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Association study in Alzheimer's disease of single nucleotide polymorphisms implicated with coffee consumption

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Abstract

Background: There is evidence from animal and *in vitro* models of the protective effects of caffeine in Alzheimer's disease. The suggested mechanisms through which caffeine may protect neurons against Alzheimer's disease pathology include the facilitation of beta-amyloid clearance, upregulation of cholinergic transmission, and increased neuronal plasticity and survival. Epidemiological studies support that Alzheimer's disease patients consume smaller amounts of coffee beverages throughout their lives as compared to age-matched cognitively healthy individuals. **Objective:** The aim of the present study was to determine whether the negative association between Alzheimer's disease and coffee consumption may be influenced by a common genetic predisposition, given the fact that the pattern of coffee consumption is determined by both environmental and genetic factors. **Method:** We conducted an *in silico* search addressing the association between genetic polymorphisms related to coffee consumption and the diagnosis of Alzheimer's disease. We further investigated the interactions between genes located in regions bearing these polymorphisms. **Results:** Our analysis revealed no evidence for a genetic association (nor interaction between related proteins) involving coffee consumption and Alzheimer's disease. **Discussion:** The negative association between Alzheimer's disease and coffee consumption suggested by epidemiological studies is most likely due to environmental factors that are not necessarily regulated by genetic background.

Yamamoto VJ et al. / Arch Clin Psychiatry. 2015;42(3):69-73

Keywords: Caffeine, Alzheimer's disease, SNP.

Introduction

More than 90% of new therapeutics developed for Alzheimer's disease (AD) have been unsuccessful¹. The lack of an effective treatment contributed to increase the attention to life style and dietary interventions that could modify the etiology of the disease². Epidemiological studies have indicated a negative association between coffee consumption and AD, suggesting that caffeine may have neuroprotective effects against cognitive decline²⁻⁵. This xanthine-derived substance, highly concentrated in coffee, is a stimulant to the central nervous system that may be beneficial against certain deficits associated with AD^{3,6,7}. Putative mechanisms for caffeine neuroprotection in AD include the facilitation of beta-amyloid clearance^{7,8}, and the upregulation of cholinergic neurotransmission⁹ and/or signalling pathways related to neuronal plasticity and survival¹⁰⁻¹². Most of those effects are probably mediated the stimulation of adenosine receptors¹³. However, evidence of beneficial effects of caffeine in human cognition is largely derived from epidemiological associations, with scarce direct evidence for the protective effects of coffee/caffeine in patients with AD¹⁴. Coffee consumption is determined by both environmental and genetic factors. Environmental factors related to coffee consumption include mainly age and sex, but it is also influenced by geographical location, religious preferences and socioeconomic conditions. Great effort has been made to identify genetic factors involved in coffee intake. Meta-analyses of genome-wide association indicated some common genetic variants that influence coffee consumption, localized in CYP1A1/CYP1A2, NRCAM and AHR genes¹⁵⁻¹⁷. AD is a multifactorial neurodegenerative disorder resulting from the interaction between multiple genetic and environmental factors¹⁸⁻²⁰. Since there are genetic factors associated with both AD and coffee consumption, one cannot rule out the possibility that the negative association observed in epidemiological studies are due to a common genetic background, or even interactions among related gene products. In

the present study, our aim was to evaluate genetic associations of single nucleotide polymorphisms (SNP) related to coffee consumption in the Alzheimer's Disease Neuroimaging Initiative (ADNI) cohort, comprising patients with AD or mild cognitive impairment (MCI) and healthy age-matched controls. Also to investigate possible interactions among the products of genes associated with AD and those located near the coffee consumption SNP.

Methods

Sample

Data used in the preparation of this article were obtained from the ADNI database (adni.loni.ucla.edu). The ADNI was launched in 2003 by the National Institute on Aging (NIA), the National Institute of Biomedical Imaging and Bioengineering (NIBIB), the Food and Drug Administration (FDA), private pharmaceutical companies and non-profit organizations, as a \$60 million, 5-year public-private partnership. The primary goal of ADNI has been to test whether serial magnetic resonance imaging (MRI), positron emission tomography (PET), other biological markers, and clinical and neuropsychological assessment can be combined to measure the progression of MCI and early AD. Determination of sensitive and specific markers of very early AD progression is intended to aid researchers and clinicians to develop new treatments and monitor their effectiveness, as well as lessen the time and cost of clinical trials.

The Principal Investigator of this initiative is Michael W. Weiner, MD, VA Medical Center and University of California – San Francisco. ADNI is the result of efforts of many co-investigators from a broad range of academic institutions and private corporations, and subjects have been recruited from over 50 sites across the U.S. and Canada.

The initial goal of ADNI was to recruit 800 subjects but ADNI has been followed by ADNI-GO and ADNI-2. To date these three protocols have recruited over 1,500 adults, ages 55 to 90, to participate in the research, consisting of cognitively normal older individuals, people with early or late MCI, and people with early AD. The follow up duration of each group is specified in the protocols for ADNI-1, ADNI-2 and ADNI-GO. Subjects originally recruited for ADNI-1 and ADNI-GO had the option to be followed in ADNI-2. For up-to-date information, see www.adni-info.org.

A total of 757 individuals were genotyped using the Illumina Human Genome 610 Quad BeadChips in the ADNI database downloaded in November 2011. We excluded individuals with less than 65 years of age, since they might correspond to the early onset forms of AD. The most recent clinical data of those subjects, at the time, revealed 198 healthy controls (CT), 193 classified as MCI and 318 diagnosed with AD. All those individuals had less than 10% missing genotypes. There was no information regarding coffee consumption in the ADNI database at the time of download.

Genotype data of SNPs that had been strongly associated with coffee consumption¹⁵⁻¹⁷ was retrieved from the ADNI database. From the chosen SNPs (rs12148488, rs2470893, rs2472297, rs2472304, rs382140, rs4410790, rs5751876, rs6495122, rs762551), only rs5751876 was not present in the ADNI database. The remaining SNPs passed our quality control with a call rate above 90% and minor allele frequency greater than 2%. rs16868941 was in Hardy Weinberg disequilibrium ($p < 0.10$; table 1) and was excluded from further analysis. Quality control analysis was performed with PLINK v1.07 and R software.

