case of significant overdispersion) models. In all cases, robust standard errors were used to adjust them for potential violations of models' assumptions.

Initial univariable analyses were performed using grouped data at the day and regional unit of residence level thus the logarithm of the total population of each regional unit (based on the 2011 National Census) was used as an offset term. Nonlinear effects of meteorological parameters were allowed in these models through the use of natural cubic splines with 3 knots but for some crude assessment of the strength of the associations, linear versions of the same models were also fitted. Delayed effects of meteorological parameters on the incidence of involuntary hospitalizations were also investigated by using lagged values of these parameters or averages over consecutive lagged values. Each meteorological parameter is entered as the current day value, lagged value (best lag model shown), or the average of lagged values (± 1 , ± 2 , or ± 3 days around best lag value; shown only if better than best lag model). Optimal lag values were chosen based on the Akaike Information Criterion (AIC). AIC is an estimator of the relative quality of comparable statistical models and is often used for model selection. That is, the model with

the lowest AIC value is considered as having the optimal trade-off between goodness of fit and complexity.

Grouping all days of the study period into a small number of different types with similar weather conditions included the following steps: (a) averaging meteorological parameters' values across all meteorological stations (b) performing a factor analysis to construct orthogonal factors and reducing the number of parameters for the analysis (c) choosing the optimal number of clusters and (d) performing a cluster analysis to assign each study day to a specific day type. Steps b, c, and d above were performed separately for the cold (16/10 to 15/4, 1458 days) and warm (16/4 to 15/10, 1464 days) periods of the year.

Factor analysis was based on the method of principal components and a varimax orthogonal rotation, after verifying the suitability of the data for such an analysis using Bartlett's test for sphericity and Kaiser-Meyer-Olkin Measure of Sampling Adequacy.¹⁹ The minimum eigenvalue used to choose the number of factors was set to 0.75 instead of the typical value of 1 to maximize the percentage of explained variation (i.e., achieve values >90%). The choice of the optimal number of clusters was based on the results from three different methods: (a) the "Jump" method,²⁰ (b) the "Slopes" method,²¹ and (c) the "Gaps" method.²² Cluster analysis was based on the "Kmeans" method which maximizes the Euclidean distance between clusters.²³

P-values less than 0.05 were considered as indicating statistical significance. All analyses were performed using Stata version 14 and R version 4.2.1.

Results

Characteristics of study participants are summarized overall and by the availability of meteorological data at the regional unit of residence level in table 1.

As shown in Supplementary table 1, the lowest (i.e., better) AIC values were found for mean wind speed and atmospheric pressure and the highest % relative changes for relative humidity and temperature. Assuming linear effects, associations of the daily number of involuntary hospitalizations with temperature and atmospheric pressure were positive while those with relative humidity and wind speed were negative.

Results from selected univariable models using cubic splines for some selected meteorological parameters' effects are shown in figure 1 for exploratory and illustrative purposes. The choice of the models included for presentation in figure 1 is based on the optimal AIC value within each set of temperature, relative humidity, atmospheric pressure, and wind speed-related parameters (see Supplementary table 1). As shown in figure 1a,

Table 1. Demographic and clinical characteristics of study participants by the availability of regional unit of residence-specific meteorological data.

Variable	Unavailable n=1299 (18.89%)	Available n=5578 (81.11%)	Overall N=6877 (100%)	p
Sex				0.018
– Male	828 (63.74%)	3357 (60.18%)	4185 (60.86%)	
– Female	471 (36.26%)	2221 (39.82%)	2692 (39.14%)	
Age (years) - Median (IQR*)	43.8 (34.4, 53.8)	45.6 (35.6, 55.8)	45.3 (35.4, 55.3)	<0.001
Diagnosis (ICD10)				0.130
– F00-F09	45 (3.46%)	264 (4.73%)	309 (4.49%)	
– F10	46 (3.54%)	147 (2.64%)	193 (2.81%)	
– F11-F19	88 (6.77%)	345 (6.19%)	433 (6.30%)	
– F20-F29	834 (64.20%)	3537 (63.41%)	4371 (63.56%)	
– F30-F39	224 (17.24%)	935 (16.76%)	1159 (16.85%)	
– F40-F48	2 (0.15%)	11 (0.20%)	13 (0.19%)	
– F50-F59	0 (0.00%)	4 (0.07%)	4 (0.06%)	
– F60-F69	23 (1.77%)	127 (2.28%)	150 (2.18%)	
– F70-F79	25 (1.92%)	101 (1.81%)	126 (1.83%)	
– F80-F89	1 (0.08%)	16 (0.29%)	17 (0.25%)	
– G90-G99	2 (0.15%)	14 (0.25%)	16 (0.23%)	
– Other	9 (0.69%)	77 (1.38%)	86 (1.25%)	
Regional unit of residence				<0.001
– East Attica	0 (0.00%)	619 (11.10%)	619 (9.00%)	
– North Athens	0 (0.00%)	691 (12.39%)	691 (10.05%)	
– West Attica	179 (13.78%)	145 (2.60%)	324 (4.71%)	
– West Athens	222 (17.09%)	902 (16.17%)	1124 (16.34%)	
– Central Athens	0 (0.00%)	2045 (36.66%)	2045 (29.74%)	
– South Athens	208 (16.01%)	682 (12.23%)	890 (12.94%)	
– Islands	58 (4.46%)	101 (1.81%)	159 (2.31%)	
– Piraeus	632 (48.65%)	393 (7.05%)	1025 (14.90%)	

*Interquartile range

an increase in the maximum temperature from 0 °C to 23 °C is associated with a clear increase in the average number of involuntary hospitalizations per day whereas a further increase in the maximum temperature does not seem to affect the frequency of involuntary hospitalizations significantly. Mean relative humidity (figure 1b) seems to have a protective effect but only for values over 60%. Minimum atmospheric pressure (figure 1c) seems to have an inverted U-shaped association with the frequency of involuntary hospitalizations, with the highest values corresponding to the 1010 to 1020 hPa range. Finally, increases in mean wind speed (figure 1d) from 0 to approximately 7 km/h seem to increase the frequency of involuntary hospitalizations but further increases seem to be associated with a strong protective effect. It is also noteworthy that the best fitting models

were found for lagged values of the examined meteorological parameters ranging from 2 days before the hospitalization day (for mean relative humidity) to 12–14 days before the hospitalization day (for minimum atmospheric pressure).

In any case, the aforementioned univariable associations should be interpreted with caution as meteorological parameters are more or less correlated with each other. Meteorological data are summarized separately for the cold and hot periods of the year in table 2. Details of the distribution of meteorological parameters by day type are given in Supplementary table 2. Figure 2, summarizes the main meteorological characteristics of each day type in the cold and hot periods of the year.

Using the type of day as a predictor for the daily number of involuntary hospitalizations we found that the

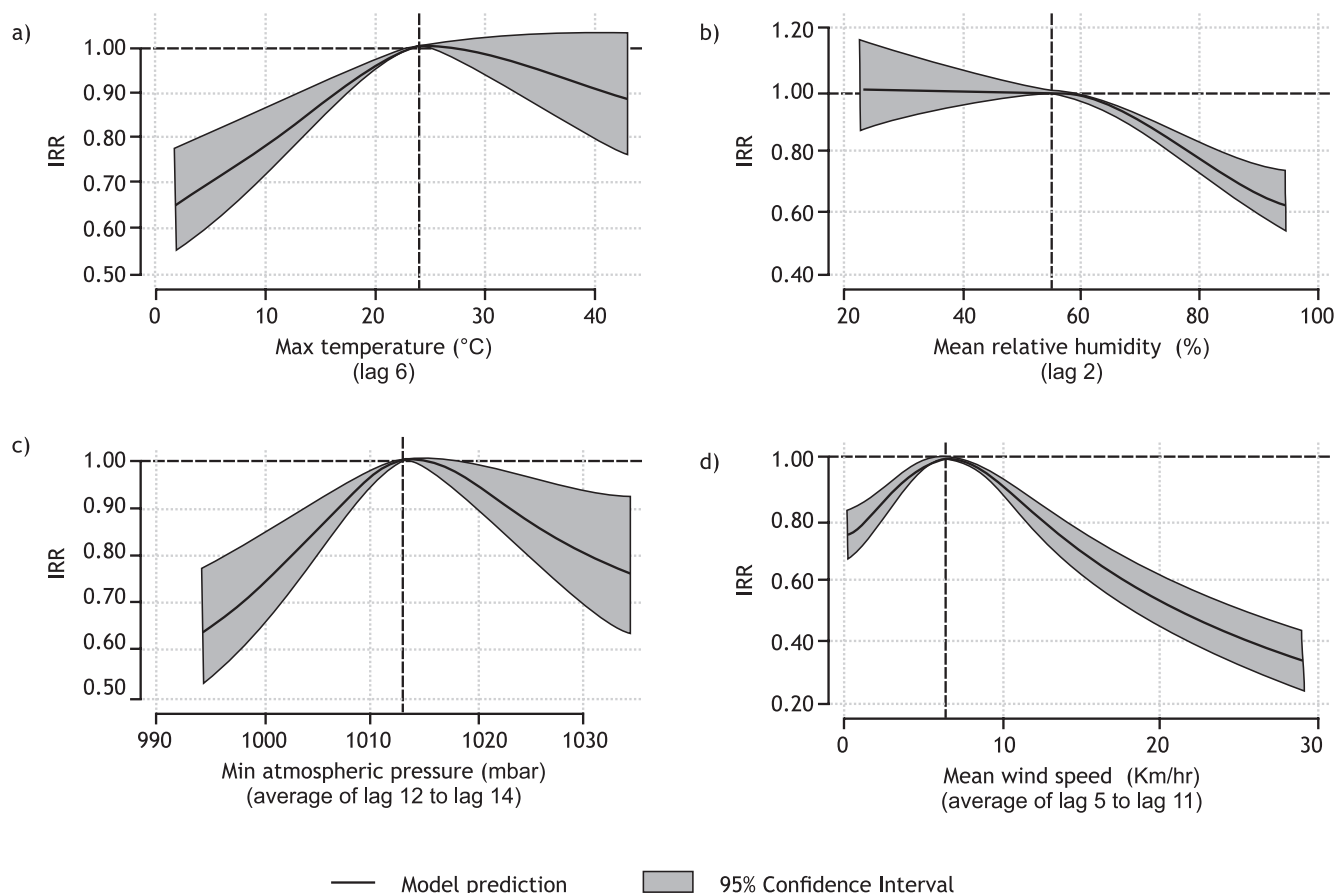


Figure 1. Estimated (95% CI) Incidence Rate Ratios (IRR) for involuntary hospitalizations by (a) max temperature, (b) mean relative humidity, (c) min atmospheric pressure, and (d) mean wind speed. Reference values for IRR are denoted with a vertical dashed line (temperature 23 °C, relative humidity 55%, atmospheric pressure 1013 hPa, mean wind speed 6.5 km/h). Estimates based on univariable Poisson models. Results are shown for lagged values or the average of lagged values associated with optimal AIC values.

most prevalent day type during the previous 5 days was associated with the best AIC values. Modeling results suggested the presence of significant overdispersion thus a negative binomial regression model was preferred instead of a Poisson one. Results of this model (Supplementary table 3) revealed that day type C2, in the cold period, was associated with the lowest frequency of involuntary hospitalizations. C2 is characterized by the lowest temperatures with a low range between minimum and maximum, northern winds of moderate intensity, high atmospheric pressure, and almost no rainfall. In the cold period, day types C4, C5, and C6 were associated with statistically significantly more involuntary hospitalizations (estimated relative increases, compared to day type C2, 19% to 21%). In the warm period, day types H2 to H6 were all associated with an increased frequency of involuntary hospitalizations compared to day type C2 (estimated relative increases of 19% to 39%).

The day type associated with the highest frequency of involuntary hospitalizations was H5 (Incidence Rate

Ratio vs. C2: 1.39; 95% CI 1.17-1.66; $p < 0.001$). It is noteworthy that the H5 day type had the 2nd lowest average daily mean temperature (21.2 °C) during the warm period but also the lowest range between minimum and maximum daily temperatures (average 5.8 °C). At the same time, H5 is associated with the highest values of relative humidity and daily rainfall and moderate wind speed/gust and atmospheric pressure.

Estimated IRRs with the corresponding 95% CIs from the final negative binomial regression model are shown graphically in figure 3.

Discussion

This study has used an eight-year dataset of 6877 involuntary admitted patients, in order to explore the association with climatic factors in Attica, Greece.

Our results from univariable analyses indicated that an increase in the maximum temperature from 0 °C to 23 °C was associated with a clear increase in the average number of involuntary hospitalizations. Findings from a survey in Italy showed that temperature (maximum and medi-

Table 2. Distribution of meteorological parameters by cold and warm periods of year.

Variable	Cold	Warm
	n=433 (49.09%)	n=449 (50.91%)
Average temperature (°C)	13.4 (3.0, 25.2)	24.7 (13.1, 34.0)
Maximum temperature (°C)	16.4 (4.5, 28.0)	28.5 (14.4, 40.8)
Minimum temperature (°C)	10.4 (0.2, 23.1)	21.1 (9.4, 29.6)
Average heat index (°C)	29.0 (28.4, 29.5)	29.2 (27.1, 33.5)
Maximum heat index (°C)	29.6 (28.9, 30.4)	30.6 (27.1, 39.0)
Minimum heat index (°C)	28.2 (28.0, 28.5)	28.0 (27.1, 29.7)
Average wind chill factor (°C)	7.1 (0.2, 9.6)	8.1 (8.1, 8.1)
Maximum wind chill factor (°C)	8.1 (2.1, 9.7)	8.1 (8.1, 8.1)
Minimum wind chill factor (°C)	6.3 (-3.0, 9.6)	8.1 (8.1, 8.1)
Average relative humidity (%)	70.4 (36.9, 89.5)	55.0 (30.2, 88.6)
Maximum relative humidity (%)	82.1 (50.1, 93.7)	69.3 (40.0, 93.9)
Minimum relative humidity (%)	57.2 (26.6, 80.9)	41.3 (19.0, 85.4)
Average dew point (°C)	7.8 (-5.0, 19.5)	14.4 (2.3, 21.7)
Maximum dew point (°C)	9.8 (0.0, 21.2)	16.7 (4.9, 23.8)
Minimum dew point (°C)	5.7 (-8.0, 17.0)	11.9 (-2.5, 19.2)
Average atmospheric pressure (hPa)	1017 (992, 1033)	1012 (993, 1026)
Maximum atmospheric pressure (hPa)	1019 (1002, 1036)	1013 (1003, 1027)
Minimum atmospheric pressure (hPa)	1014 (985, 1032)	1011 (984, 1024)
Daily rainfall (mm)	2.2 (0.0, 68.1)	0.4 (0.0, 20.5)
Average wind speed (km/h)	6.5 (0.4, 19.0)	6.8 (1.6, 16.6)
Maximum Wind Gust (km/h)	13.1 (1.8, 28.0)	13.7 (5.8, 29.8)
Dominant wind direction		
- N	1 (0.23%)	3 (0.67%)
- NNE	32 (7.39%)	38 (8.46%)
- NE	6 (1.39%)	4 (0.89%)
- ENE	24 (5.54%)	20 (4.45%)
- E	36 (8.31%)	35 (7.80%)
- ESE	38 (8.78%)	42 (9.35%)
- SE	50 (11.55%)	71 (15.81%)
- SSE	59 (13.63%)	79 (17.59%)
- S	61 (14.09%)	63 (14.03%)
- SSW	50 (11.55%)	43 (9.58%)
- SW	30 (6.93%)	20 (4.45%)
- WSW	22 (5.08%)	13 (2.90%)
- W	13 (3.00%)	15 (3.34%)
- WNW	11 (2.54%)	3 (0.67%)

*Cold period 16/10 to 15/4, Warm period 16/4 to 15/10, **All values are averaged over regional units. Data refer to days with at least one involuntary hospitalization. All figures are mean (min-max).

um) significantly correlated with involuntary admission.²⁴ Another study from Greece, mentioned that increasing major psychiatric diseases total admissions are associated with increasing temperature.²⁵ Researchers from Switzerland found that the hospitalization risk increased

linearly by 4.0% for every 10 °C increase in mean daily temperature.²⁶ Evidence from research in the USA showed that higher temperature (high, low, and average) was significantly correlated with the number of emergency psychiatric evaluations.²⁷

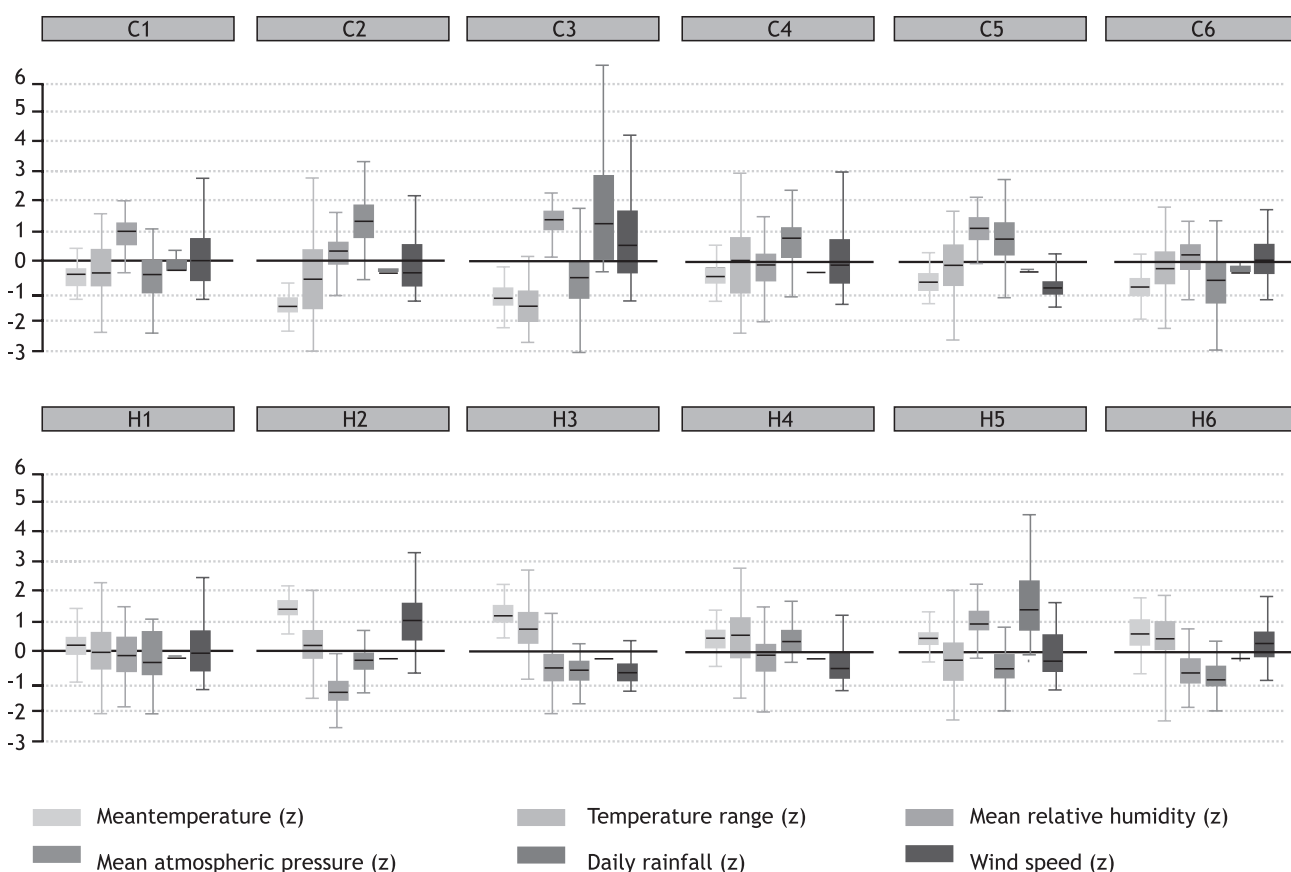


Figure 2. Distribution (box plots) of selected meteorological parameters by day type. All values are standardized (i.e., z-values: difference with mean divided by standard deviation). Day types C1 to C6 refer to the cold period (16/10 to 15/4) and H1 to H6 to the warm period (16/4 to 15/10).

Our study's statistical analyses showed mainly negative association of daily number of involuntary hospitalizations with relative humidity. On the opposite, research findings from Italy showed that the humidex index was significantly associated with involuntary admission,²⁴ while in a Brazilian study, relative humidity did not present any risk for total mental health admissions.²⁸

The study's evidence, that low temperatures might be a protective factor against involuntary admission, strengthens the results of previous studies from Berlin and Lisbon for total psychiatric evaluations⁹ and admissions.²⁹ On the contrary, research evidence from a study in Shanghai found no effect of cold weather on mental health hospital admissions.³⁰

Although our findings from the univariable analyses showed that further increase of the maximum temperature above 23 °C at lag 6 days before admission did not seem to significantly affect the frequency of involuntary hospitalizations, other studies from Portugal (27 °C, lag 0–1 and lag 0–2),²⁹ China (24.6 °C, lag 0–1),³⁰ and Hong Kong (28 °C, lag 0–2)³¹ indicated a significant positive

association between high daily temperature and total psychiatric hospitalizations.

The statistical analysis showed that the minimum atmospheric pressure (lag 12–14) and the mean wind speed from 0 to approximately 7 km/h (lag 5–11) increased the frequency of involuntary hospitalizations, whereas further increase in the wind speed appeared to have a strong protective effect. This evidence is quite similar to the results from a study in Germany, which indicated that low pressure and windiness predicted the number of emergency psychiatric evaluations for up to 7 days, although no protective effect of increased wind speed was reported.⁹

The predominant day type during the last five days before admission showed the strongest correlation with the daily number of involuntary hospitalization. The C2-day type of cold season, characterized by the lowest temperatures, was associated with the lowest frequency of involuntary hospitalizations. On the other hand, the H5 day type of warm season, characterized by relatively low average daily mean temperature and the lowest range between minimum and maximum

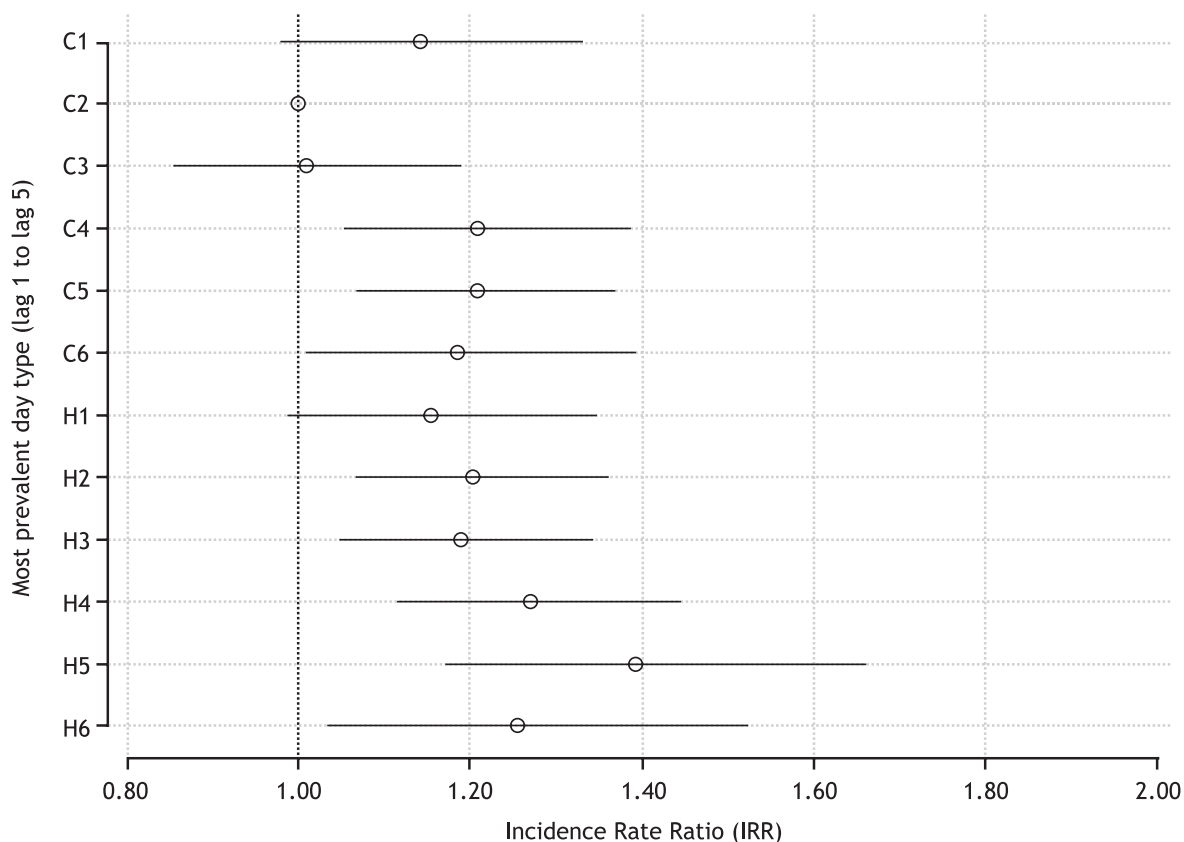


Figure 3. Results from a negative binomial regression model for the daily number of involuntary hospitalizations by type of day (most prevalent day type during the previous 5 days). Day types C1 to C6 refer to the cold period (16/10 to 15/4) and H1 to H6 to the warm period (16/4 to 15/10).

daily temperatures, was associated with the highest frequency of involuntary admissions. A study from Sweden underlined that temperature was associated with an increase in emergency psychiatric visits during the warm (14% at lag 0–3 and 22% for lags 0–14, statistically significant) and cold (25% and 18% at lags 0–14 and 0–21 respectively, not statistically significant) season.³²

Seasonal, biological, psychological, and social factors are implicated in the causation of mental health disorders.³³ Season may increase the risk of psychiatric patients' hospitalizations,³⁴ especially for manic^{35,36} and schizophrenia episodes.^{37,38} As our study coincided with the Greek financial crisis, available research worldwide indicated that consequences of economic crisis increased the risk of exposure to weather variations,⁶ caused a negative impact on mental health³⁹ and might be associated with higher rates of admissions in psychiatric hospitals.⁴⁰

As we mentioned above, one of the criteria for involuntary admission in Greece is dangerousness.¹³ Involuntarily admitted patients commonly present dangerous behav-

iors,⁴¹ meteorological factors are associated with an increase of acts of violence and emergency psychiatric visits⁴² and hospitalizations.⁴³ Therefore, dangerousness and acts of violence and their positive correlation with meteorological factors are likely to be an independent parameter that significantly influences the association of involuntary hospitalization with these factors.

Modern people live in closed and air-conditioned spaces, which reduces the body's self-regulation mechanisms and natural adaptation ability to respond to different environmental conditions and sudden weather changes.⁴⁴ Various climatic parameters could affect biological mechanisms, which are associated with the pathophysiology of mental health, such as dysfunction of synaptic neurotransmission,⁴⁵ elevations of extracellular serotonin in the hypothalamus,⁴⁶ changes of serotonin precursor L-tryptophan concentration in plasma⁴⁷ and platelet serotonin.²⁹

Recent studies reported that extreme temperature and precipitation had a significant effect on mental health hospitalization.^{48,49} As the increasing frequency of extreme events caused by global climate change has

made floods, droughts, and heat waves more likely,⁵⁰ we should pay more attention to the development of a different scientific, professional, and operational culture in the management of mental health services.

Strengths and limitations

The strengths of the present study include its longitudinal design, based on an eight-year retrospective time series study with a large number of involuntary admissions and meteorological parameters. To the best of our knowledge, the current study is one of the fewest worldwide investigating the relationship between meteorological factors and involuntary admissions.

One main limitation is the ecological fallacy due to the design of the study. We regarded all admissions as discrete episodes and a patient could potentially be counted more than once. All data obtained was for patients requiring involuntary hospitalization and the impact of meteorological factors may differ from those who are voluntarily admitted. Factors that could contribute to the onset of an acute psychiatric episode have not been taken into consideration.

Conclusions

The findings of this study underline that certain meteorological factors as well as specific types of weather affect the frequency of involuntary hospitalizations.

There are positive associations of the daily number of involuntary admissions with temperature and atmos-

pheric pressure and negative with relative humidity and wind speed are negative. Low temperatures might be a protective factor, while a further increase of the maximum temperature above 23 °C (at lag 6 days) does not affect significantly the frequency of involuntary hospitalizations. Minimum atmospheric pressure (at a lag of 12–14 days) and mean wind speed from 0 to 7 km/h (at a lag of 5–11 days) increase the frequency of involuntary hospitalizations, further increases of wind speed have a strong protective effect. The lowest frequency of involuntary hospitalizations was noticed on C2 day type (low temperatures and low range between minimum and maximum temperature, northern winds of moderate intensity, high atmospheric pressure, and almost no rainfall) of the cold season, whereas the highest frequency in H5 day type (lowest average and range of daily mean temperature during the warm season and the daily highest values of relative humidity, rainfall and moderate wind speed/gust and atmospheric pressure) of the warm season (both at lags 1 to 5 days).

Further studies should be carried out in the future, including diagnostic and sociodemographic characteristics, in order to clarify the impact of meteorological parameters on involuntary admitted patients and investigate the possible causative factors.

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Ερευνητική εργασία

Η επίδραση των μετεωρολογικών παραγόντων στην ακούσια νοσηλεία στην Αττική, Ελλάδα

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ΠΕΡΙΛΗΨΗ

Μελέτες έχουν δείξει τη συσχέτιση συγκεκριμένων μετεωρολογικών παραμέτρων με τη θνησιμότητα και τις σωματικές ασθένειες, λιγότερα στοιχεία υπάρχουν για την συσχέτισή τους με τις ψυχικές διαταραχές. Σκοπός της παρούσας μελέτης είναι να διερευνήσει πιθανή συσχέτιση των μετεωρολογικών παραγόντων με την ακούσια νοσηλεία. Η έρευνα διεξήχθη στο Ψυχιατρικό Νοσοκομείο Αττικής «Δαφνί». Πρόκειται για αναδρομική μελέτη χρονοσειράς δεδομένων 8 συναπτών ετών (2010 έως 2017) και περιλαμβάνει 6887 ακουσίως νοσηλευόμενα περιστατικά. Οι τιμές των ημερήσιων μετεωρολογικών παραμέτρων προέρχονται από το Εθνικό Αστεροσκοπείο Αθηνών. Η στατιστική ανάλυση βασίστηκε σε μοντέλα Poisson ή αρνητικής διωνυμικής παλινδρόμησης με διορθωμένα τυπικά σφάλματα. Οι αναλύσεις βασίστηκαν αρχικά σε μονοπαραγοντικά μοντέλα για κάθε μετεωρολογικό παράγοντα χωριστά. Όλοι οι μετεωρολογικοί παράγοντες ελήφθησαν υπόψη μέσω παραγοντικής ανάλυσης και μέσω ανάλυσης κατά συστάδες έγινε αντικειμενική ομαδοποίηση ημερών με παραπλήσιο τύπο καιρού. Οι τύποι ημερών που προέκυψαν εξετάστηκαν ως προς την επίδραση τους στον ημερήσιο αριθμό νοσηλειών. Αύξηση της μέγιστης θερμοκρασίας από τους 0 έως 23 °C, αυξήσεις της μέσης ταχύτητας ανέμου από 0 έως 7 Km/h και τιμές της ελάχιστης ατμοσφαιρικής πίεσης μεταξύ 1010-1020 hPa, συνδέονται με αύξηση του μέσου αριθμού νοσηλειών ανά ημέρα. Αύξηση της μέγιστης θερμοκρασίας πάνω από 23 °C, με βέλτιστη περίοδο υστέρησης εμφάνισης 6 ημέρες πριν την εισαγωγή, δεν επηρεάζει σημαντικά την συχνότητα των νοσηλειών. Η χαμηλή θερμοκρασία και η μέση σχετική υγρασία υψηλότερη από 60%, έχουν προστατευτική επίδραση. Ο επικρατέστερος τύπος ημέρας εμφάνισε την εντονότερη συσχέτιση επίδρασης με τον ημερήσιο αριθμό νοσηλειών, 1 έως 5 ημέρες πριν την νοσηλεία. Ο τύπος ημέρας της ψυχρής περιόδου, με χαμηλότερες θερμοκρασίες, μικρό ημερήσιο θερμοκρασιακό εύρος, βόρειους ανέμους μέτριας ταχύτητας, υψηλή ατμοσφαιρική πίεση και ελάχιστη βροχόπτωση, σχετίζεται με χαμηλότερη συχνότητα νοσηλειών, ενώ αντιθέτως ο τύπος ημέρας της θερμής περιόδου, με χαμηλή ημερήσια θερμοκρασία και μικρό ημερήσιο θερμοκρασιακό εύρος κατά την διάρκεια της θερμής περιόδου, υψηλές τιμές σχετικής υγρασίας και ημερήσιας βροχόπτωσης, μέτρια ταχύτητα/ριπή ανέμου και ατμοσφαιρικής πίεσης, σχετίζεται με υψηλότερη. Καθώς η κλιματική αλλαγή έχει αυξήσει την συχνότητα ακραίων μετεωρολογικών φαινομένων, είναι αναγκαία η ανάπτυξη διαφορετικής οργανωτικής και διοικητικής κουλτούρας των υπηρεσιών ψυχικής υγείας.