Firstly, we compared the genome location of the coffee consumption and AD SNPs from the top 10 associated SNPs in the repository of meta-analyses AlzGene (last updated 18th April 2011 – <http://www.alzgene.org>)²¹.

We used the Search Tool for the Retrieval of Interacting Genes/Proteins (STRING; <http://string-db.org>)²² to investigate known protein interactions and pathway enrichment among the coffee consumption genes (up to 50 kb of distance, if the SNP is not inside

a gene) and the top 10 AD associated genes from Alzgene²¹. Significance for this analysis was set as $p < 0.05$ after FDR correction.

APOE alleles frequencies were retrieved from AlzGene meta-analysis and ADNI database. We used a chi-square test in LibreOffice Calc 3.5 (significance, $p < 0.05$) to compare the frequencies in control and AD individuals in those sets.

Association of each caffeine SNP among controls, MCI or AD was tested with Wald test for multinomial logistic regression controlled by age, gender, years of education and presence of the e4 allele of APOE. We also tested the model considering a dominant (MAF allele carrier vs non-carrier) or recessive (homozygous for the MAF allele vs other genotypes) pattern of inheritance for each MAF allele of each SNP. Significance was set as $p < 0.0018$, to correct for multiple comparisons with the conservative Bonferroni method. We also tested for association of controls, MCI or AD with caffeine SNP, age, gender, years of education and APOE genotype with a classification and regression tree (CART). These analyses were conducted with the aid of the R software version 2.15.2.

Results

Demographic data is summarized in table 2. The MCI group had significantly fewer females than control ($p = 0.010$) or AD ($p = 0.049$) groups. AD subjects on average had fewer years of education than controls ($p = 0.019$). There was no difference in APOE alleles frequencies between ADNI and AlzGene (table 1, $p > 0.90$). We observed a strong association of the e4 allele of APOE and AD tested with a general linear model controlled by age, gender and education compared to healthy controls ($p = 2.079 \times 10^{-17}$). Also, presence of APOE e4 in MCI was significantly different from both healthy controls ($p = 0.0005$) and AD patients ($p = 4.908 \times 10^{-7}$). No association was observed between the coffee consumption SNPs and AD, for the three different scenarios tested (general, dominant MAF allele and recessive MAF allele models; table 3). CART analysis showed no association of coffee consumption SNPs and the three groups after cross validation. However, if we exclude MCI from the analysis, rs6495122 appears as

Table 1. Coffee consumption SNPs – List of SNPs associated with coffee consumption, nearby genes (up to 50 kb, if the SNP is not inside a gene) and chromosome they are located – Minor allele frequency (MAF) and p value for Hardy-Weinberg equilibrium (HWE; In bold $p < 0.10$) for each SNP in the Alzheimer's Disease Neuroimaging Initiative (ADNI) cohort is also presented

SNP	Genes	Chr	MAF (%)	HWE	HWE Control	HWE MCI	HWE AD
rs12148488	PPCDC	15	G (49)	0.275	1.000	0.885	0.033
rs16868941	NCALD	8	A (19)	0.063	-	1.000	0.848
rs2470893	CYP1A1, CYP1A2, EDC3	15	A (28)	0.179	0.706	0.469	0.144
rs2472297	CYP1A1, CYP1A2, EDC3, CSK	15	T (21)	0.286	0.622	0.684	0.877
rs2472304	CYP1A2	15	G (37)	0.140	0.140	0.522	0.286
rs382140	LAMB4, NRCAM	7	A (17)	0.379	0.507	0.464	0.535
rs4410790	AHR	7	T (41)	0.940	0.659	0.042	0.347
rs5751876	ADORA2A	22	-	-			
rs6495122	CPLX3, ULK3, SCAMP2, MPI, LMAN1L, CSK	15	A (45)	0.825	0.774	0.020	0.056
rs762551	CYP1A2	15	C (27)	0.855	0.733	0.698	1.000

Table 2. Summarized demographic data of the ADNI individuals selected for this paper and APOE*e4 frequencies for ADNI and AlzGene cohort (# $p < 0.05$ in Fisher exact test when compared to either Healthy control or Alzheimer's Disease groups. * $p < 0.05$ in ANOVA, with post TUKEY-HSD when compared to Healthy control group. & $p < 0.05$ in Fisher exact test when compared to Healthy control)

	Healthy control	Mild cognitive impairment	Alzheimer's disease
Gender (% female)	45.9	33.2#	42.1
Age (mean ± SD)	79.2 ± 5.5	78.9 ± 6.6	79.3 ± 5.8
Age at diagnostics (mean ± SD)	-	-	75.0 ± 5.9
Years of education (mean ± SD)	16.0 ± 2.8	15.6 ± 3.2	15.2 ± 3.1*
Handedness (% right handed)	91.9	94.3	93.7
Ethnic background (% Caucasian)	91.4	90.0	91.8
APOE*e4 (%) ADNI	15	25#	42&
AlzGene	14	-	38&

a relevant factor to classify between controls and AD (Figure 1). Our analysis of protein interactions with STRING revealed no known interactions among coffee consumption associated proteins and the AD proteins. As can be seen in figure 2 the genes for AD and for coffee

consumption had no significant interaction (with a confidence greater than 0.5 in STRING algorithm). Also, enrichment analysis of KEGG pathways showed only a significant ($p = 0.038$ after FDR correction) group of AD associated genes (PSEN1, PSEN2, APP and APOE).