ΛΕΞΕΙΣ ΕΥΡΕΤΗΡΙΟΥ: Μετεωρολογικοί παράγοντες, καιρικές μεταβλητές, ψυχική υγεία, ψυχική ασθένεια, ψυχιατρικές εισαγωγές, ακούσιες νοσηλείες.

Research article

Early maladaptive schemas and symptoms of psychopathology in children in residential care

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ABSTRACT

According to schema theory, early maladaptive schemas (EMS) contribute to the onset and development of psychopathology. Given that research on EMS in children is limited, the contribution of the present study is that it investigates the role of EMS in psychopathology in children living in residential care. Participants of the present study were children who lived in residential care and were referred for assessment to the Day Center “The House of the Child” run by the Organization “The Smile of the Child”. The study sample comprised 75 children (35 boys, 40 girls), mean age of 12.7 years old. The Greek version of the Achenbach Child Behavior Checklist was completed by the child’s caregiver, whereas the Greek version of the Schema Questionnaire for Children was administered to children. The research questions were explored by implementing both variable-focused (multiple regression) as well as person-focused (cluster analysis) techniques. The Confirmatory Factor Analysis conducted in the Schema Questionnaire for Children showed acceptable goodness of fit indices. The Vulnerability schema was found to be the highest-scoring schema. Social isolation was a strong predictor for most indicators of psychopathology (internalizing and externalizing). A strong predictor for the Symptoms of Withdrawal, Anxiety/Depression, Social Problems, and Thought Problems was the EMS of Failure. Hierarchical cluster analysis on schemas revealed two strong clusters, one with low scores and one with high scores in most EMS. In the cluster with high levels of EMS, Emotional deprivation, Failure, Defectiveness, Social isolation, and Abandonment showed the highest scores. In this cluster, children presented statistically significant burdened indicators in externalizing psychopathology. Our hypotheses that EMS and, especially, schemas related to the domains of Disconnection/Rejection and Impaired Autonomy/Performance would be predictive indicators of psychopathology were confirmed. Cluster analysis confirmed the above findings and highlighted the role of schemas Emotional deprivation and Defectiveness in the emergence of psychopathology symptoms. The results of the current study highlight the importance of assessing EMS in children who live in residential care and could inform the development of appropriate intervention programs in this population to prevent the establishment of psychopathology.

KEYWORDS: Early maladaptive schemas, psychopathology, children, residential care.

Introduction

Early maladaptive schemas (EMS) have been found to be associated with the onset and maintenance of psychopathology,¹ including depressive and anxiety symptoms,² attachment issues,³ and personality disorders.⁴

EMS develops early in life as a result of the interaction between the child’s temperament and adverse early experiences with parents/caregivers. When parents or carers are sources of insecurity and fear throughout development, internalized dysfunctional patterns for self

and others are transferred to adulthood.⁵ According to research on children and infants living in residential care, 66%⁶ to 85%⁷ of the infants showed disorganized attachment to their caregivers with an average estimate of 72.8%,⁸ while 25% of children growing up in a non-institutional context displayed disorganized attachment style.⁶ Children with attachment difficulties, especially those with a disorganized bond, tend to demonstrate higher rates of psychopathology⁹ and significant difficulties in therapeutic interventions.¹⁰ The study of Ford et al¹¹ found that at least 60% of children in residential care have mental health problems and 72% of those have been diagnosed with a mental health disorder/condition. A recent Greek study conducted by Andreopoulou et al¹² showed that children in residential care had higher rates of clinical/borderline range symptoms in internalizing and externalizing problems than their counterparts rearing at home. Adults raised as children in institutional care tend to have more health problems, lower educational attainment, and more social problems compared to the rest of the adult population, etc.^{13–14}

At this point, we will elaborate on schema theory and present results of studies that have investigated schemas in children in various settings focusing on children who have had traumatic experiences. According to Malogiannis et al,¹⁵ schema theory integrated elements from attachment theory and developed the concept of schema, shifting from the organizational and information processing function of schema to a definition that emphasizes the developmental origin and the early onset of schemas.

Schema theory¹ suggests that internalized dysfunctional models developed as a result of exposure to childhood adversity are expected to adversely affect interpersonal relationships in later life through the emergence and establishment of Early Maladaptive Schemas (EMS). According to Young et al,¹ they are broad, pervasive patterns comprised of memories, emotions, sensations, and cognitions, concerning the self and relationships with others that are formed in childhood or adolescence and develop further throughout an individual's lifetime through new experiences.¹ Therefore, in addition to the family or the caregiver, other resources, such as peers and school, constitute important factors in the establishment and/or modification of schemas. As suggested by Reinecke et al,¹⁶ there is little empirical evidence available regarding the developmental/dynamic dimension of EMS.

As suggested by Young et al,¹ the domain of disconnection and rejection involves schemas related to violations of the basic universal needs for security,

safety, stability, nurturance, empathy, sharing of feelings, acceptance, and respect. Typical families of origin are unstable (Abandonment/Instability), abusive (Mistrust/Abuse), cold (Emotional Deprivation), rejecting (Defectiveness/Shame), or isolated from the outside world (Social Isolation/Alienation). The domain of Impaired Autonomy and Performance (Dependence/Incompetence, Vulnerability to Harm or Illness, Enmeshment/Undeveloped Self, Failure) is related to expectations about oneself and the environment that interfere with one's perceived ability to separate, survive, function independently, or perform successfully.

Research into the presence of schemas in children is limited.^{16–18} Regarding construct validity in children, a few studies found similar factor structure similar to that obtained in adults.^{19–20} Differences in EMS between non-clinical and clinical groups were found in a few studies.^{17,21} A few studies have investigated the relationship between early adverse experiences, EMS, and psychopathology in both clinical^{22–23} and community^{24–26} samples of children. Children who are victimized within their family develop patterns of Vulnerability to harm and Distrust/Abuse. Emotional abuse in children was related to higher scores on Vulnerability to harm, Defectiveness/Shame, and Social isolation/Alienation.¹ According to Calvete,²⁴ neglect is related to higher scores on EMS.

The current study is the first study, to our knowledge that attempts to investigate the relationship between EMS and psychopathology indicators in a sample of children and adolescents in residential care. We expect higher scores on Vulnerability to harm and distrust/abuse schemas. We also expect EMS to be predictive factors of Internalizing (Anxious/depressed, Withdrawn-depressed, and Somatic complaints) and Externalizing symptoms (Rule-breaking and Aggressive behavior). Higher-order EMS of Disconnection/Rejection and Impaired Autonomy and Performance will be predictive indicators of psychopathological symptoms specifically in this sample of children from residential care homes.

Materials and Method

Participants

Children and adolescents who were referred to the Day Center "The House of the Child" of the organization "The Smile of the Child" for diagnostic evaluation and/or treatment, participated in the study. The Day Center provides customized mental health services to children victims of abuse and neglect.²⁷ All participants lived in childcare facilities (Homes) of "the Smile of the Child". Seventy-five children participated, 35 of which (46.7%) were boys and 40 (53.3%) were girls. Their age ranged

from 8 to 18 years with an average age of 12.77 years ($SD = 2.49$). The questionnaires completed by both children and their caregivers were part of the diagnostic assessment process and were completed during the diagnostic evaluation phase.

Measurements

The Schema Questionnaire for Children (SQC), developed by Stallard and Rayner,²⁸ has been administered to community and clinical samples¹⁷ and aims to investigate and evaluate the EMS. The SQC, translated in the Greek language by Zafiropoulou et al,²⁹ assesses 15 early maladaptive schemas as proposed by Young. A single item is used to assess each schema. Children were asked to use a thought thermometer to rate, on a 1–10 scale, how strongly they agreed with each statement. In previous studies, the SQC showed acceptable face and convergent validity,^{17,28} and satisfactory index of internal consistency,²⁸ and in the present study, Cronbach's alpha was 0.8.

The Child Behavior Checklist is a screening questionnaire assessing emotional and behavioral problem areas as reported by the parent. The Greek version of the CBCL is a reliable and valid instrument for the assessment of psychological symptoms in youth.^{30–32} In our study, subscales of Cronbach's alpha presented acceptable internal consistency indices and the range was between 0.6–0.9. Each item is rated on a 0–1–2 scale for how truly/accurately is described by the child (0 = does not apply; 1=occasionally; 2=very true). For research purposes, as suggested by Van Vlierberghe and Braet,³³ we worked with raw scale scores.

Procedure

The data collection took place from January 2017 to December 2019. This is a retrospective study as it was conducted on already available data collected as part of routine diagnostic evaluation. Written informed consent was obtained by the person who had the legal custody of the minor at the point of the assessment process (before the minor was assessed). Recognizing the need for ethical clearance for such a retrospective analysis, the researchers were concerned with whether there was more than minimal risk for harm to the participants. No risk was identified and the authors/researchers obtained approval from the President of the "Smile of the Child" who has legal custody for all/ the majority of the participants. Moreover, researchers ensured that privacy and confidentiality were maintained at all times by using unlinkable anonymized data, storing the data in an anonymized or a de-identified database, and extracting them securely.

Results

Confirmatory Factor Analysis

A Confirmatory Factor Analysis was conducted in the Schema Questionnaire for Children to ensure the statistical appropriateness of the measurement model. The analysis showed acceptable goodness of fit indices in the determination of the underlying structure ($\chi^2=97.38$, $df=81$, $p=0.104$, $\chi^2/df=1.20$, $TLI=0.93$, $CFI=0.95$, $RMSEA=0.05$, $SRMR=0.08$. (see figure 1).

Descriptive statistics

Regarding EMS, the highest scores were observed in Vulnerability to harm, Unrelenting standards/Hypocriticalness and Dependence/Incompetence while the lowest scores were noted in Emotional deprivation and Failure (see table 1). More data about descriptive statistics and the number of items per indicator are presented in table 1.

Demographic factors, EMS and indices of psychopathology

Pearson r was used to estimate the correlations among age, EMS, and indices of psychopathology. Age was correlated (inversely) with Subjugation and with symptoms of withdrawal. Independent t -tests were used to estimate gender differences in EMS and symptoms of psychopathology. Males reported statistically significant higher scores on social problems, thought problems, attention problems, delinquent behavior, and aggressive behavior in comparison to females (see table 2).

Prediction of factors of psychopathology by EMS

A series of multiple regression analyses (using the stepwise method) were performed in order to investigate whether EMS predicts indices of psychopathology (see table 3). Anxious/Depressed symptoms were predicted by Social Isolation and Failure. Withdrawn symptoms were predicted by Failure, Dependence/Incompetence, and inversely by Abandonment and Subjugation. Somatic complaints symptoms were predicted by Social Isolation. Social problems symptoms were predicted by Failure. Thought problems were predicted by Entitlement, Failure, and Abandonment. Attention problems symptoms were predicted by Social Isolation and Entitlement. Delinquent behavior symptoms were predicted by Social Isolation and Subjugation (inversely). Aggressive behavior symptoms were predicted by Social Isolation, Emotional Deprivation, and Vulnerability to harm (inversely) (see table 3).

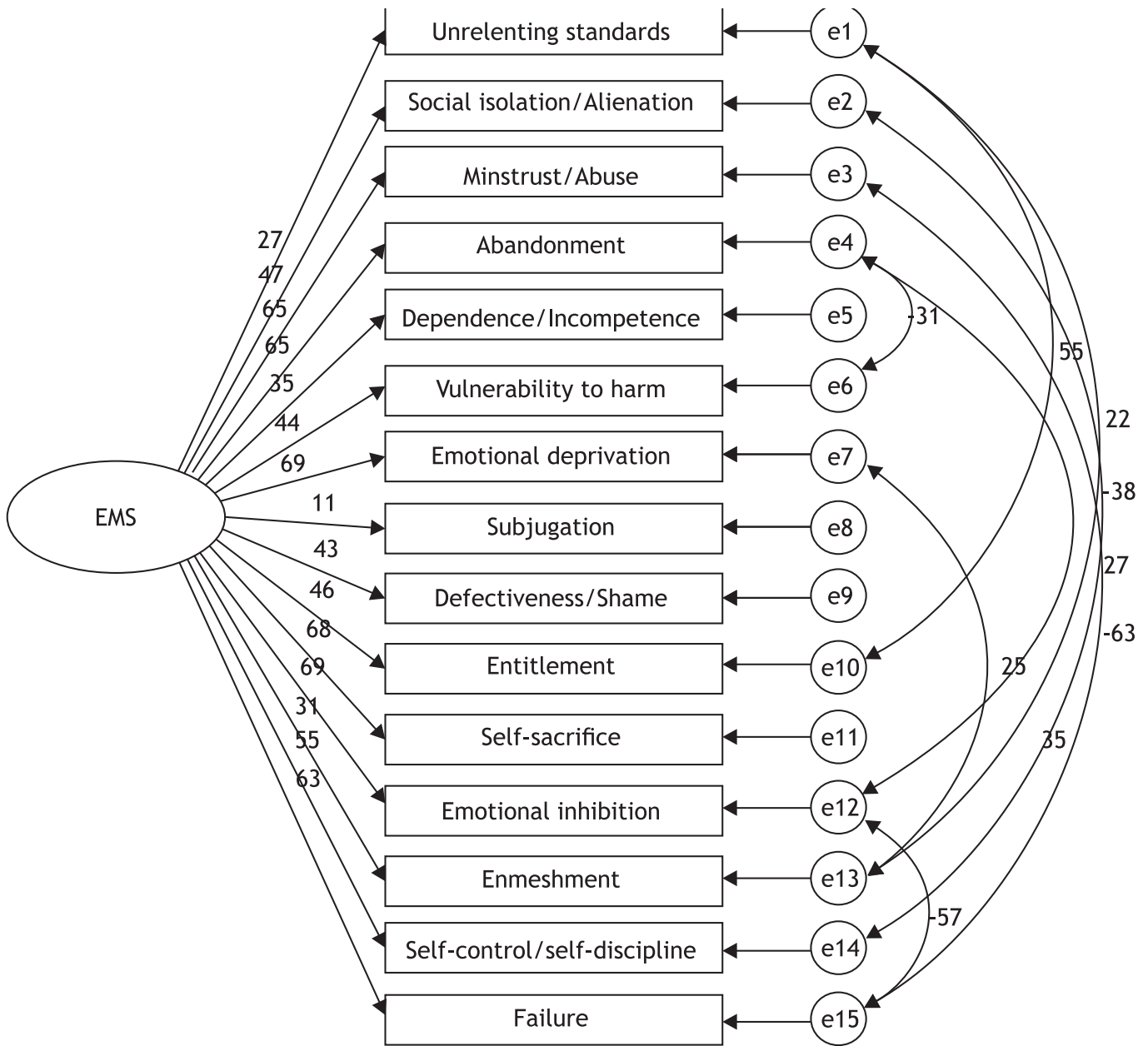


Figure 1. Confirmatory Factor Analysis for Schema Questionnaire for Children.

Profile of children based on EMS

A cluster analysis (using Ward's method) was conducted to identify groups of children in terms of EMS. The cluster with high levels of EMS included 11 (14.7%) children and the cluster with low levels of EMS included 64 (85.3%) children. Figure 2 below presents the z scores displayed by the children of the two clusters in the EMS.

According to the results, in the cluster with high scores in EMS, a pattern appears with the highest scores

in EMS: Emotional deprivation, Failure, Defectiveness, Social isolation, and Abandonment.

Differences in psychopathology based on EMS profile

A series of Mann-Whitney tests indicated that children in cluster with high levels of EMS reported higher scores in Thought problems, Attention problems, Delinquent behavior, Aggressive behavior, and a tendency for higher scores in Anxious/Depressed symp-

Table 1. Descriptive statistics of EMS and psychopathology indices.

	Number of items	M	SD
Vulnerability to harm	1	6.23	3.31
Unrelenting standards/hyper criticalness	1	4.39	3.59
Dependence/Incompetence	1	4.12	3.44
Emotional inhibition	1	4.10	3.46
Self-sacrifice	1	3.90	3.17
Social isolation/Alienation	1	3.60	2.96
Subjugation	1	3.54	2.86
Enmeshment	1	3.51	2.90
Entitlement	1	3.46	3.43
Mistrust/Abuse	1	3.14	2.95
Self-control/self-discipline	1	2.99	2.95
Defectiveness/Shame	1	2.80	2.49
Abandonment	1	2.45	2.92
Emotional deprivation	1	1.95	2.06
Failure	1	1.86	2.07
Aggressive behavior	18	12.88	9.30
Social problems	11	6.32	3.60
Attention problems	10	6.28	4.23
Anxious/Depressed	13	5.85	3.67
Delinquent behavior	17	5.73	5.00
Withdrawn	8	5.05	3.98
Thought problems	15	2.98	2.80
Somatic complaints	11	1.25	1.81

toms in comparison to the cluster with lower scores in EMS (see table 4).