Table 3. Association of AD and Coffee consumption SNPs in the ADNI cohort – Association of AD and Coffee consumption SNPs in the ADNI cohort was evaluated with a multinomial logistic regression model controlled by age, gender, years of education and presence of the e4 allele of APOE followed by Wald test – Dominant and Recessive columns, correspond to p value of the model, when testing for dominant (MAF allele carrier vs non-carrier) and recessive (homozygous for the MAF allele vs other genotypes) pattern of association. General is the p value with no pattern of inheritance considered. Significance was set as $p < 0.0018$, to correct for multiple comparisons with the conservative Bonferroni method

SNP		General	Dominant		Recessive	
			Vs Control	AD vs MCI	Vs Control	AD vs MCI
rs12148488	C: GG(23); GT(50); TT(27) MCI: GG(26); GT(51); TT(23) AD: GG(27); GT(44); TT(29)	0.431	- 0.324 0.849	- - 0.200	- 0.364 0.218	- - 0.779
rs2470893	C: CC(57); CT(36); TT(7) MCI: CC(51); CT(43); TT(6) AD: CC(50); CT(39); TT(11)	0.392	- 0.247 0.249	- - 0.934	- 0.738 0.330	- - 0.166
rs2472297	C: CC(69); CT(28); TT(3) MCI: CC(60); CT(34); TT(6) AD: CC(58); CT(36); TT(6)	0.315	- 0.085 0.446	- - 0.847	- 0.459 0.624	- - 0.733
rs2472304	C: CC(19); CT(43); TT(38) MCI: CC(11); CT(47); TT(42) AD: CC(17); CT(44); TT(39)	0.209	- 0.324 0.482	- - 0.722	- 0.035 0.752	- - 0.052
rs382140	C: CC(65); CT(30); TT(5) MCI: CC(68); CT(28); TT(4) AD: CC(71); CT(26); TT(3)	0.741	- 0.559 0.174	- - 0.444	- 0.953 0.698	- - 0.652
rs4410790	C: AA(17); AG(47); GG(36) MCI: AA(17); AG(57); GG(26) AD: AA(17); AG(45); GG(38)	0.049	- 0.011 0.782	- - 0.012	- 0.859 0.758	- - 0.901
rs6495122	C: GG(31); GT(48); TT(21) MCI: GG(28); GT(58); TT(14) AD: GG(32); GT(44); TT(24)	0.024	- 0.629 0.594	- - 0.280	- 0.142 0.306	- - 0.010
rs762551	C: AA(49); AC(43); CC(8) MCI: AA(57); AC(38); CC(5) AD: AA(49); AC(42); CC(9)	0.290	- 0.110 0.618	- - 0.211	- 0.386 0.433	- - 0.099

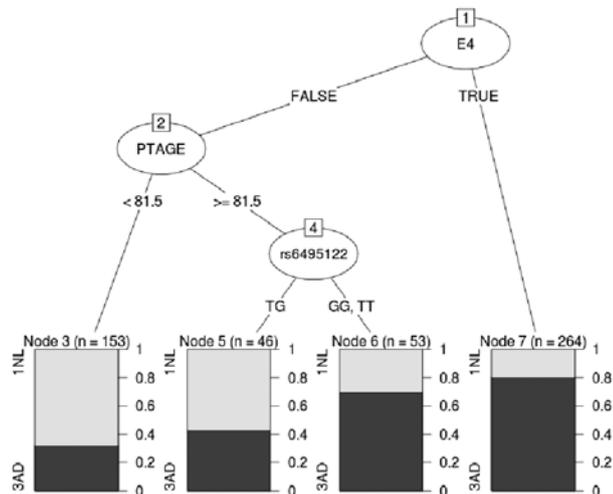


Figure 1. Coffee consumption SNP (rs6495122) improves the classification between healthy controls (1 NL) and Alzheimer’s disease patients (3AD) in a classification and regression tree. Main factors for classification were presence of e4 allele of APOE (E4) and age (PTAGE).

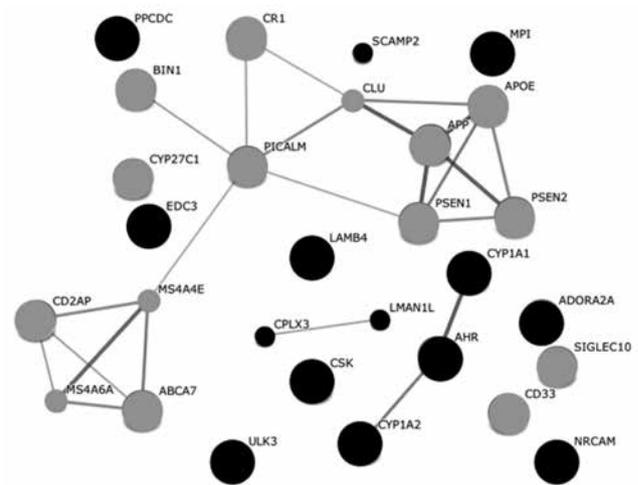


Figure 2. Network of interactions for the corresponding genes within 50 kb of the selected SNPs. Adapted from image generated with STRING with a confidence of 0.5 in June 2013. For better viewing we painted the nodes for Alzheimer’s disease genes in gray and Coffee consumption in black. Stronger interactions are represented with thicker lines. Bigger nodes indicate those for which the protein structure has been elucidated.

Discussion

Our results suggest that it is unlikely that the negative association between coffee consumption and AD prevalence is due to a common genetic background, at least between the regions compared here. We found no association between coffee consumption SNPs and AD, also there was no correlation between genetic regions and gene products for those two characteristics.

Firstly, none of the evaluated coffee consumption SNPs¹⁵⁻¹⁷ is genetically near any of the most associated SNPs for AD²¹. This rule out the possibility of linkage disequilibrium between them. Also, there was no significant association between coffee consumption SNPs and AD in general, dominant MAF allele and recessive MAF allele models in the ADNI cohort. Also, rs6495122 appears as a relevant factor for classification in CART only after APOE genotype and age, two already known risk factors for AD¹⁹. Lastly, we found no known interaction between the gene products considered for coffee consumption and AD, which might have suggested an indirect association. Cornelis *et al.* mentioned in his meta-analysis that the coffee consumption SNPs did not showed before in large AD GWAS studies¹⁷. This is the first attempt to investigate if there is a genetic correlation behind the evidence for a protective effect of coffee in AD. Larger cohorts with genetic and coffee consumption information might be required to further elucidate this question.