Discussion

The present study aimed to investigate whether Young's schema theory constitutes a comprehensive framework for understanding psychopathology in youth, especially in residential care. This is the first study, to our knowledge, that explored EMS and psychopathology in a clinical and residential care sample. As expected, higher scores were found in Vulnerability to harm and moderate scores in Mistrust / Abuse. Our findings are in line with previous findings in a clinical sample of children.¹⁷ The pattern of Vulnerability to harm has been linked to the onset of depression¹ in adulthood. Relatively high scores in the Unrealistic standards were also observed in our sample. Unrealistic standards have been linked to emotional abuse and particularly to the effort of individuals to meet very high standards in order to either avoid disapproval/shame or feel worthy

of the love of others.¹ Innovation of the present study is that research questions were explored by implementing both variable-focused as well as person-focused techniques. More specifically, we investigated both the predictive power of each EMS (regression analysis) on psychopathology and also the co-occurrence of EMS (cluster analysis) regarding psychopathological parameters. Our hypotheses that (a) EMS would be predictive indicators of psychopathology and (b) that schemas related to the higher-order factors Disconnection/Rejection and Impaired Autonomy/Performance were confirmed. Through cluster analysis, the role of EMS Emotional deprivation and Defectiveness was also highlighted.

Regarding the predictive power of EMS on psychopathology symptoms, higher R^2 was observed for externalization symptoms (Rule-breaking and Aggressive behavior) as well as for internalization symptoms (Anxiety/Depression) and thinking problems. The strongest factor in predicting the symptoms of psychopathology was social isolation/alienation which is related to the sense of being different from or not fitting into the larger social world outside the family.¹ Social isolation could be related to previous victimization but also to the social stigma attached to children living in residential care. A previous study,²³ found that social isolation related to internalizing symptomatology. However, in our study it was an important predictor of externalizing symptomatology as well. Overall, robust predictors of psychopathological symptoms were social isolation, abandonment (domain: Disconnection and Rejection), and Dependence/Incompetence and Failure (domain: Impaired Autonomy and Performance). It is noteworthy that EMS of Mistrust/Abuse was not a statistically significant predictor of psychopathology. Corresponding findings have been found in the study of Van Vlierberghe and Braet,³³ while in a subsequent study, only a low correlation with internalizing problems was observed.³⁴ Findings may be related to bonding difficulties (e.g., disorganized attachment) and, as suggested by Tsouvelas et al,²⁷ it could be assumed that EMS of Mistrust/Abuse is subject to a developmental process; there may be a pattern that develops over the course of life through accumulated experiences of betrayal and insecure attachment in relationships with caregivers and friends. Therefore, it would be useful for subsequent research to investigate the relationship between Mistrust/Abuse and psychopathology through longitudinal studies.

No gender differences were observed on EMS. Corresponding findings have been found in relevant studies.^{17,35} However, Calvete et al²⁵ found that adolescent girls scored higher than boys on EMS referring to the other-directedness domain. In terms of gender dif-

Table 2. Person *r* correlations with age and independent *t* test for gender differences.

	Gender					t	d
	Age	Male		Female			
	Pearson <i>r</i>	M	SD	M	SD		
Unrelenting standards/hyper criticalness	0.01	4.52	3.68	4.28	3.55	0.29	0.07
Social isolation/Alienation	-0.06	4.11	3.23	3.15	2.67	1.41	0.33
Mistrust/Abuse	0.03	3.53	3.10	2.80	2.79	1.07	0.25
Abandonment	-0.01	2.37	2.93	2.53	2.94	-0.23	-0.05
Dependence/Incompetence	-0.07	4.56	3.63	3.75	3.26	1.02	0.23
Vulnerability to harm	0.23	6.05	3.20	6.40	3.44	-0.46	-0.11
Emotional deprivation	-0.05	2.13	2.50	1.79	1.60	0.71	0.17
Subjugation	-0.25*	3.60	3.16	3.49	2.61	0.16	0.04
Defectiveness/Shame	0.09	3.17	2.63	2.48	2.35	1.21	0.28
Entitlement	-0.06	3.93	3.79	3.05	3.08	1.10	0.26
Self-sacrifice	0.22	3.36	3.16	4.36	3.14	-1.37	-0.32
Emotional inhibition	0.01	4.09	3.69	4.10	3.29	-0.01	0.00
Enmeshment	-0.13	3.98	3.23	3.11	2.56	1.30	0.30
Self-control/self-discipline	-0.05	3.27	3.29	2.75	2.64	0.76	0.18
Failure	-0.05	2.18	2.65	1.58	1.34	1.21	0.30
Anxious/Depressed	0.13	6.36	4.18	5.40	3.15	1.13	0.26
Withdrawn	0.25*	5.43	4.32	4.73	3.77	0.76	0.17
Somatic complaints	0.22	1.08	1.48	1.40	2.07	-0.77	-0.18
Social problems	0.15	7.49	3.40	5.29	3.48	2.76**	0.64
Thought problems	0.01	3.75	2.66	2.29	2.77	2.33*	0.54
Attention problems	-0.03	7.91	4.16	4.85	3.79	3.33***	0.77
Delinquent behavior	0.03	7.43	5.62	4.24	3.85	2.82**	0.67
Aggressive behavior	0.02	16.19	10.19	9.97	7.41	2.98**	0.71

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

ferences and psychopathology symptoms, boys were more burdened than girls in Externalizing problems (Rule-breaking and Aggressive behavior) as well as symptoms related to Social, Thoughts and Attention problems. Regarding externalization symptoms of psychopathology, our finding agrees with findings of similar studies in non-clinical samples.³⁶ Regarding age, younger children showed higher scores in Subjugation. There are not enough studies in children that have investigated the effect of age on EMS. Relevant studies¹⁷⁻³⁷ identified no significant differences in age. The observed correlation between age and Subjugation in younger children may be related to the feeling of helplessness and a more functional way of adapting to institutional care.

The present study attempts to shed light on the link between EMS and symptoms of psychopathology in a

clinical sample of children residing in childcare homes, with the aim of helping to develop effective and helpful interventions for this population. By focusing on specific EMS in therapy, we could intervene early on in order to both establish more functional beliefs and address pre-existing EMS-related difficulties. Therefore, as Wright et al³⁸ suggest, early intervention is particularly important to help children modify their internalized working models. However, in order for any therapeutic interventions to be effective, the complexities of the residential system need to be considered. Intervening at an organizational/institutional level could involve raising awareness among residential care staff on trauma and promoting a trauma-informed approach to care. Similar interventions for staff have been proposed and implemented by programs, including the SafePath which is based on Schema Therapy principles³⁹ and the

Table 3. Multiple regression (stepwise method) for the prediction of symptoms of psychopathology by EMS.

	Anxious/Depressed		Withdrawn		Somatic complaints		Social problems		Thought problems		Attention problems		Delinquent behavior		Aggressive behavior	
	Step (ΔR ²)	B	Step (ΔR ²)	B	Step (ΔR ²)	B	Step (ΔR ²)	B	Step (ΔR ²)	B	Step (ΔR ²)	B	Step (ΔR ²)	B	Step (ΔR ²)	B
Unrelenting standards/ Hyper criticalness	1 (0.26)	0.39***			1 (0.12)	0.35***			1 (0.18)	0.39***	1 (0.26)	0.50***	1 (0.33)	0.55***		
Social isolation/ Alienation																
Mistrust/Abuse																
Abandonment			2 (0.06)	-0.33**			3 (0.06)	0.26**								
Dependence/ Incompetence			4 (0.04)	0.22*												
Vulnerability to harm															2 (0.04)	-0.25**
Emotional deprivation															3 (0.03)	0.20*
Subjugation			3 (0.05)	-0.27*							2 (0.09)	-0.30***				
Defectiveness/Shame																
Entitlement									1 (0.25)	0.32**	2 (0.06)	0.25**				
Self-sacrifice																
Emotional inhibition																
Enmeshment																
Self-control/self-discipline																
Failure	2 (0.07)	0.30***	1 (0.14)	0.42***			1 (0.14)	0.36***	2 (0.06)	0.35***						
R ²	0.33		0.29		0.12		0.14		0.44		0.24		0.34		0.41	

Note: * p<0.05, ** p<0.01, *** p<0.001

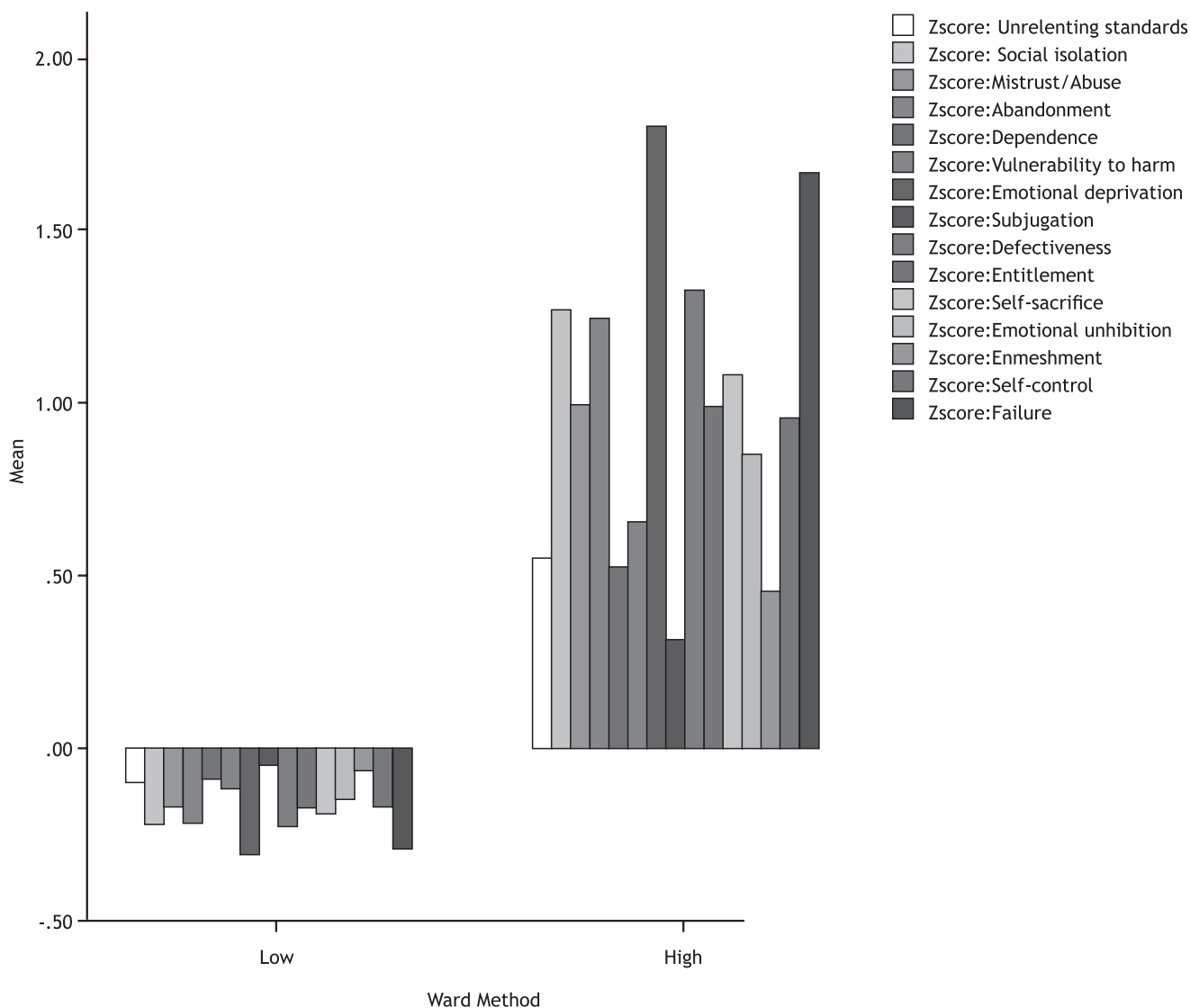


Figure 2. Hierarchical cluster analysis of EMS.

Table 4. Differences in clusters of EMS regarding indices of psychopathology.

	Low EMS	High EMS	U	z
Anxious/Depressed	6.00	7.00	223.50	-1.93*
Withdrawn	4.00	3.57	325.00	-0.41
Somatic complaints	1.00	1.00	296.00	-0.87
Social problems	6.00	9.00	240.50	-1.67
Thought problems	2.00	7.00	110.50	-3.64****
Attention problems	5.00	8.00	194.50	-2.36**
Delinquent behavior	4.00	8.12	221.50	-1.96**
Aggressive behavior	11.00	21.58	157.00	-2.92****

Note: *p<0.10, **p< 0.05, ***p< 0.01, ****p<0.001

Fairy Tale model⁴⁰ which draws upon research evidence on the common factors.

The present study has some limitations that need to be acknowledged. It should be noted that the selection of participants does not meet the criteria for random sampling. Furthermore, limitations of the present study concern the nature of the cross-sectional design (which does not permit a causal relationship to be established between the variables) and the possibility of information bias when the caregivers filled out the questionnaires. The SQC scale evaluates each EMS through a single item which may not adequately reflect the multiple dimensions encapsulated within the schemas.²⁸ It is suggested that future studies administer the Schema Inventory for Children (SIC, a commonly used scale for children, and investigate whether our findings would be confirmed.³⁷

Subsequent longitudinal studies, using larger samples, should examine symptoms of EMS and psychopathology across the spectrum of childhood and adolescence and shed more light on the causal relationships. It is also suggested that further studies investigate the mediating role of attachment and Adverse Life Experiences.

Children in residential care are at increased risk for developing psychopathology both in childhood/ adolescence and in adulthood. Psychopathological indices predicted by EMS and especially by domains of Disconnection/Rejection and Impaired Autonomy/

Performance. Through cluster analysis, the role of Emotional deprivation and Defectiveness EMS in psychopathology in our residential sample was also highlighted. The present study offers an initial attempt to examine the relationship between Young schemas and internalizing and externalizing symptoms in youth in residential care. Through appropriate interventions, children in residential care could be empowered and equipped to prevent victimization as they grow up (e.g., peer problems, sexual violence) and overcome adversities when they occur.

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Ερευνητική εργασία

Πρώιμα δυσλειτουργικά σχήματα και συμπτώματα ψυχοπαθολογίας σε παιδιά που διαμένουν σε δομές παιδικής φιλοξενίας

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ΠΕΡΙΛΗΨΗ

Σύμφωνα με τη θεωρία σχημάτων, τα πρώιμα δυσλειτουργικά σχήματα (ΠΔΣ) συμβάλλουν τόσο στην εκδήλωση όσο και στην εγκαθίδρυση της ψυχοπαθολογίας. Η έρευνα στα ΠΔΣ στα παιδιά είναι περιορισμένη και η συμβολή της παρούσας μελέτης έγκειται στο ότι διερευνά το ρόλο των ΠΔΣ στην εμφάνιση ψυχοπαθολογίας σε παιδιά που διαμένουν σε πλαίσια φιλοξενίας. Οι συμμετέχοντες στην παρούσα μελέτη είναι παιδιά που διαμένουν σε δομές παιδικής φιλοξενίας και παραπέμφθηκαν για κλινική και διαγνωστική εκτίμηση στο Κέντρο Ημέρας «το Σπίτι του Παιδιού» του Συλλόγου «το Χαμόγελο του Παιδιού». Στη μελέτη συμμετείχαν 75 παιδιά (35 αγόρια και 40 κορίτσια) με μέση ηλικία τα 12,7 έτη. Χορηγήθηκαν η ελληνική έκδοση της κλίμακας Achenbach Child Behavior Checklist, η οποία συμπληρώθηκε από τους φροντιστές των παιδιών, και η κλίμακα Schema Questionnaire for Children, η οποία συμπληρώθηκε από τα παιδιά. Τα ερευνητικά ερωτήματα διερευνήθηκαν με συνδυασμό τεχνικών εστιασμένων τόσο στις μεταβλητές (πολλαπλή παλινδρόμηση) όσο και στα άτομα (ιεραρχική ανάλυση συστάδων). Η Επιβεβαιωτική Ανάλυση Παραγόντων για την κλίμακα Σχημάτων για παιδιά (SQC) εμφάνισε αποδεκτούς δείκτες καλής προσαρμογής. Αναφορικά με τα ΠΔΣ, το σχήμα της Ευαλωτότητας στον κίνδυνο εμφάνισε τους υψηλότερους μέσους όρους. Το ΠΣΔ Κοινωνικός αποκλεισμός ήταν ο ισχυρότερος προβλεπτικός δείκτης για την ψυχοπαθολογία (εσωτερικευμένη και εξωτερικευμένη). Σημαντικός προβλεπτικός παράγοντας για τα συμπτώματα Απόσυρσης, Άγχους/Κατάθλιψης, Κοινωνικών προβλημάτων και Προβλημάτων Σκέψης βρέθηκε να είναι το ΠΣΔ της Αποτυχίας. Η ιεραρχική ανάλυση συστάδων ανέδειξε δύο ισχυρές συστάδες, μία με χαμηλές και μία με υψηλές τιμές στα περισσότερα ΠΔΣ. Στη συστάδα με τα υψηλά επίπεδα στα ΠΔΣ, οι υψηλότερες τιμές εμφανίστηκαν στη Συναισθηματική Στέρηση, στην Αποτυχία, στη Μειονεξία, στον Κοινωνικό αποκλεισμό και στην Εγκατάλειψη. Τα παιδιά που εντάχθηκαν σε αυτή τη συστάδα εμφάνισαν στατιστικώς σημαντική επιβάρυνση σε δείκτες προβλημάτων εξωτερικεύσεως. Οι ερευνητικές μας υποθέσεις ότι τα ΠΣΔ και ειδικά οι τομείς Αποσύνδεση/Απόρριψη και Ανεπαρκής Αυτονομία/Επίδοση θα αποτελούσαν προβλεπτικούς δείκτες για την ψυχοπαθολογία, επιβεβαιώθηκαν. Μέσα από την ανάλυση συστάδων, επιβεβαιώθηκαν τα παραπάνω ευρήματα και επισημάνθηκε παράλληλα και ο ρόλος των σχημάτων Συναισθηματική στέρηση και Μειονεξία στην εμφάνιση συμπτωμάτων ψυχοπαθολογίας. Τα ευρήματα της παρούσας μελέτης υπογραμμίζουν τη σημαντικότητα της αξιολόγησης των ΠΔΣ σε παιδιά που διαμένουν σε πλαίσια φιλοξενίας και θα μπορούσαν να συμβάλλουν στη διαμόρφωση κατάλληλων και εστιασμένων παρεμβάσεων σε αυτό τον πληθυσμό με στόχο τόσο την πρόληψη εμφάνισης αλλά και εδραίωσης ψυχοπαθολογίας.