Experimental data suggests that caffeine derivatives have neurobiological benefits on cognition and AD pathology. It probably results from the effects of these substances on signalling pathways related to AD pathophysiology and/or neuronal resilience.

Animal models suggested that caffeine administration was associated with reduction of both soluble and deposited amyloid- β (A β) in brain⁷. The hydrophobic nature of caffeine allows its rapid absorption through all biological membranes, rendering it is rapidly absorbed into the bloodstream and through the blood-brain barrier²³. *In vitro* studies, showed that caffeine increases basal synaptic transmission, but does not affect LTP, at the same synapses²⁴. However, the concentrations of caffeine required to exert these effects, are several orders of magnitude higher than the plasmatic concentration attained by ingestion of moderate amounts of coffee^{17,25,26}. The only pharmacological mechanism known for caffeine in the low micromolar range is the antagonism of adenosine receptors, namely adenosine A1 and A2A receptors and maybe adenosine A3 receptors^{13,16,27,28}, leading to many downstream changes, including alterations in gene expression. The blockade of adenosine receptors confers neuroprotection against A β ⁶, but the underlying mechanisms by which caffeine reduces the relative risk for AD are not well elucidated. Adenosine A1 receptors in the cerebral cortex and hippocampus are primarily located on pre-synaptic terminals. Caffeine can block those receptors in cholinergic terminals which increases extracellular levels of acetylcholine, an important neurotransmitter for cognitive processing, dramatically decreased in the AD brain⁹. Another plausible hypothesis which could explain the decreasing level of A β is based on enhanced clearance of A β from the brain due to upregulation of P-glycoprotein (P-gp) induced by caffeine⁸. P-gp is an adenosine triphosphate (ATP) dependent transporter protein, which acts as an efflux pump. This transporter is located mainly in luminal membrane of brain capillary endothelium comprising the blood-brain-barrier, and is responsible for extrusion of drugs and toxins from the brain, including A β ²⁹. An increasing number of studies further suggest that alterations in expression and functional activity of P-gp contribute to the accumulation of A β in the brain, and lead to increased risk for developing AD³⁰. A third possible mechanism by which caffeine could ameliorate AD prognosis is by acting in neuronal plasticity and survival. Caffeine induced both elongation of existing dendritic spines and new spine formation in primary cultured hippocampal neurons¹¹. Also, long-term caffeine treatment in AD transgenic mice decreased pro-inflammatory cytokines such as TNF α and IFN γ in the brain¹⁰. Taken together with its beneficial effects on signal transduction¹², these results suggest an important role for caffeine in neuronal plasticity and survival. There are also other hypotheses about the

mechanisms involved in neuroprotection by caffeine³¹, however the exactly mechanisms are not completely understood⁸.

There is no specific information of coffee consumption in the ADNI database. This is a limitation of the present analysis, since the evaluated SNPs might not correspond directly to coffee consumption in this sample. Also, we cannot rule out that the lack of significance might be due to a lack of power, because of the sample size. On the other hand, the ADNI sample had frequencies of APOE allele similar to the general population and we also replicated the strong association between APOE e4 allele and AD. These results indicate there were no sampling errors.

If we consider a less conservative threshold of $p < 0.05$, there are some observable differences in the MCI group compared to AD and/or healthy controls, rs4410790 (general and dominant models), rs6495122 (general and recessive models) and rs2472304 (recessive model). As mentioned, rs6495122 also appears as a relevant factor for the CART. Interestingly, the daily dose associated with cognitive protection is 3 to 5 cups of coffee. Depending on preparation and coffee type this dose corresponds to 210-1,100 mg of caffeine per day⁵. In comparison, the coffee consumption SNPs are associated with a change of less than 1 mg/day in a general model, but a maximum 44 mg per day difference between genotypes¹⁷. Given the effects magnitude, these coffee consumption genetic variants may not be a determinant factor in the estimated protective coffee dose. However, they might act as outcome modifiers as a result of the direct and indirect interaction with other genetic and environmental factors. Thus, it might be a good approach to introduce those SNPs as covariables in future studies of coffee and caffeine consumption, cognitive deficit and AD.

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Does the brain produce the mind? A survey of psychiatrists' opinions

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Abstract

Background: Psychiatrists' views on the mind-brain relationship (MBR) have marked clinical and research implications, but there is a lack of studies on this topic. **Objectives:** To evaluate psychiatrists' opinions on the MBR, and whether they are amenable to change or not. **Methods:** We conducted a survey of psychiatrists' views on the MBR just before and after a debate on the MBR at the Brazilian Congress of Psychiatry in 2014. **Results:** Initially, from more than 600 participants, 53% endorsed the view that "the mind (your "I") is a product of brain activity", while 47% disagreed. Moreover, 72% contested the view that "the universe is composed only of matter". After the debate, 30% changed from a materialist to a non-materialist view of mind, while 17% changed in the opposite way. **Discussion:** Psychiatrists are interested in debates on the MBR, do not hold a monolithic view on the subject and their positions are open to reflection and change, suggesting the need for more in-depth studies and rigorous but open-minded debates on the subject.

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Keywords: Mind-brain relationship, psychiatry, opinion, survey, psychiatrists.

Introduction

The mind-body or mind-brain relationship (MBR) is one of the oldest and most challenging philosophical and scientific questions, having marked implications for psychiatry¹⁻⁴. However, this subject has been poorly discussed in psychiatric literature and training³. Despite all the historical diversity of attempted solutions to the problem, many contemporary debates tend to revolve around two polarized positions, which can be roughly summarized as follows. On the one hand, materialists say, mind is a material or physical process, a product of brain functioning. On the other hand, according to non-materialist views, mind is something different from, and may exist beyond the brain¹. Both positions are rooted in a long philosophical tradition, which dates back at least to ancient Greece. For example, while Democritus defended the idea that everything is composed of atoms and that every thought is caused by their physical movements⁵, Plato insisted that human intellect is immaterial and that the soul survives the death of the body⁶.

This antagonism between physicalism and anti-physicalism has assumed different forms throughout the centuries, being a constant feature of Western thought, and remains alive in contemporary debates^{7,8}. In fact, scientists and philosophers are far from solving the mind-body problem^{1,8-12}. However, despite the lack of consensus among specialists and the persistence of the problem, both academic and lay publications often present the materialist view of mind as an established scientific fact that should be accepted by every educated person, including psychiatrists and scientists in general^{4,8}.

This fact poses some problems for the traditional view of science as promoting balanced debates and the free pursuit of rational inquiry, thus contradicting the very scientific spirit one claims to be defending. Moreover, it has implications for clinical and research training in psychiatry, as psychiatrists work depends on certain assumptions on the MBR that they may take for granted without balanced reflection. Views on the MBR are closely related to views and attitudes about human nature in general (*e.g.*, one can assume that we are biological robots determined by our neurons and our genes, that the mind is a fundamental aspect of human being that somehow influences brain and genes, etc.), free will (*e.g.*, one can believe that patients have control over their thoughts, feelings, symptoms and

behavior), the etiology of mental disorders (organic/biological and/or functional/psychological), and treatment options (emphasis on biological and/or psychosocial interventions)²⁻⁴.

Yet, there has been few studies investigating scientists and clinicians positions regarding the MBR as well as their openness to reflection and change. While surveys with university students and health professionals are scarce^{13,14}, to our knowledge there is none among psychiatrists. The aim of this study is to evaluate psychiatrists' opinions on the MBR, and whether they are amenable to change or not.

Methods

We performed a survey of attendees (mostly psychiatrists) of the 2014 Brazilian Congress of Psychiatry that took place in Brasilia (DF), Brazil. As part of the official program, there was a debate titled "What is the relationship between the mind and the brain? Does the brain produce the mind or is it an instrument for the manifestation of the mind?". Two speakers (both psychiatrists), each defending one general position on the MBR (materialist or non-materialist), were coordinated by a chair (a psychiatrist) in a two-hour debate, including time for questions from the audience. The debate was very well attended (the 600-seat auditorium was packed) and attendees answered the same questions on the MBR and the ultimate nature of the universe (Table 1) immediately before and after the debate, using wireless keypads in an interactive voting system.

Results

The audience was split before the debate, with around half endorsing each position on the MBR, and 2/3 endorsing a non-materialist view of the universe (Table 1). There was also coherence among the answers to both questions: only 6% simultaneously accepted that the mind is not a product of brain activity and the incompatible view that the whole universe is composed only of matter. Besides, materialist views on the MBR did not necessarily imply a materialist view of the universe, as 55% of those believing that the mind is a brain product rejected a purely physical description of the universe. Finally, almost half of the Brazilian psychiatrists endorsed the view that the mind is not a product of brain activity.

Table 1. Responses to the two questions just before and after the MBR debate

	Do you think that your mind (your "I") is a product of brain activity?		Do you think that the universe (everything that exists) is composed only of matter (particles and physical forces)?	
	Before % (n)	After % (n)	Before % (n)	After % (n)
Yes	53 (331)	40 (103)	28 (181)	17 (41)
No	47 (298)	60 (155)	72 (474)	83 (195)
Total (n)	629	258	655	236

From the attendees who answered questions before and after the debate, 30% changed their position from a materialist to a non-materialist view of mind, and 17% did in the opposite way; 30% changed from a materialist to a non-materialist view of the universe, and 2% did in the opposite way.

Discussion

The division of Brazilian psychiatrists' views on the MBR in two halves seems to reflect the academic controversies regarding the mind-brain problem. Our findings lie midway between the views of Scottish university students (67% stated that mind and brain are separate things) and Belgian health professionals (40%)¹³.

The audience was not only interested in the discussion, but also susceptible to reflection and opinion change based on arguments presented during the debate. Studies with US college students found that presenting strong mechanistic explanations of mind increases their acceptance of materialist views of the MBR^{14,15}, and that showing the limits and the explanatory gap in neuroscience increases their acceptance of non-materialist views of mind¹⁵. Several attendees came to talk informally to us after the session, and admitted they had never thought deeply on the MBR or even heard many of the arguments presented during the debate. Some told us the debate caused them a deep impression.

One limitation of our survey is that not all the attendees were psychiatrists, some probably being medical students or another type of mental health professional. However, since around 85% of the participants were physicians, especially psychiatrists, it is very likely that most of our sample was composed by psychiatrists. Moreover, we had a considerable loss of subjects near the end of the debate. As the entire session lasted two hours and the last part was devoted to audience questions, several people left the room during the last 30 minutes. However, to minimize bias, we only considered opinion change data from those attendees who answered the same questions before and after the debate. Finally, despite the considerable sample size, it is not clear how precisely it represents the positions of Brazilian psychiatrists as a whole.

This study has several strengths, though. To our knowledge, it is the first survey of psychiatrists' views on the MBR and has a large sample collected at the world's third largest psychiatry conference. Given the technology of the wireless interactive voting system, it was possible not only to access psychiatrists' position on the MBR, but also to perform a natural experiment on the impact of exposing

a large and qualified audience of psychiatrists to presentation and discussion on the two main views on the MBR, something that has never been done before.

The present paper found that about half of psychiatrists accepted a materialist and about half a non-materialist view of mind. Seventy-two percent endorsed a non-materialist view of the universe. Our data suggest that psychiatrists are interested in discussions about the MBR, despite the low frequency of such discussions on psychiatric training and literature. It is clear that psychiatrists do not hold a monolithic view on the MBR, and that discussions may foster critical thinking on the subject, leading to opinion consolidation or change. However, in order to foster critical thinking, we need more than simplistic or caricatural presentations of the MBR as if it were a problem already solved, thus opening the debate to different views and the challenges they pose to our scientific understanding of human life.