ΛΕΞΕΙΣ ΕΥΡΕΤΗΡΙΟΥ: Πρώιμα δυσλειτουργικά σχήματα, ψυχοπαθολογία, παιδιά, πλαίσια ιδρυματικής φροντίδας.

Research article

Stigma and discrimination among persons with mental illness in a tertiary care medical institution in Southern India

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ABSTRACT

The proportional contribution of mental disorders to the total disease burden in India has almost doubled since 1990. Stigma and discrimination are major barriers to seeking treatment for persons with mental illness (PMI). Stigma reduction strategies are thus crucial, and for this, there needs to be an understanding of the various factors associated with them. The current study intended to assess stigma and discrimination in PMI visiting the department of psychiatry in a teaching hospital in Southern India and their association with various clinical and sociodemographic factors in them. The index study was a descriptive cross-sectional study involving consenting adults who presented to the Department of Psychiatry with mental disorders from August 2013 to January 2014. Socio-demographic and clinical data were collected using a semi-structured proforma, and the Discrimination and Stigma Scale (DISC-12) was used to assess discrimination and stigma. Most PMI suffered from bipolar disorder, followed by depression, schizophrenia, and other disorders, such as obsessive-compulsive disorder, somatoform disorder, and substance use disorder. Discrimination was experienced by 56% of them and 46% had stigmatizing experiences. Both discrimination and stigma were found to be significantly associated with their age, gender, education, occupation, place of residence, and illness duration. While PMI suffering from depression experienced the highest discrimination, those with schizophrenia faced the stronger stigma. Binary logistic regression revealed depression, family history of psychiatric illness, age of less than 45 years, and rural locality of residence to be the significant determinants of discrimination and stigma. The study thus found that stigma and discrimination were associated with multiple social, demographic, and clinical factors in PMI. A rights-based approach to PMI is the need of the hour to tackle stigma and discrimination, which is already included in recent Indian acts and statutes. Implementation of these approaches is the need of the hour.

KEYWORDS: Mental illness, stigma, discrimination, persons with mental illness.

Introduction

Mental disorders are among the leading causes of non-fatal disease burden in India, affecting one in seven Indians.¹ The proportional contribution of mental disorders to the total disease burden in India has almost doubled since 1990.² Stigma remains a major barrier

to seeking treatment for persons with mental illness (PMI). Stigma is a complex issue that exists in different forms, and many factors like the public, family members, media, patients themselves, and even sometimes the health providers are involved.^{3–5} It is also significantly associated with self-stigma among PMI.^{6,7} The latter seems

to be the worst form of stigma against PMI that can directly affect the patient's overall well-being.⁸ It negatively affects adherence to psychiatric services, self-esteem, hope, and quality of life, apart from preventing effective rehabilitation and social integration.^{8,9}

Mental illness stigma can be explained using parameters like stereotypes, prejudice, and discrimination.¹⁰ Stereotype is the collective notion of society imposed upon a group of people (here PMI) which may create negative emotional responses in prejudiced people against them. Discrimination is the behavioral response to prejudice. Stigma, however, can be both public and personal. Public stigma is the reaction that people have toward PMI. Personal stigma includes perceived stigma (an individual's thinking on society's perception of oneself), experienced stigma (an individual faces discrimination from society), and internalized stigma (internalization of public stigma).¹¹

Most of our understanding of internalized stigma originated in developed nations and may not be applicable to other settings because of socio-cultural differences.^{12,13} In India, studies have mostly focused on assessing the stigma associated with mental illness among family members, caretakers, or the general population. One of the major goals of mental health research and policy is to identify ways to reduce stigma. To accomplish this, it is necessary to understand the background factors of stigma, one of which is the use of psychiatric labels and societal misinformation about mental illness, which is often mediated by the media.¹⁴ Efforts to reduce stigma by replacing mental health myths with more accurate, empirically based information on mental illness have, however, not lived up to expectations. Studies investigating this conclude that negative attitudes are easier to affect in education programs directed at smaller and chosen groups^{15,16} and if the content in the program is focused on specific negative stereotypes, i.e., schizophrenia and depression.^{16,17}

Societal misinformation and psychiatric diagnosis are not the only factors accounting for stigma. Studies indicate that PMI with severe symptoms and poorer social skills are more likely to experience stigma.¹⁸ Severe symptoms such as disorganized behavior and flat affect may scare others and reinforce the fear of mental illness.¹⁹ Results are divergent with regard to studies investigating factors associated with stigma in schizophrenia. While Dickerson et al (2002) reported no relationship between symptoms or social functioning and stigma,²⁰ Penn et al (2000) found a robust association between them and concluded that social skills, negative symptoms, and perceived strangeness, may contribute to stigma.²¹ To identify ways to reduce stigma on an individual level, knowledge about sociodemographic and clinical factors associated with stigma is important. The current study intends to assess stigma and discrimination among PMI attending a psychiatric depart-

ment and explore the association between socio-demographic factors and internalized stigma.

Material and Method

Participants and procedures

This descriptive cross-sectional study recruited patients (after obtaining informed consent) between age groups of 18 years to 65 years, using a convenient sampling method, with an ICD-10 (World Health Organization, 1992)²² psychiatric diagnosis of at least more than a year of being ill, attending the department of psychiatry of a tertiary care medical institution of Southern India. Data were collected between August 2013 and January 2014. It was approved by the institution's ethics committee. Acutely ill patients, those with intellectual disability, or sensory impairment, and those who didn't give us written consent for their inclusion are all excluded from the study.

Measures

Data were collected using a semi-structured proforma to assess their socio-demographic and relevant clinical data. The Discrimination and Stigma Scale (DISC 12) was used to assess discrimination faced by the study participants due to their mental illness in the last year.²³ DISC-12 contains 32 questions about aspects of everyday life including work, marriage, parenting, housing, leisure, and religious activities wherein discrimination experienced is being recorded. It has 4 subscales (Items 1–21: Unfair treatment; items 22–25: Stopping self; items 26 and 27: Overcoming stigma and items 28–32: Positive treatment which assesses coping strategies to overcome discrimination). The responses were rated on a 4-point Likert scale. The calculation of both a mean and total score is recommended for each subscale. This allows both the level of stigma in each applicable area of life and its spread over the different areas to be presented. Higher scores indicate higher levels of stigma (including positive stigma).²⁴ The mean DISC-12 score is calculated for individual subscales by adding up the scores obtained in each subscale and dividing them by the number of applicable and non-missing items in the subscale.²⁴ For the sake of this study, instead of subscale mean scores, a total mean score is calculated by adding all the items marked for all 4 subscales and dividing them by the total number of applicable and non-missing items in the 32-item DISC-12 scale. DISC-12 is a self-reported scale that was translated into the local language following the translation and back translation protocol for its application.

Stigma experienced was assessed with direct questioning that evoked a dichotomous response (yes/no) from the study participants. The responses were analyz-

ed with further open-ended questioning of the experiences (if any) before accepting the dichotomous (yes/no) responses.

Statistical analysis

The data were analyzed using SPSS for Windows. Data were normally distributed according to the Shapiro-Wilk test. Graphs and tables were used to present the data. DISC-12 scores were compared between various socio-demographic and clinical variables using the t-test and one-way ANOVA while the chi-square test was used to determine associations between stigma and socio-demographic/clinical variables. Multiple linear regression

analysis was used to predict the impact of socio-demographic and clinical variables on DSIC scores. Logistic regression was done to identify predictors resulting in stigma. The level of significance was set at $p \leq 0.05$.

Results

General characteristics of study subjects

Three hundred PMI attending the outpatient department (OPD) of a tertiary care hospital in western India with specialized psychiatry services participated in the study. The socio-demographic and clinical profiles of the study participants are described in table 1.

Table 1. Associations of socio-demographic and clinical profile with discrimination.

		N	Mean	SD	t(df)/F(df)	p
Age	<25 years	35	2.8	0.3	2.1 (4)	0.001
	25 – 34 years	70	3.1	0.29		
	35 – 44 years	110	3.3	0.32		
	45 – 54 years	57	3	0.36		
	>55 years	28	2.8	0.23		
Gender ^a	Male	146	2.9	0.3	-1.02 (298)	0.02
	Female	154	3.3	0.31		
Education	Less than high school	158	3.8	0.29	1.92 (3)	0.001
	SSLC	92	3.6	0.26		
	Pre-degree	28	3.3	0.36		
	Degree	22	2.9	0.29		
Occupation	Unskilled	112	2.6	0.3	2.03 (2)	0.001
	Semiskilled	148	3.4	0.32		
	Skilled	40	3.9	0.36		
Location	Rural	50	3.7	0.34	1.04 (2)	0.01
	Semi urban	208	3.3	0.28		
	Urban	42	2.6	0.23		
Marital Status	Unmarried	144	3.4	0.28	1.1 (2)	0.77
	Married	108	3.1	0.25		
	Separated	48	2.9	0.23		
	Others	13	2.9	0.27		
Psychiatric diagnosis	Depression	72	3.7	0.39	2.8 (6)	0.001
	Bipolar disorder	98	3.1	0.28		
	Obsessive Compulsive Disorder	34	2.3	0.23		
	Somatoform disorder	34	2.1	0.21		
	Schizophrenia	41	3.5	0.37		
	Substance Use Disorder	8	2.7	0.28		
	Others	13	2.9	0.27		
Illness duration	<10 years	147	2.7	0.29	2.31 (2)	0.02
	10–15 years	75	3	0.31		
	>15 years	78	3.4	0.35		
Family history of mental Illness ^a	Yes	165	0.38	0.28	-1.2 (298)	0.01
	No	135	0.29	0.19		
On current Treatment ^a	Yes	188	0.21	0.09	-1.5 (298)	0.049
	No	112	0.25	0.075		

SD-Standard Deviation; df- degrees of freedom, Superscript 'a'- t-test

Bipolar disorder (32.7%) was the predominant psychiatric diagnosis, followed by depression (24%), schizophrenia (13.7%), somatoform disorders (11.3%), obsessive-compulsive disorder (OCD) (11.3%), substance use disorder (SUD) (2.7%) and others (4.3%). 51.3% of the participants were on treatment. Nearly half (49%) of the study subjects had an illness duration of fewer than 10 years, 26% had an illness of more than 15 years, and 25% of study subjects had an illness for a period of between 10–15 years. A family history of psychiatric illness was present in 55% of the study subjects. 62.7% of the subjects were on treatment during study recruitment, while 37.3% were non-adherent/ treatment-naïve to their prescribed regimens.

Discrimination and stigma

Discrimination was faced by 56% of the study subjects, while 46% have been subjected to stigmatizing experiences. The total mean DISC-12 score was 3.2 ± 1.8 which was calculated by counting the scores of all 32 items of the scale and dividing them by the number of applicable and non-missing items. The four sub-scale scores are; unfair treatment (total score: 4.8, mean score: 0.23), stopping self (total score: 2.3, mean score: 0.09), overcoming stigma (total score: 1.2, mean score: 0.06) and positive treatment (total score: 2.6, mean score: 0.10).

The discrimination experienced (figure 1) was mostly from neighbors (32%), followed by discrimination from intimate partners in a relationship (21.3%). The other sources of discrimination experienced by the study participants were their physical health (18%), in areas of education (15.3%), places of worship and religious practices (12.7%), their interaction with the legal system and police (9%) and when they played their role as parents (9.7%).

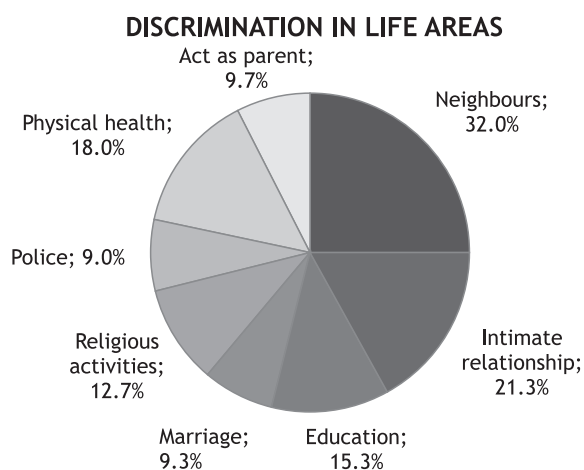


Figure 1. Discrimination in life areas.

Factors associated with discrimination and stigma

Table 1 describes the statistical associations between various socio-demographic and clinical parameters of the participants and DISC-12 mean scores.

The associations between the stigma faced by the participants and their socio-demographic and clinical parameters (variables) are mentioned in table 2. Stigma was found to be statistically high in 35–44 years of age, female sex, having pre-degree education, those who were unskilled workers, and those staying in an urban location. Patients suffering from schizophrenia (68.3%) experienced stigma the most in the study, followed by depression (58.3%), bipolar disorder (38.7%), and SUD (37.5%). Stigma experienced was higher in those who didn't have a family history of mental illness as opposed to those who have one, but this was not statistically significant. Those who stopped treatment or were non-adherent or treatment naïve experienced significantly higher stigma than those who were on treatment for their mental illness.

Regression analysis

Regression analysis revealed that none of the predictor variables had any significant impact on the DISC-12 score (table 3). It was found that participants less than 45 years of age were more likely to face stigma [OR:1.4 (1.08–1.9); $P=0.05$] than older participants. In addition, participants residing in rural localities were 1.2 times more likely to face stigma [OR:1.2 (1.15–1.7); $P=0.05$] than those residing in urban areas (table 4).

Discussion

Bipolar disorder (32.7%) was the predominant psychiatric diagnosis, followed by depression (24%), schizophrenia (13.7%), somatoform disorder (11.3%), OCD (11.3%), and SUD (2.7%) in the sample of 300 patients who were included in the study. These are both common and severe mental disorders in India. The values, however, don't match with those in the recently published National Mental Health Survey 2016 (NMHS 2016).¹ These can be attributed to the fact that our study dealt with a hospital population, while NMHS 2016 is an epidemiological study, not restricted to any population group. More than half of our sample (62.7%) were on treatment during their index presentation, while the remaining (37.3%) were either treatment naïve or non-compliant. This went in line with the study by Jain et al (2017) that found 38.2% of patients, in an outpatient mental health service set-up in north India, discontinued their treatment after their first visit, and among the remaining patients, 61.8% discontin-

Table 2. Associations of socio-demographic and clinical profile with stigma.