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Brief report

A randomized clinical trial of home-based telepsychiatric outpatient care via videoconferencing: design, methodology, and implementation

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Abstract

Background: Healthcare providers are continuously challenged to find innovative, cost-effective alternatives and to scale up existent services to meet the growing demand upon mental health care delivery. Due to continuous advances in technologies, telepsychiatry has become an effective tool for psychiatric care. In 2012, the Institute of Psychiatry of the University of São Paulo Medical School started a randomized clinical trial of home-based telepsychiatric outpatient care via videoconferencing. **Objective:** The objective of this article is to describe the design, methodology and implementation of a pilot project, which aimed to verify the applicability and efficiency of psychiatric attendance via Internet-based videoconferencing in a resource-constrained environment. **Methods:** The project consisted of a 12 months follow-up study with a randomized clinical trial, which compared various quality indicators between home-based telepsychiatric aftercare via videoconferencing and face-to-face aftercare. **Results:** The final sample comprised 107 outpatients (53 in the telepsychiatry group and 54 in the control group). Among 1,227 realized consultations, 489 were held by videoconferencing. Satisfaction with the aftercare by videoconferencing and the medication delivery was high among patients. Attending psychiatrists were satisfied with the assistance by videoconferencing. **Discussion:** The experiences during this pilot project have overall been very positive and psychiatric outpatient care by videoconferencing seems viable to treat patients even in a resource-constrained environment.

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Keywords: Telepsychiatry, telemental health, videoconferencing, outpatient care, home-based treatment.

Introduction

Mental, neurological and substance-use (MNS) disorders constitute 13% of the global burden of disease, measured in disability-adjusted life years (DALYs), surpassing cardiovascular disease and cancer¹. Thereby, depressive disorders accounted for 40,5% of DALYs caused by mental and substance use disorders².

In a cross-national epidemiological study that compared the prevalence of DSM-IV major depressive episode between high-income and low-to-middle-income countries, Brazil took first place regarding the 12-month prevalence (10.4%), followed by Ukraine (8.4%), and the United States (8.3%)³.

Although effective interventions to reduce this burden exist, they are often not available to those in greatest need. In São Paulo, 53% of adults with an active mental disorder do not receive treatment services³. As most mental health resources are centralized in and or near big cities and in large institutions, and services are unequally distributed across Brazil, this treatment gap is, in all probability, even much worse in more remote regions of the country.

Thus, the challenge to healthcare providers is to find innovative, cost-effective alternatives and to scale up existent services to meet the growing demand upon mental health care delivery.

With 108 millions of internet users (53% of the population) in 2014, Brazil takes fifth place in the global ranking of Internet users (behind China, USA, India, and Japan)⁴. The use of information and communication technologies (ICT) holds enormous promise for significantly increasing the access to quality mental health care, even in settings like Brazil, where resources are restricted⁵.

Telepsychiatry has been defined as “the delivery of health care and the exchange of health information for purpose of providing psychiatric services across distances”⁶ and is primarily achieved with the use of live, interactive videoconferencing. The use of videoconferencing in the field of psychiatry is over half a century old⁷. Due to the advances in information technologies, the sounds and images transmitted through video conferencing became equivalent to verbal information and visual cues in face-to-face assessment⁸. Previous studies have shown that telepsychiatry is effective for many services

(assessment, diagnosis, ongoing management/aftercare, medication review, psychotherapy, etc.) across many populations (adult, child, and geriatric) and disorders (depression, posttraumatic stress disorder, substance use, etc.), and thus, appears to be comparable to in-person care⁹.

However, a telepsychiatric service is not simply a technology, it also involves processes and its use is influenced by many factors. To ensure that mental health needs receive the level of priority necessary to reduce the burden associated with MNS disorders, mental health services has to be scaled up in order to increase the impact of interventions that have been successfully tested in pilot project.

The objective of this article is to describe the design, methodology and implementation of a pilot project, which aimed to verify the applicability and efficiency of psychiatric attendance via Internet-based videoconferencing in a resource-constrained environment.

Methods

Study design

The pilot project consisted of a 12 months follow-up study with randomized clinical trial, which compared various quality indicators between home-based telepsychiatric aftercare via videoconferencing and face-to-face aftercare. Whereas the telepsychiatry group realized monthly consultation with the attending psychiatrist through Internet-based videoconference, the control group received monthly face-to-face (F2F) consultations at the Institute of Psychiatry (IPq) of the University of São Paulo Medical School (FMUSP).

Sampling

Interested patients received an online questionnaire via e-mail to verify their age, connectivity (broadband Internet at home), and were screened for already existing diagnostics and/or a possible presence of a depressive disorder, with the use of the Patient Health Questionnaire (PHQ-9), a self-administered screening instrument¹¹.

Recruited patients completed at least two initial F2F consultations at the IPq, where the clinical diagnostic was confirmed, the medication initiated, and the stability of the patient ensured. Patients with a total score of less or equal than 15 in the Hamilton Depression Rating Scale (HAMD-17)¹² were considered as stabilized. After the second F2F appointment, patients who fulfilled the inclusion criteria (stabilized unipolar depression disorder, age 18-55 years, broadband Internet access at home) were randomized into the telepsychiatry or control group. As the randomization was realized after the initial evaluation, potential biases were balanced between the two groups. Moreover, all involved psychiatrists attended via videoconference as well as F2F. The study has been approved by the local ethics committee and written informed consent was obtained from all patients prior to inclusion.

Safety plan

Monitoring patients through videoconferencing in a clinically unsupervised setting like the home of the patient demands an establishment of a safety plan, based on the identification of predictable cultural, clinical, organizational, structural and technical risks and barriers, such as health professional or patients resistance against the remote treatment, inappropriate substitution of personal contact due to psychopathological causes, lack of training, familiarity with technologies, or technical support.

All attending psychiatrists and patients were recruited specifically for the present project. That is to say that they all agreed to deliver treatment or to be treated by videoconferencing.

If a patient scored higher than 15 in the Hamilton Depression Rating Scale, needed additional consultations beside the monthly contacts, or showed an increased suicide risk, he or she was not included or, if already participating, excluded from the study.