		Stigma Experienced		Chi Square	p
		Yes	No		
		N (%)	N (%)		
Age	<25 years	4 (11.4)	31 (88.6)	5.02	0.001
	25–34 years	28 (40.0)	42 (60)		
	35–44 years	64 (58.1)	46 (31.9)		
	45–54 years	24 (42.1)	33 (57.9)		
	>55 years	18 (64.2)	10 (35.8)		
Gender	Male	53 (36.3)	93 (63.7)	4.1	0.032
	Female	85 (55.1)	69 (44.9)		
Education	Less than high school	79 (50)	79 (50)	3.8	0.043
	SSLC	36 (39.1)	56 (60.9)		
	Pre-degree	16 (57.1)	12 (42.9)		
	Degree	07 (31.8)	15 (68.2)		
Occupation	Unskilled	98 (87.5)	14 (12.5)	2.1	0.001
	Semiskilled	34 (22.9)	114 (70.1)		
	Skilled	06 (15)	34 (85)		
Location	Rural	12 (24)	38 (76)	5.01	0.001
	Semi urban	86 (41.3)	122 (59.7)		
	Urban	40 (95.2)	02 (4.8)		
Marital Status	Unmarried	64 (44.4)	80 (55.6)	0.502	0.57
	Married	48 (44.4)	60 (55.6)		
	Separated	24 (50.0)	24 (50.0)		
Psychiatric diagnosis	Depression	42 (58.3)	30 (41.7)	4.6	0.07
	Bipolar disorder	38 (38.7)	60 (61.3)		
	Obsessive Compulsive Disorder	12 (35.2)	22 (64.8)		
	Somatoform disorder	10 (29.4)	24 (70.6)		
	Schizophrenia	28 (68.3)	13 (31.7)		
	Substance Use Disorder	03 (37.5)	05 (62.5)		
	Others	05 (38.4)	08 (61.6)		
Illness duration	<10 years	64 (43.6)	83 (56.4)	2.4	0.29
	10–15 years	35 (46.6)	40 (53.4)		
	>15 years	46 (58.9)	32 (41.1)		
Family history of mental illness	Yes	71 (43.0)	94 (57.0)	0.78	0.23
	No	65 (48.1)	70 (51.9)		
On current Treatment	Yes	77 (41.0)	111 (59.0)	7.5	0.001
	No	59 (52.7)	53 (47.3)		

ued their treatment within 6 months.²⁶ A recent meta-analysis on psychotropic non-adherence also supports this (49% overall non-adherence).²⁷

Discrimination was faced by 56% of the study subjects and 46% reported having experienced stigma. This is lower in comparison to the study by Bipeta et al (2020) in the Indian state of Telangana, wherein 76.32% reported having experienced a moder-

ate-to-high level of stigma while 85.53% endorsed secrecy.²⁸ This difference can be explained by the geographical and cultural differences between the two places where the studies were conducted. Still, these figures point to the abysmally high level of stigma and discrimination that a PMI faces. Discrimination was reported more from the neighbors (32%) followed by that intimate relationships (21.3%), areas of

Table 3. Multiple linear regression with socio-demographic and clinical variables as predictors for discrimination.

Parameter		B	t	p	Lower Bound	Upper Bound
Intercept		5.335	6.141	0.001	3.625	7.046
Age	<25 years	-0.167	-0.385	0.7	-1.018	0.684
	25 – 34 years	-0.025	-0.063	0.95	-0.816	0.765
	35 – 44 years	-0.274	-0.716	0.47	-1.026	0.479
	45 – 54 years	-0.087	-0.219	0.83	-0.874	0.699
	>55 years	0	.	.		
Gender	Male	-0.065	-0.392	0.70	-0.392	0.262
	Female	0	.	.		
Education	< high school	0.319	0.783	0.43	-0.483	1.121
	High school	0.702	1.698	0.09	-0.112	1.515
	Pre-degree	0.54	1.258	0.21	-0.305	1.384
	Degree	0	.	.		
Occupation	Unskilled	-0.141	-0.498	0.62	-0.699	0.417
	Semiskilled	-0.204	-0.735	0.46	-0.75	0.343
	Skilled	0	.	.		
Location	Rural	-0.196	-0.866	0.39	-0.44	0.506
	Semi urban	-0.094	-0.455	0.65	-0.313	0.65
	Urban	0	.	.		
Diagnosis	Depression	-0.458	-0.828	0.41	-1.54	0.631
	Bipolar disorder	-0.236	-0.427	0.67	-1.32	0.85
	Obsessive Compulsive Disorder	-0.312	-0.561	0.58	-1.4	0.78
	Somatoform disorder	-0.811	-1.351	0.18	-1.77	0.57
	Schizophrenia	-0.602	-1.011	0.31	-2.1	1.15
	Substance Use Disorder	-0.489	-0.587	0.56		
	Others	0	.	.		
illness duration	<10 years	0.243	0.811	0.42	-0.34	0.84
	10 – 15 years	0.049	0.129	0.90	-0.703	0.802
	>15 years	0	.	.		
Family History	Yes	0.18	1.092	0.28	-0.144	0.504
	No	0	.	.		
Current illness	Yes	-0.103	-0.593	0.55	-0.44	0.23
	No	0	.	.		

R² – 0.06; 0–reference category

education (15.3%), religious activities (12.7%), physical health (18%), with the police and law (9%) and when they played their role as a parent (9.7%). This is in line, albeit with subtle differences, with a study by Hansson et al (2014), where the most experienced discrimination was observed in the family (53.9%), in a marital relationship (16.8%) whereas, areas with the least perceived discrimination included religious practice (5.1%), starting a family (9.1%) and using public transport (11.5%).⁸

The total mean discrimination score was high among study subjects with depression followed by schizophrenia, which was closely followed by bipolar disorder, SUD, OCD, and somatoform disorder, and this was statistically significant. Concerning stigma, PMI suffering from schizophrenia suffered more than the other diagnostic entities. Together, this points to the fact that both affective disorders and non-affective psychosis top the list of discrimination and stigma faced by sufferers. This finds support from earlier studies

Table 4. Multiple logistic regression with demographic and clinical variables as predictors for stigma.

	B	SE	Wald	OR (95% CI)	p
Less than 45 years of age	0.115	0.275	0.175	1.4 (1.08–1.9)	0.05
Rural Locality	0.026	0.272	0.09	1.2 (1.15–1.7)	0.05

done abroad, where a higher level of stigma was experienced by those with a diagnosis of schizophrenia than those with bipolar disorder and depression.^{29,30} Schizophrenia and bipolar disorder patients reported higher internalized stigma and discrimination than anxiety disorders in other studies that compared this factor across psychiatric diagnoses.^{31,32} Farrelly et al (2014) however, observed no significant differences in experienced discrimination among their sample of patients suffering from mental illness (schizophrenia, depression, and bipolar disorder).³³ These differences can be attributed to differences in assessments, but the overall point to a higher prevalence of discrimination across the diagnostic groups. Subtle differences thus exist, but as a whole, all these points to higher discrimination and stigma among mental disorders, more so with psychotic and affective spectrum disorders than neurotic disorders. A family history of psychiatric illness has also been found to be significantly associated with higher discrimination among those with mental illness and also a significant determinant for discrimination in the regression analysis.

Females experienced significantly higher discrimination and stigma than males in our study. Ertugul et al (2004) in their study involving schizophrenia patients, found no such gender differences in stigma experiences.¹⁹ This difference can be explained by the difference in the study population in the two studies. The finding by Grover et al (2017) however, matched our; female gender had significantly higher stigma scores while males had a higher stigma resistance in their multisite study across Indian states involving severe mental illness.³⁴ These gender differences in experiencing stigma and discrimination can be partly attributed to the patriarchal society and its deeply entrenched societal patterns that this country still has to offer.

The DISC-12 score was higher in the 35–44 age group while stigma experienced was higher in PMI above 55 years of age. Regression analysis, Grover et al (2017) discovered that younger age is associated with a significantly higher stigma score in patients with severe mental illness.³⁴ A younger age and thus an earlier age of onset of mental illness, leads to widespread negative consequences in overall functioning, seeking employment,

and securing a fruitful relationship. These may be the reasons why PMI in younger groups experience more stigma and discrimination than their older counterparts. This also necessitates targeting young PMI for any form of stigma-alleviating programs.

The discrimination experienced was also higher among those who did not complete high school. Those who didn't complete their degree education (pre-degree) experienced a significantly highest stigma than the other educational attainments. The discrimination score and the proportion of PMI experiencing stigma were also significantly higher in those who were skilled workers in employment than those who were semi-skilled and unskilled. The findings match with those of Grover et al (2017) where sufferers of SMI who were educated until the 10th grade and those who were unemployed experienced significantly higher stigma.³⁴ However, education was not associated with stigmatizing experiences as reported by Ilic et al (2013).³² This difference can be explained by the study population and the cultural differences in the study setting.

The place of residence in our study showed a conflicting picture in their association with discrimination score and stigma experienced. While the total mean DISC-12 score was significantly higher for rural dwellers than urbanites, the latter was reported to have experienced higher stigma than the former. The rural location has been found to be one of the significant determinants of stigma and discrimination in regression analysis. Loganathan et al (2008) also reported a similar finding in their study involving patients with schizophrenia, wherein rural dwellers experienced more ridicule, shame, and discrimination while urban respondents reportedly felt the need to hide their illness during job interviews.¹² Phillips et al (2002) report that patients' behavior is observed more in the crowded urban community compared to the rural community, which could perhaps explain the need to conceal their illness.³⁵ Whatever the findings could be, this points to the need for a comprehensive stigma-reducing strategy to be planned for sufferers of mental illness, which would ultimately reciprocate in early treatment seeking, treatment compliance, and thus an overall holistic improvement in functioning and quality of life.

In the present study, the total mean DISC-12 score was found to be high among study subjects who had a family history of psychiatric illness. An important finding was the strong advantage (positive discrimination) conferred on the majority of respondents by family members. In contrast, a similar multi-site international study on stigma and discrimination against individuals with schizophrenia from Europe reported a positive advantage from family members in only a quarter (24%) of the respondents.²³ This finding demonstrates the importance of traditional (extended), closely knit family structure and its supportive influence as experienced by individuals with depression. Furthermore, depression may be a more socially acceptable condition than a more behaviorally disturbed diagnosis, such as a psychotic illness, even in this environment; and this may have accounted for the stronger family support reported in this study. Whatever the actual reason for the strong family support reported here, it is a noteworthy strength to be utilized, especially in the light of the world mental health survey report by Alonso et al (2008), which indicated that perceived stigma was nearly twice as prevalent at 21.1% in developing countries as compared with the developed ones (11.7%).³⁶

This study is not without limitations. A small sample size in a hospital setting limits the generalizability of the findings. A more multicentric approach could have been taken to understand the topic under study across this country. The study could also have incorporated an intervention component for PMI, thus looking for their impact on reducing stigma and discrimination.

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Conclusion

Stigma and discrimination are thus multifactorial and encompass a wide range of social and demographic parameters of a person suffering from any form of mental illness across a gamut of diagnostic entities, more commonly a primary psychotic disorder and a mood disorder. The current study found a younger age (<45 years), female gender, rural location, a family history of mental illness, and a diagnosis of a mood disorder (here depression) to be significantly associated with stigma and discrimination. Knowledge of these factors will help mental health professionals (MHPs) deal effectively with their clients (PMI) and alleviate the stigma and discrimination they face. The endeavor to lessen these experiences faced by PMI should be holistic. This should start with country-based legislations and acts percolating through the deeper layers of the country to the community set-ups. MHPs should be strong advocates for these activities. The recent legislation and government statutes on mental illness in this country, viz the Mental Health Care Act 2017 and the Rights of Persons with Disability Act 2016 have added important components that provide a rights-based approach to PMI with necessary clauses on promotion for a stigma- and discrimination-free environment for them.^{37,38} They also include appropriate clauses for meting out punishments to those who discriminate against and stigmatize a PMI in any form. We need to look for further studies nationally and globally that look into stigma-reducing interventions for psychiatric disorders and their impact on the overall mental health of a country.

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Ερευνητική εργασία

Στίγμα και διακρίσεις σε άτομα με ψυχική ασθένειες σε ένα τριτοβάθμιο ιατρικό ίδρυμα στη Νότια Ινδία

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ΠΕΡΙΛΗΨΗ

Η συμβολή των ψυχικών διαταραχών στο συνολικό βάρος της νόσου στην Ινδία έχει σχεδόν διπλασιαστεί από το 1990. Το στίγμα και οι διακρίσεις αποτελούν μείζονα εμπόδια στην αναζήτηση θεραπείας για άτομα με ψυχικές ασθένειες (persons with mental illness, PMI). Επομένως, οι στρατηγικές μείωσης του στίγματος είναι ζωτικής σημασίας και γι' αυτό πρέπει να υπάρχει κατανόηση των διαφόρων παραγόντων που σχετίζονται με αυτές. Η παρούσα μελέτη είχε σκοπό να αξιολογήσει το στίγμα και τις διακρίσεις σε PMI που επισκέπτονται το τμήμα ψυχιατρικής σε ένα νοσοκομείο διδασκαλίας στη Νότια Ινδία και τη συσχέτισή τους με διάφορους κλινικούς και κοινωνικο-δημογραφικούς παράγοντες σε αυτά. Η μελέτη δεικτών ήταν μια περιγραφική συγχρονική μελέτη στην οποία συμμετείχαν κατόπιν συναίνεσης ενήλικες που παρουσιάστηκαν στο τμήμα ψυχιατρικής με ψυχικές διαταραχές από τον Αύγουστο του 2013 έως τον Ιανουάριο του 2014. Τα κοινωνικο-δημογραφικά και κλινικά δεδομένα συλλέχθηκαν χρησιμοποιώντας ημι-δομημένο ερωτηματολόγιο και η κλίμακα Discrimination and Stigma Scale (DISC-12) χρησιμοποιήθηκε για την αξιολόγηση των διακρίσεων και του στίγματος. Το μεγαλύτερο μέρος των PMI υπέφερε από διπολική διαταραχή, ακολουθούμενο από κατάθλιψη, σχιζοφρένεια και άλλες διαταραχές, όπως η ιδεοψυχαναγκαστική διαταραχή, η σωματομορφική διαταραχή και η διαταραχή χρήσης ουσιών. Το 56% από αυτούς υπέστη διακρίσεις και το 46% είχε εμπειρίες στιγματισμού. Τόσο οι διακρίσεις όσο και το στίγμα βρέθηκαν να συνδέονται σημαντικά με την ηλικία, το φύλο, την εκπαίδευση, το επάγγελμα, τον τόπο διαμονής και τη διάρκεια της ασθένειας. Ενώ οι PMI που έπασχαν από κατάθλιψη βίωσαν τις πλέον έντονες διακρίσεις, εκείνοι με σχιζοφρένεια αντιμετώπισαν το ισχυρότερο στίγμα. Η δυαδική λογιστική παλινδρόμηση έδειξε ότι η κατάθλιψη, το οικογενειακό ιστορικό ψυχιατρικής νόσου, η ηλικία κάτω των 45 ετών και η αγροτική τοποθεσία κατοικίας είναι οι σημαντικοί καθοριστικοί παράγοντες των διακρίσεων και του στίγματος. Συνεπώς η μελέτη διαπίστωσε ότι το στίγμα και οι διακρίσεις συσχετίστηκαν με πολλούς κοινωνικούς, δημογραφικούς και κλινικούς παράγοντες στους PMI. Μια προσέγγιση βασισμένη στα δικαιώματα των PMI είναι η επίκαιρη ανάγκη για την αντιμετώπιση του στίγματος και των διακρίσεων, η οποία περιλαμβάνεται ήδη σε πρόσφατες ινδικές πράξεις και καταστατικά. Η εφαρμογή αυτών των προσεγγίσεων είναι η επιτακτική ανάγκη.

ΛΕΞΕΙΣ ΕΥΡΕΤΗΡΙΟΥ: Ψυχική νόσος, στίγμα, διακρίσεις, άτομα με ψυχικές ασθένειες.

Research article

Depression in medical students during the COVID-19 lockdown in Greece

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ABSTRACT

The COVID-19 pandemic has caused a mental health crisis. The purpose of this study was to estimate the prevalence of depression in medical students in Greece during a nationwide lockdown. The secondary aims were to assess the association of depression with socio-demographic factors and students' attitudes regarding the quality of their studies. The data was gathered anonymously through a self-administered online questionnaire between January 11 and 27, 2021. The CES-D scale was used to measure depression rates. Multiple logistic regression was used to identify factors independently associated with depression. In total, 978 sixth- and fifth-year medical students participated; their mean age was 23.2 years and 65.6% were females. The prevalence of clinical depression was 21.3% (95% CI: 18.7%, 24.0%), whereas 17.9% (95% CI: 15.5%, 20.4%) experienced severe distress. Depression was more prevalent in females (25.4% vs 13.1% in males, $p < 0.001$). Approximately half (53.4%) of the participants reported a change in plans regarding their medical career due to the pandemic and 16.9% expressed a decreased willingness to practice medicine. Factors independently associated with depression were female gender, living alone or with housemates at high risk for COVID-19, being anxious about becoming infected with SARS-CoV-2, studying in one of the three largest medical schools, negatively evaluating the adjustment of the teaching personnel to online teaching and the university's response to the pandemic. The findings of this study report depression in one out of five medical students during the COVID-19 pandemic, highlighting the need to protect the most vulnerable medical students during a pandemic. Medical students must be able to seek professional mental health services, even in the era of a pandemic. Universities should increase accessibility to support services and provide a student-centered approach in their strategies, as the pandemic has placed a spotlight on an existing phenomenon.