As the lack of knowledge about the use of communication technologies and of confidence to manage technical problems are the main impediments patients described using telepsychiatric services¹³, test-consultations were conducted with each patient to verify if the equipment and Internet connection would warrant the necessary picture and audio quality in preparation for the first online consultation with the psychiatrist. Moreover, before each online contact with the psychiatrist, the study coordinator tested those technical issues again. The study coordinator accompanied all consultations by videoconferencing during the first minutes to ensure the quality of transmission and, if necessary, got in touch with the patient by telephone to solve technical problems.

Aftercare via videoconferencing

In a first step, seven psychiatrists with several years of professional experiences in public and private health care were recruited and trained in video consultations by the study coordinator and the telemedicine staff of the FMUSP.

After being included randomly in the telepsychiatric aftercare program the patients received monthly video consultations with a psychiatrist during 12 months. All consultations took approximately 20 minutes and contained psycho-education, medication monitoring, and counseling. It has been shown that follow-up consultations providing counseling services can be defined as low-risk, as they do not include key diagnostic and clinical decisions¹⁴. Nevertheless, for patient safety reasons, another two F2F consultations, one after six and another after 12 months, were outlined. Patients have been attended by one and the same psychiatrist during the whole time, independently of the modality (face-to-face or videoconferencing).

The video consultations were realized in consulting rooms at the IPq, using three 17,3-Inch multimedia laptop computers and the institutional broadband Internet of 100 megabits per second (Mbps). If necessary, participants of the videoconference telepsychiatry group could borrow a headset and a webcam (2 Megapixels). All online consultations were performed via Skype, a free and widely used Internet videoconferencing service, which is password-protected (private accounts) and uses encryption methods to ensure privacy

and security of data transfers. A recent systematic review has shown that there do not exist any reasons for not using this software in clinical settings.

Evaluation framework

At the baseline, after six and 12 months, various outcome variables were assessed by the psychiatrists and through online self-applied questionnaires among all participants. The primary outcome of the present study was the clinical effectiveness of psychiatric attendance via videoconferencing, measured by depression severity evolution, mental health status, relapses, and medication course. The secondary outcome was the applicability of online aftercare, measured by satisfaction with treatment, therapeutic relationship, medical compliance, and treatment adherence.

Results

From over 2,000 interested persons who entered in contact by e-mail, 216 were invited for one or two initial F2F screening consultation at the IPq. The most common reasons for not being invited were residence in another city, state or country, other diagnostics than mood disorders, or no Internet access at home. The final sample comprised 107 outpatients (53 in the telepsychiatry group and 54 in the control group).

Within the project's aftercare, 1,227 consultations were conducted during a period of 35 months. Among them, 489 were realized by videoconferencing. Medication was delivered after every video consultation to the patients' home. In general, patients treated via videoconferencing were very satisfied with the delivery.

The general satisfaction with the treatment via videoconferencing was also high among patients, and, if they could choose, they would prefer to be treated by videoconferencing in the future.

The aftercare by videoconferencing has also received high ratings from the attending psychiatrists. Their feedback indicated that, the majority felt comfortable with providing consultations by telepsychiatry.

The evaluation of the effectiveness and applicability is ongoing and will be presented in a future article.

Discussion

Within this paper, the design, methodology and implementation of a randomized clinical trial of home-based telepsychiatric outpatient care via videoconferencing have been presented. The experiences during this pilot project have overall been very positive and psychiatric outpatient care by videoconferencing seems a viable approach to treat patients even in a resource-constrained environment. The study is an important contribution to verify the applicability and effectiveness of treatment by videoconferencing in the management of mental illness, to improve the treatment delivery system of the Institute of Psychiatry, and to increase the access to mental health care in Brazil. Further evaluations will deliver more results about the effectiveness and applicability of this new treatment modality.

Declarations of interest

No competing financial interests exist.

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A case of cycloid psychotic disorder

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Abstract

Based on a case of an acute and transient psychotic disorder with full recovery between recurrences, the authors remind the concept of cycloid psychoses. This diagnosis has been neglected in modern psychiatry and in the current nosological systems. However, the cycloid psychoses concept may offer an alternative diagnosis for some psychotic disorders in spite of the need of more studies to improve the understanding of its etiology and treatment.

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Keywords: Psychopathology, psychoses, schizophrenia.

Introduction

Cycloid psychoses are characterized by polymorphic symptomatology with intraphasic bipolarity, a remitting and recurrent course and favorable prognosis^{1,2}. Despite its clinical relevance, the cycloid psychoses concept has been relatively neglected in current psychiatric nosological systems².

Case report

Mr. F is a 32 year old, single man. He had no past medical history or known familial disease. The patient has a history of five previous psychiatric hospitalizations, having been the first at age of nineteen. The second and third admissions were at his 25 years old and the fourth and fifth admissions at his thirties. He was psychopathologically compensated in the periods between admissions.

The clinical pictures that motivated these five hospitalizations have some similarities, namely the acute onset (two or three days until the installation of the full clinical picture), the presence of auditory hallucinatory activity in the form of voices, delusional persecutory ideation, neutral mood, insomnia, anxiety, mutism, agitation and increased reactive motions.

At the first-episode psychosis the analytical and imagiological investigation was negative and included laboratory studies (blood count, biochemistry and thyroid function), serological tests (hepatitis B and C, syphilis and HIV), toxicology screen, head CT and EEG. In all hospitalizations, abuse of substances and medical conditions that could justify the existing symptoms were excluded.

All relapses had a sudden onset and only in the first episode was described a major trigger factor (cousin's death on a car crash).

In the psychiatric unit, the patient was medicated with anti-psychotics in therapeutic doses (olanzapine 15 mg/day in the first hospitalization and amisulpride 400 mg/day in the others four admissions) and a benzodiazepine (lorazepam 2,5 mg three times a day) for control of anxiety and insomnia.

During the admissions, motor symptoms described showed rapid fluctuations between the two opposite poles (agitation/inhibition) and the clinical picture have a rapid improvement in few days with high-dose antipsychotic therapy with complete remission within a week. Thus, patient returned to his normal life, fully functional as previously without evidence of deterioration (normal Mini Mental State Examination score).