KEYWORDS: Depression, distress, medical students, questionnaire, COVID-19 lockdown, SARS-CoV-2.

Introduction

A mental health crisis has occurred around the globe due to the COVID-19 pandemic. The psychological impacts of this pandemic have been increasingly reported with every new wave of the novel coronavirus and reoccurring lockdown measures.¹ Changes in working con-

ditions, daily habits, and routines, as well as in social interactions and relationships can trigger feelings of stress and loneliness. Fear and worry are also predominant in cases of economic crisis and possible unemployment.¹

University students constitute a vulnerable group regarding mental issues as they go through a transitional

stage from adolescence to adulthood.² Any disturbance during the time of the studies has significant long-standing consequences in the lives of the individuals. With the continuous spread of COVID-19, strict isolation measures, and delays in starting schools, colleges and universities have had a great influence on the mental health of university students with rising rates of anxiety, depression, and suicidal thoughts.^{3,4} Several published studies suggest that medical students may be at high risk for depression and anxiety, with varying prevalence reported across the globe.⁵

Greece is a country that had relatively strict measures in action during the first year of the coronavirus pandemic, with medical students relying completely on online education before the distribution of the vaccine. Medical Schools were shut down and no practical training took place from the beginning of the pandemic in Greece in March 2020, until June 2021, when students were vaccinated against SARS-CoV2.

The aim of the present study was to estimate the prevalence of clinical depression in the population of senior medical students in Greece during the lockdown period in the winter of the 2020–2021 academic year. The secondary aims were to assess the association of depression with socio-demographic factors and students' attitudes regarding the quality of their studies.

Material and Method

Survey

In January 2021, a cross-sectional survey was conducted to assess the attitudes of Greek medical students regarding their education during the COVID-19 pandemic. The data was gathered anonymously through a self-administered online questionnaire between January 11 and 27, 2021, during a nationwide lockdown period. On January 11, 2021, the questionnaire was administered for the first time through Facebook. The groups utilized for this purpose were already existent, constituted solely by students of each respective medical school, separated by year of study, and are mainly used for informative and organizing purposes. The invitation for the survey only addressed sixth- and fifth-year medical students. Furthermore, the investigators communicated with the secretaries of the Medical Schools so that the questionnaire would be subsequently sent to the academic email accounts of all the presumptive participants. The survey stopped receiving new responses on January 27, 2021, reaching a total of 978.

The questionnaire contained 7 distinct sections, with a total of 45 multiple-choice and scale question items and an open-ended question. The first section consisted of 11 questions about the demographics of the sam-

ple, connections with people at high risk for COVID-19, positive and quarantine cases, and the fear that the students had regarding re-infection. The second section was composed of 15 questions that were oriented to the online lessons and addressed the impact that COVID-19 had on medical studies, student satisfaction in relation to the handling of the situation by the Medical Schools, technical problems during online lessons and online exams, the quality of lessons and exams, as well as a comparison to the live lessons and exams and students' willingness to continue online lessons after the pandemic. Section three embodied 5 questions with respect to clinical rotations, for which only students who had answered previously to have taken part in rotations during the pandemic were allowed to answer (61.5%). The questions addressed the response of the clinics during the pandemic, the provision and training for the use of COVID-19 personal protective equipment, the maintenance of prevention measures, the frequency of PCR testing for SARS-CoV-2, the management of positive cases, the overall feeling of safety, the providence for students being at high risk or living with people at high risk for COVID-19, as well as the student satisfaction with clinical rotations. The fourth section addressed actions in the future regarding COVID-19 and consisted of 11 questions that referred to anxiety about the possible non-replacement of lost practice hours, students' willingness to become volunteers, willingness to continue clinical rotations in case of a new lockdown, a change in plans regarding a medical career due to COVID-19, willingness and preparedness for practicing medicine, change of plans due to COVID-19 and willingness to get vaccinated against SARS-CoV-2. Section five had 1 question geared exclusively towards students who had changed their specialty choice (9.9%), regarding their new preference. Section six encompassed a Greek translation of the Centre for Epidemiologic Studies–Depression scale (CES-D)⁶ as well as an extra question concerning the change in the feelings of CES-D compared to the period before the COVID-19 pandemic. The survey closed with the seventh section, which was composed of a sole optional open-ended question that asked for actions that should have been taken differently during the COVID-19 lockdown and recommendations for the future.

CES-D included 20 questions regarding feelings or situations occurring in the week before the completion of the questionnaire. Each of the questions was graded with a score from 0 to 3, based on the frequency of appearance. Cases of major depression were identified using the cut-off score 23/24 for the CES-D and a derived algorithm based on only three factors of the scale, in order to increase the specificity.⁶ Cases of depression were identified with both methods, while those being positive in only one of the two methods were consid-

ered false-positive cases. These cases were identified as having severe distress.

All students who participated in the survey were informed in advance about the purpose of the study and were assured of the confidentiality and anonymity of their answers. According to the Greek legislation (Law 2328/1995, Presidential Decree 310/1996, Law 3603/2007, Law 2472/1997, Law 3471/2006), there is no need for ethics approval for telephone and internet surveys such as the one presented here (Association of Opinion Polls and Survey Organizations - www.sedea.gr). Therefore, the study protocol was not submitted to the ethical committee of any institution for approval.

Sample

Medical students from all seven Medical Schools in Greece were asked to voluntarily fill in the questionnaire. Of note, only students in their final two years of their medical studies –namely, the 5th and 6th years - were considered eligible to take part in the study, as to assert that all participants would be attending a clinical year. Medical Schools included were the Aristotle University of Thessaloniki (A.U.T.H.), the Democritus University of Thrace (D.U.T.), the National and Kapodistrian University of Athens (N.K.U.A.), the University of Crete (U.O.C.), the University of Ioannina (U.O.I.), the University of Patras (U.O.P.), and the University of Thessaly (U.O.T.).

The Greek medical training system consists of Undergraduate and Postgraduate education and there is no pre-medical training. There are seven Medical Schools across the country, and all of them are national. In the first two years, mainly basic sciences prevail. In the following two years, there is a mixture of theoretical and practical education, while the last two years are spent almost entirely in the affiliated teaching hospitals with clinical rotations throughout a wide range of medical specialties.⁷

Statistical analysis

Mean and standard deviation (SD) or percentages were used to describe participants' characteristics/answers, as appropriate. We calculated the prevalence of depression in the sample as the proportion of students with depression out of the total number of participants, along with the 95% confidence interval (95% CI).

We performed an univariable analysis to identify factors associated with depression using the chi-squared test. Multiple logistic regression was used to assess variables independently associated with depression. Variable selection was performed using the algorithm proposed by Hosmer, Lemeshow and Sturdivant.⁸ Analyses were conducted using Stata version 16.0 (College Station, TX: StataCorp LLC) and the IBM® SPSS® v.26 software.

Results

Description of the sample

In total, 978 medical students participated by completing the questionnaire (estimated target population 2964). Table 1 shows detailed sample characteristics, including gender, year of study, residence information, and COVID-19 epidemic-related information. The mean (SD) age of the participants was 23.2 (2.1) years; 65.6% were females, 33.4% were males, and 0.9% identified as "Other/Prefer to not say". Regarding university of origin, 27% were medical students from the N.K.U.A., 21% from the A.U.T.H., 17.2% from the U.O.P., 10.1% from the U.O.C., 9.7% from the U.O.I., 8.2% from the D.U.T. and 6.9% from the U.O.T.

Approximately two-thirds of the participants studied in a city other than that of their permanent residence. A small proportion (5.7%) reported being at high risk for COVID-19 whereas 16.3% lived with housemates who were at high risk for COVID-19.

Prevalence and correlates of depression

The prevalence of clinical depression according to the simultaneous application of both CES-D methods (CES-D cut-off 23/24 and CES-D algorithm) was 21.37% (95% CI: 18.7%, 24.0%). The prevalence of severe distress (only positive in CES-D cut-off 23/24 or only in the algorithm) was 17.9% (95% CI: 15.5%, 20.4%). The results of the univariable analysis for selected sociodemographic characteristics and other variables are presented in table 2 (the complete univariable analysis is provided in Supplementary table 1). The prevalence of depressive symptoms was higher in females than in males (25.4% vs 13.1%, respectively, $p < 0.001$), in medical students reporting being at high risk for COVID-19 (32.1% vs. 20.6% in those not at high risk, $p = 0.041$) and in those living with people at high risk for COVID-19 during their studies (28.8% vs. 19.8% among those not living with a high-risk person, $p = 0.011$). Medical students who expressed concerns about becoming infected with SARS-CoV-2 had a higher prevalence of depression as compared to those with little or no concerns (26.8% vs. 16.8%, respectively, $p = 0.008$). Similarly, participants who reported feeling unsafe during clinical rotations in the pandemic had higher depression rates compared to those who felt safe or were neutral (24.3 vs. 13.1 and 19.2, respectively, $p = 0.026$). Of note, 53.4% of the participants reported a change of plans regarding their medical career due to the pandemic, and 16.9% expressed a decreased willingness to practice medicine. Among these students, high depression rates have been identified (28.7% and 41.2%, respectively) (table 2).

Table 1. Sociodemographic characteristics and COVID-19 related information of 978 medical students (January 2021).

Characteristics	n	%
Gender		
Male	327	33.4
Female	642	65.6
Other	9	0.9
Medical School		
Athens (N.K.U.A.)	264	27.0
Alexandroupoli (D.U.T.)	80	8.2
Heraklion (U.O.C.)	99	10.1
Thessaloniki (A.U.T.H.)	205	21.0
Ioannina (U.O.I.)	95	9.7
Larisa (U.O.T.)	67	6.9
Patra (U.O.P.)	168	17.2
Age, mean (SD)	23.1	(2.0)
Year of studies		
5th	617	63.1
6th	361	36.9
Permanent residence/residence during studies		
Same	319	32.6
Different	659	67.4
Residence during studies		
Without housemates	516	52.8
With housemates not at high risk for COVID-19	293	30.0
With housemates at high risk for COVID-19	160	16.3
Dormitory	9	0.9
At high risk for COVID-19		
Yes	56	5.7
No	922	94.3
Everyday contact with people at high risk for COVID-19		
Yes	292	29.9
No	686	70.1
Been in quarantine after contact with a confirmed case of COVID-19		
Yes	273	27.9
No	705	72.1
Tested positive for SARS-CoV-2		
Yes	56	5.7
No	922	94.3

In the multivariable analysis, the factors independently associated with higher odds of depression were female gender (OR vs male: 2.39, $p < 0.001$), living alone (OR 1.51, $p = 0.038$) or with housemates at high risk for COVID-19 (OR 1.59, $p = 0.063$) (vs. living with housemates

not at high risk of COVID or in dormitory), being anxious about becoming infected with SARS-CoV-2 (OR vs. neutral, somewhat worried or not at all: 2.10, $p = 0.009$), evaluating the adjustment of the teaching personnel to online teaching as ineffective – very ineffective (OR vs. effective, very effective: 2.42, $p < 0.001$) and evaluating the university's response to the pandemic as neutral (OR 2.69, $p = 0.017$) or ineffective – very ineffective (OR 3.31, $p = 0.002$) (vs. effective, very effective) (table 3). Studying in a Medical School other than the three largest medical schools (Athens, Thessaloniki, and Patra) was associated with lower odds of depression (OR 0.60, $p = 0.020$).

Discussion

According to our study, the prevalence of depression among medical students during the COVID-19 pandemic in Greece was 21.2%. The factors independently associated with higher odds of depression were female gender, living alone or with housemates at high risk for COVID-19, being anxious about becoming infected with SARS-CoV-2, being dissatisfied with the adjustment of the teaching personnel to online teaching and with the university's response to the pandemic, as well as studying in the three largest medical schools. Moreover, medical students with depression expressed more frequently a decreased willingness to practice medicine and feeling unsafe during clinical rotations during the COVID-19 period.

The literature suggests that medical students manifest high rates of depression even during periods of low stress. In a study comparing depression rates between three international cohorts of medical students, those from the Middle East had the highest rates of positive depression screens (41.1%), followed by those from China (14.1%), whereas in the US the relevant rates were low (3.8%).⁵ However, when comparing medical students, physicians, and the general population, data from the US has consistently demonstrated higher overall psychological distress and depression among medical students.⁹ In the only study from Greece during a normal period (non-pandemic) in a population of university students including, among others, students from the School of Health, the prevalence of depression was 20.4% (7.7% was borderline, 9.4% moderate, and 3.3% extreme).¹⁰ Whether medical students begin their training with a greater predisposition to depression or develop it throughout the studies is still unclear. A meta-analysis,¹¹ which included 77 cross-sectional studies covering a total of 62,728 medical students, demonstrated a global prevalence of depression among 28.0% (CI 24.2–32.1%) of medical students, while another analysis,¹² which included 167 cross-sectional studies ($n = 116,628$) and 16 longitudinal studies ($n = 5728$) from 43 countries, estimated the prevalence of depression or depressive symptoms to be 27.2%.

Table 2. Association of participants' characteristics/answers with depression (univariable analysis, N= 978 medical students).

Variable	Number	With Depression, n (%)	p
Gender			<.001
Male	327	43 (13.1)	
Female	642	163 (25.4)	
Other	9	2 (22.2)	
Medical School			.135
Athens (N.K.U.A.)	264	72 (27.3)	
Alexandroupoli (D.U.T.)	80	16 (20)	
Heraklion (U.O.C.)	99	20 (20.2)	
Thessaloniki (A.U.T.H.)	205	39 (19)	
Ioannina (U.O.I.)	95	15 (15.8)	
Larisa (U.O.T.)	67	10 (14.9)	
Patra (U.O.P.)	168	36 (21.4)	
Residence during studies			.011
With housemates not in high risk for COVID-19	818	162 (19.8)	
With housemates in high risk for COVID-19	160	46 (28.8)	
At high risk for COVID-19			.041
Yes	56	18 (32.1)	
No	922	190 (20.6)	
Worried about getting infected by SARS-CoV-2			.008
Very much / A lot	321	86 (26.8)	
Neither much, nor little	372	74 (19.9)	
A little / Not at all	285	48 (16.8)	
Impact of COVID-19 pandemic on studies			.050
Very positive / Positive	42	4 (9.5)	
Neither positive, nor negative	69	10 (14.5)	
Negative / Very Negative	867	194 (22.4)	
University response			<.001
Very effective / Effective	112	8 (7.1)	
Neither effective, nor ineffective	243	47 (19.3)	
Ineffective / Very ineffective	623	153 (24.6)	
Experience from online lessons			<.001
Very positive / Positive	296	41 (13.9)	
Neither positive, nor negative	293	58 (19.8)	
Very negative / Negative	389	109 (28)	
Professors' adjustment to online teaching			<.001
Very effective / Effective	506	84 (16.6)	
Neither effective, nor ineffective	313	71 (22.7)	
Ineffective / Very ineffective	159	53 (33.3)	
Feeling of safety during clinical rotations in COVID-19 period			.026
Very safe / Safe	213	28 (13.1)	
Neither safe, nor unsafe	182	35 (19.2)	
Unsafe / Very Unsafe	140	34 (24.3)	
Change of plans regarding medical career due to COVID-19			<.001
Yes	522	150 (28.7)	
No	456	58 (12.7)	
Willingness to practice medicine			<.001
Increased	325	58 (17.8)	
Same	488	82 (16.8)	
Decreased	165	68 (41.2)	
Change of mind about specialty			<.001
Yes	97	35 (36.1)	
No	492	87 (17.7)	
Haven't decided yet	389	86 (22.1)	

Table 3. Results of the multiple logistic regression analysis with depression as dependent variable (N= 978 medical students).

Variables	b	SE	Wald's χ^2	p	OR (95% CI)
Gender					
Male					Reference category
Female	.87	.20	4.45	<.001	2.39 (1.62, 3.51)
Medical School					
Athens (N.K.U.A.)					Reference category
Thessaloniki (A.U.T.H.)	-.26	.24	-1.10	.273	.77 (.48, 1.23)
Patra (U.O.P.)	-.27	.25	-1.10	.273	.76 (.47, 1.24)
Other	-.51	.22	-2.32	.020	.60 (.39, .92)
Living conditions					
With housemates not at high risk of COVID-19 or in dormitory					Reference category
Alone	.41	.20	2.08	.038	1.51 (1.02, 2.23)
With housemates at high risk for COVID-19	.46	.25	1.86	.063	1.59 (.98, 2.59)
University response to the pandemic					
Very effective/Effective					Reference category
Neutral	.99	.41	2.39	.017	2.69 (1.20, 6.02)
Ineffective/Very Ineffective	1.20	.40	3.03	.002	3.31 (1.52, 7.18)
Adjustment of the teaching personnel to online teaching					
Very effective/Effective					Reference category
Neutral	.22	.19	1.15	.249	1.24 (.86, 1.81)
Ineffective/Very Ineffective	.88	.23	3.87	<.001	2.42 (1.55, 3.78)
Worried about getting infected by SARS-CoV-2					
Very worried	.74	.28	2.62	.009	2.10 (1.20, 3.66)
Worried	.21	.19	1.11	.269	1.23 (.85, 1.79)
Neutral/Somewhat worried/Not at all					Reference category

A recent systematic review and meta-analysis on the prevalence of depression in medical students during the COVID-19 pandemic, which included eleven studies, estimated the overall prevalence of depression in medical students to be 31% (95% CI: 23%-40%).¹³ In a cross-sectional study that was conducted by recruiting medical students at Chiang Mai University during the pandemic, a total of 27% of the participants were identified as having depression, using the Patient Health Questionnaire (PHQ-9) to measure depressive symptoms.¹⁴ A cross-sectional study in Mexico during the COVID-19 pandemic reported a prevalence of 67.9% for anxiety and 81.3% for depression, using the Goldberg Anxiety and Depression Scale (GADS).¹⁵ In a smaller study with a sample of 144 medical students that used the Hospital Anxiety and Depression Scale (HADS) for screening anxiety and depression symptoms during the pandemic, symptoms of depression were found in 38.9% of females and 41.9% of males.¹⁶

Regarding the estimated prevalence of depression, it is important to mention that the heterogeneity of the study populations and the variety of the methodology used by the researchers make comparisons difficult. However, it is worth noting that the methodology utilized by the current study (combined use of a cut-off point and an

algorithm) returned lower but more reliable rates, as it corrects for the rate of false positive events reducing the possibility of misclassification.

In the current study, a higher prevalence of depression was observed in females (25.0% vs 13.0%), which is in agreement with several studies that identified female gender as a risk factor for depression.^{9,17-20} A study conducted in Greece with 559 medical students revealed that female medical students were experiencing significantly more severe symptoms in all mental health measures scores (GAD-7, PHQ-9, IES-COVID19) that this survey used to assess depression. About the specified cutoff values of 5, 10, 15, and 20 that align with different levels of depression symptoms (mild, moderate, moderately severe, and severe), the research findings indicated that females exhibited a higher average PHQ-9 score (9.95 ± 6.16) in comparison to males (7.93 ± 5.98 , $p=0.001$).¹⁷⁻²¹ Consistently, in a study conducted by Karakasi et al., a sample of 342 medical students from Northern Greece was examined, revealing a greater prevalence of self-reported increase in pessimistic thoughts, anxiety, agitation, and sleep disturbances among female participants.²² Meanwhile, another study including general university students from the University of Patras highlighted that depressive symptoms during

the COVID-19 pandemic increased to 51.2%, but this score did not differ between males and females, while the anxiety score was higher in females.²³ Furthermore, a higher prevalence of depression was identified among participants who reported being at high risk for COVID-19 infection, who expressed stronger concerns about becoming infected with SARS-CoV-2, and who were residing with people at high risk for COVID-19 during their studies. In the literature, high levels of concern about other family members getting COVID-19 were significantly associated with higher stress,²⁴ and having symptoms compatible with COVID-19 was identified among risk factors for at least one mental health outcome in a large survey study of a 69,054-student sample in France.¹⁹

From a different point of view, researchers suggest that regardless of the actual risk during the pandemic, people with depression tend to express higher levels of COVID-19-related fear.^{25–27} Therefore, individuals' perceptions tend to depend heavily on underlying depressive symptoms, particularly when they are faced with stressful external events, like the COVID-19 pandemic in our case. Moreover, we report that medical students with depression seem to have a different perception of several other issues as they evaluate the university's response to the COVID-19 pandemic more strictly, the adjustment of the teaching personnel to online teaching as ineffective – very ineffective, and the university's response to the pandemic as neutral or ineffective – very ineffective.

This study highlights the need to protect the most vulnerable of medical students during a pandemic. Medical students must be able to seek professional mental health services, even in the era of a pandemic. Universities should increase the accessibility to support services and provide a student-centered approach in their strategies, as the pandemic has placed a spotlight on an existing phenomenon.

Moreover, the pandemic calls for flexibility, preparedness, and innovation. Since the majority of medical students rated the University's response to the pandemic as "ineffective/very ineffective" and "slow/very slow" on relevant questions and, in contrast to our expectations, more than 70% stated that the University's response to the second wave of the pandemic was not better than their response in the first wave (Supplementary table 1B), we have to ensure that Universities will be more adaptive. The pandemic highlights the importance of updating the educational environment and using synchronous and asynchronous online methods of learning, especially –but not exclusively– when this is the only option given and must be seen as an opportunity for growth.

Now that the acute crisis is over, medical students must stand at the frontline, as they can play a major role in policy-making and crisis management, in close cooperation

with medical school administrators and educators. The recovery calls for meaningful inclusion of medical students in the post-pandemic reform,^{28,29} which, through the recent policy proposal of the International Federation of Medical Students Associations (IFMSA), included a stronger focus on public health & epidemic preparedness, interprofessional education, collaboration, and knowledge exchange, tech-based andragogy, student-faculty partnership, and mental health education.³⁰

The current study investigates the rates of probable depression on a large scale, specifically among medical students in Greece, while also emphasizing the analysis of associated factors. In total, 978 medical students participated by completing the questionnaire, which is approximately one-third of the total population of medical students in their 5th and 6th years of study in Greece. In addition, geographical coverage was achieved with participants from all Medical Schools. The number of participants per Medical School reflects the anticipated numerical discrepancies between student populations across the respective Medical Schools.

A limitation of our study is that the sample was recruited through Facebook as well as emails. This source of recruitment may have introduced selection bias, i.e., a systematic difference between students participating in the study and those who did not. It should be noted, however, that the survey was implemented during a nationwide lockdown period, which did not allow us to reach the target population using other approaches. Nevertheless, we feel that the sample still provides a representative image of the influence that the COVID-19 pandemic had on depression severity among medical students in Greece. An additional limitation is the paucity of relevant pre- and post-pandemic data, which is essential for a more robust assessment of the pandemic's impact and to derive definitive conclusions.

In conclusion, the current study reports depression in one out of five medical students during the COVID-19 pandemic. Higher prevalence rates were found among female students who perceived the environment of the pandemic in a more worrisome way, were less satisfied with the interventions, changed their plans regarding an upcoming a medical career, and simultaneously were feeling less inclined towards practicing clinical medicine.

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Ερευνητική εργασία

Κατάθλιψη στους φοιτητές ιατρικής κατά τη διάρκεια της COVID-19 απαγόρευσης κυκλοφορίας στην Ελλάδα

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ΠΕΡΙΛΗΨΗ

Η πανδημία COVID-19 έχει προκαλέσει μια κρίση ψυχικής υγείας. Σκοπός αυτής της μελέτης ήταν να εκτιμήσει τον επιπολασμό της κατάθλιψης στους φοιτητές ιατρικής κατά τη διάρκεια της πανελλαδικής απαγόρευσης κυκλοφορίας. Δευτερεύοντες στόχοι ήταν η εκτίμηση της συσχέτισης της κατάθλιψης με κοινωνικοδημογραφικούς παράγοντες και με την άποψη των φοιτητών σχετικά με την ποιότητα των σπουδών τους. Τα δεδομένα συγκεντρώθηκαν ανώνυμα μέσω ενός διαδικτυακού ερωτηματολογίου μεταξύ 11 και 27 Ιανουαρίου 2021. Ο υπολογισμός του επιπολασμού της κατάθλιψης πραγματοποιήθηκε μέσω της χρήσης της κλίμακας CES-D. Η πολλαπλή λογιστική παλινδρόμηση χρησιμοποιήθηκε για τον εντοπισμό παραγόντων που σχετίζονται ανεξάρτητα με την κατάθλιψη. Συνολικά συμμετείχαν 978 φοιτητές από το πέμπτο και το έκτο έτος από όλες τις σχολές Ιατρικής της χώρας. Η μέση ηλικία τους ήταν τα 23,2 έτη και το 65,6% ήταν γυναίκες. Ο επιπολασμός της κλινικής κατάθλιψης ήταν 21,3% (95% CI: 18,7%, 24,0%) ενώ το 17,9% (95% CI: 15,5%, 20,4%) βίωσε σοβαρή ψυχική καταπόνηση. Η κατάθλιψη ήταν πιο διαδεδομένη στις γυναίκες (25,4% έναντι 13,1% στους άνδρες, $p < 0,001$). Περίπου οι μισοί (53,4%) των συμμετεχόντων ανέφεραν αλλαγή σχεδίων σχετικά με την ιατρική τους σταδιοδρομία λόγω της πανδημίας και το 16,9% μειωμένη προθυμία να ασκήσει κλινικά την ιατρική. Παράγοντες που συνδέθηκαν ανεξάρτητα με την κατάθλιψη ήταν το γυναικείο φύλο, η διαβίωση με ή χωρίς συγκατοίκους σε υψηλό κίνδυνο για COVID-19 νόσηση, η μεγάλη ανησυχία για μόλυνση από τον ιό SARS-CoV-2, η φοίτηση σε μία από τις τρεις μεγαλύτερες ιατρικές σχολές, καθώς και η αρνητική αξιολόγηση της προσαρμογής του διδακτικού προσωπικού στη διαδικτυακή διδασκαλία και της ανταπόκρισης του πανεπιστημίου στην πανδημία. Στην μελέτη αυτή ανευρέθη κατάθλιψη σε έναν στους πέντε φοιτητές ιατρικής κατά τη διάρκεια της πανδημίας COVID-19, τονίζοντας με τον τρόπο αυτό την ανάγκη προστασίας των πιο ευάλωτων φοιτητικών ομάδων κατά τη διάρκεια μιας πανδημίας. Οι φοιτητές ιατρικής πρέπει να μπορούν να αναζητούν επαγγελματικές υπηρεσίες ψυχικής υγείας, ακόμη και στην εποχή μίας πανδημίας. Τα πανεπιστήμια οφείλουν να αυξήσουν την προσβασιμότητα στις υπηρεσίες υποστήριξης και να υιοθετήσουν μια προσέγγιση με επίκεντρο τον φοιτητή, καθώς μέσω της πανδημίας αναδύθηκε ένα ήδη υπάρχον φαινόμενο.

ΛΕΞΕΙΣ ΕΥΡΕΤΗΡΙΟΥ: Κατάθλιψη, ψυχική καταπόνηση, φοιτητές ιατρικής, ερωτηματολόγιο, covid-19 απαγόρευση κυκλοφορίας, SARS-CoV-2.

Letter to the Editor

The outcome in patients with religious delusions

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To the Editors,

We read with interest the recent report on the definition, diagnosis, and clinical implications of religious delusions (RD).¹ In our sample of 929 delusional schizophrenia patients who had been admitted to two psychiatric hospitals in Germany between 2010 and 2014, 138 patients (15%) reported RD. In 569 cases, information on religious affiliation was available. Patients with religious affiliation did not differ from patients without religious affiliation in the frequency of RD [$\chi^2(1,569)=0.02$, $p=0.885$]. Furthermore, patients with RD did not differ from patients with other types of delusion (OD) in the duration of hospitalization [$t(924)=-0.39$, $p=0.695$], or the number of hospitalizations [$t(927)=-0.92$, $p=0.358$]. Additionally, in 185 cases, information on Clinical Global Impressions (CGI) and Global Assessment of Functioning (GAF) was available at the beginning and end of the hospital stay. By CGI scores, no difference was seen in the morbidity of subjects with RD relative to subjects with OD on admission [$t(183)=-0.78$, $p=0.437$] and discharge [$t(183)=-1.10$, $p=.273$]. Likewise, GAF scores on admission did not differ in these groups [$t(183)=1.50$, $p=0.135$]. However, a trend was noted for lower GAF

scores on discharge in subjects with RD [$t(183)=1.91$, $p=.057$, $d=0.39$, CI 95% (-0.12–0.78)]. While RD has often been associated with a poorer prognosis in schizophrenia,^{2,3} we argue that this need not apply to all domains. Mohr et al⁴ reported that patients with RD were less likely to maintain psychiatric treatment, but did not have a more severe clinical status than patients with OD. Iyassu et al⁵ found higher levels of positive, but also lower levels of negative symptoms in patients with RD compared to patients with OD. Groups did not differ in terms of length of illness or level of medication. Siddle et al⁶ reported higher symptom scores in patients with RD at their first presentation, but a similar response to treatment when compared to patients with OD after 4 weeks of treatment. Furthermore, Ellersgaard et al⁷ indicated that first-episode psychosis patients with RD at baseline were more likely to be non-delusional at follow-ups conducted after years 1, 2, and 5 when compared to patients with OD at baseline. We conclude that RD may thus interfere with short-term clinical outcomes. With regard to long-term effects more favorable observations exist⁸ and the interplay of psychotic delusions with non-psychotic beliefs still warrants further research.

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George Konstantakopoulos
Editor-in-Chief



ΨΥΧΙΑΤΡΙΚΗ

Τριμηνιαία έκδοση της Ελληνικής Ψυχιατρικής Εταιρείας

ΤΟΜΟΣ 34

ΙΑΝΟΥΑΡΙΟΣ-ΔΕΚΕΜΒΡΙΟΣ 2023

Ευχαριστίες προς Κριτές

Η Συντακτική Επιτροπή της Ψυχιατρικής θα ήθελε να ευχαριστήσει όλους όσους συνέβαλαν στον 34ο τόμο και ειδικά τους παρακάτω ειδικούς κλινικούς και ερευνητές, που εργάστηκαν ως κριτές εργασιών του περιοδικού μας.

A

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Γιαννούλη Βαϊτσα
Γιωτάκος Ορέστης
Γιωτσίδα Βασιλική
Γκοτζαμάνης Βίκτωρας
Γονιδάκης Φραγκίσκος
Γουρζής Φίλιππος
Γουρνέλλης Ρωσσέτος
Γρίβα Φαίη
Γώγου Μαρία

Δ

Di Natale Chiara
Δημητρακόπουλος Στέφανος
Δουζένης Αθανάσιος

E

Ευσταθίου Γιώργος

Z

Ζέρβας Ιωάννης

H

Hallit Souheil
Hassan Sehar un Nisa

Θ

Θεοδωράτου Μαρία

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Καλαϊτζάκη Αργυρούλα
Καράβατος Αθανάσιος
Καρακατσούλης Γρηγόριος
Κασελίμης Δημήτριος
Katarodi Maria
Κατέρη Ευαγγελία
Κιούλος Κανέλλος
Κόλλιας Κωνσταντίνος
Κοντοάγγελος Κωνσταντίνος
Κρασανάκης Στέλιος
Kravariti Eugenia
Κυριακόπουλος Μαρίνος
Κωνσταντινίδης Βασίλειος
Κωνσταντίνου Γεράσιμος
Κωστελέτος Ιωάννης
Κώτσης Κωνσταντίνος

Λ

Λαμπροπούλου Αικατερίνη

M

Μαλικέντζου Ναυσικά
Μαλογιάννης Γιάννης
Μαρούδα Κυριακή
Μαυρέας Βενετσάνος
Μητρόπουλος Γεώργιος
Michalorouλου Panagiota
Mitelman Mijal
Μιχόπουλος Ιωάννης
Μουρίκης Ηρακλής
Μπάστα Μαρία
Μπενιουδάκης Εμμανουήλ
Μποζίκας Βασίλειος
Μπουγέα Αναστασία

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Ντούρος Ευάγγελος

Ξ

Ξενάκη Λήδα-Αλκηστη

O

Οικονόμου Μαρίνα

Π

Πάλλη Αλεξάνδρα
Παναγιωτάκος Δημοσθένης
Παπαρρηγόπουλος Θωμάς
Πατρικέλης Παναγιώτης
Πετρικής Πέτρος
Πεχλιβανίδης Αρτέμιος
Πολίτης Αντώνιος
Πόταγας Κωνσταντίνος

P

Ρούκας Δημήτρης

Σ

Σακελλάρη Ευανθία
Σαμαρά Μυρτώ
Σίμος Παναγιώτης
Σιώμος Κωνσταντίνος
Σταχτέας Παναγιώτης
Στεφανάτου Πενταγιώτισσα
Στυλιανίδης Στέλιος

T

Ταμιωλάκη Αλεξάνδρα
Τζαβέλλας Ηλίας
Τριανταφύλλου Ευγενία
Τριανταφύλλου Καλλιόπη
Τσόπελας Χρήστος
Τσουβέλας Γιώργος

Φ

Φλωράκης Ανδρέας
Φλώρος Γεώργιος
Φουντουλάκης Κωνσταντίνος
Φρανσίσ Κώστας

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Χατζούλης Μιχάλης
Χριστοδούλου Νίκος
Χριστοδούλου Χρήστος

Σας ευχαριστούμε από καρδιάς για την ανεκτίμητη βοήθειά σας!

Γιώργος Κωνσταντακόπουλος
Διευθυντής Σύνταξης