In the maintenance phases of the disease, the patient was treated with low doses of antipsychotic (amisulpride 200 mg/day) and lora-

zepam 2.5 mg/day, except during the gap between the first and second hospitalization, when clinical diagnosis was not clear and therefore he was treated with olanzapine 15 mg/day.

Currently, the patient is clinically stabilized and no relapses had place since about two years.

Discussion

The case described close up of the category of acute and transient psychotic disorder in ICD-10 or of the brief psychotic disorder in DSM-5, based on duration criteria.

For the differential diagnosis are important two clinical aspects: absence of altered mood (exclusion of bipolar disorders) and time course of each episode less than one month (exclusion of schizophreniform disorder).

However, this clinical case is more complex with clinical peculiarities that classification systems do not highlight, such as, the mixture of psychotic, anxious and psychomotor symptoms, the intraphasic bipolarity and the cyclic course with rapid and full recovery.

The clinical case described would be better diagnosed using the concept of cycloid psychoses and it seems to be approaching the Kleist-Leonhard's subtype "hyperkinetic-akinetic motility psychoses", once the psychomotor activity is most affected.

In what concerns to treatment, the pharmacological intervention with atypical neuroleptics seems to be effective in the remission of the acute episode but its potential to prevent relapse is unclear². Other therapeutic approaches referred in the literature are related with electroconvulsive therapy and lithium³.

Given the lack of studies, the empirical evidence suggests that prophylactic treatment with lithium or anticonvulsive agents may be superior to neuroleptic therapy³. However, some cases reported suggest that the cycloid psychoses may not require long-term maintenance pharmacological treatment².

In fact, the cycloid psychoses concept can be an alternative diagnosis for some psychotic disorders. However, more research is needed towards better understanding the role of somatic factors that might trigger the psychoses and the efficacy (acute phase and prophylaxis) of neuroleptics agents, benzodiazepines, anticonvulsive agents and electroconvulsive therapy³.

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Treatment-resistant mood disorders

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Treatment-resistant mood disorders pose a great socio-economic and life-threatening burden on public health system. On one hand, major depressive disorder (MDD) has a lifetime prevalence of 17-21%, and it is a leading cause of disability adjusted life years worldwide according to The Global Burden of Disease study¹. However, only 30-40% of patients achieve remission following a standard trial with a first-line antidepressant agent². On the other hand, bipolar disorder (BD) affects about 2% of the world's population, with subthreshold forms affecting another 2%³. It is known that non-response in bipolar depression is also highly prevalent, and it occurs in 40% of patients⁴. Moreover, the addition of antidepressants to an ongoing treatment with mood stabilizers will be helpful in only a quarter of patients with bipolar depression⁵. It is also known that the rates of completed suicide in patients with BD are 7.8% in men and 4.9% in women⁶, which could be partially explained by treatment refractoriness. Therefore, despite the pharmacological and psychological strategies to treat patients with mood disorders, how to treat the large number of patients who are refractory to them is still a major challenge. Lack of such knowledge is an important question since treatment-resistant mood disorder patients are associated with greater morbidity, suicide attempts, as well as with extensive use of mood-related and general medical services⁷. Thus, a book on the subject of treatment resistance is key and of great clinical and public health value.

The book "Treatment-Resistant Mood Disorders"⁸ covers the forefront findings in this issue and provides a detailed outline of current therapeutic strategies and future therapeutic targets. It stands out as an essential tool for clinicians and researchers. The first chapters of the book looking for enlighten the reader about the current definitions of refractory mood disorders, as well as aspects related to epidemiology and assessment. Notwithstanding the lack of a clear consensus on a working criteria for treatment resistance mood disorders, several key parameters have been agreed, including the multi-dimensional assessment of the symptoms severity, presence of psychiatric or general medical comorbidity, and the objective determination of previous response to adequate treatments. One interesting point presented by the book is the comorbidity with anxiety disorders, such as posttraumatic stress disorder and panic disorder, which are common among treatment-resistant patients^{9,10}. The likelihood of remission in anxious depression was only one third compared with those having pure depression for instance¹¹. Besides refractoriness to antidepressants and mood stabilizers, patients with comorbidity anxiety disorders are also associated with functional impairment, poor psychosocial adjustments, more frequent hospitalizations, increase suicidality, and slower recovery from a mood episode^{9,10,12}.

Both chapters of predictors of treatment response in MDD and BD cover the substantial progress that has been made over the last few years in the search for clinically useful variables. In this vein, a recent work has led to the development of a risk stratification tool for treatment resistance in MDD incorporating both baseline

socio-demographic and clinical features¹³. The study was innovative because of the use of machine learning techniques to analyze several variables at the same time leading to a useful predictive tool to assess treatment resistance. However, clinical information alone probably is insufficient for adequate prediction. Genetics and neurobiological markers may help to improve the accuracy of the clinical predictive tools. For instance, a large study including 1761 bipolar type-I patients from the Taiwan Bipolar Consortium showed that two single nucleotide polymorphism located in the introns of GADL1 gene (rs17026688 and rs17026651) were strongly associated with the response to lithium maintenance treatment¹⁴. Therefore, future studies may combine clinical, genetic, epigenetic, neuroimaging, and/or neurobiological markers to obtain meaningful signatures to predict treatment response and provide a more personalized treatment¹⁵. Advanced pattern recognition methods, such as machine learning techniques, that could integrate these characteristics may be of great value in this challenge.

The book also supplies updated data about evidence-based pharmacological and psychosocial approaches for treatment-resistant mood disorder, as well as about the use of electroconvulsive therapy, which remains one of the most important tools available. The chapter about evidence-based pharmacological approaches for treatment-resistant depressive disorder is one of the most important for clinical practice, since it provides a detailed and concise overview of the augmentation and switching pharmacological strategies in MDD. Other strategies of non-invasive, such as transcranial magnetic stimulation (TMS), and invasive neurostimulation, such as deep brain stimulation, are also addressed in subsequent chapters. Moreover, the last two chapters provide meaningful information on potential novel therapeutic targets for mood disorders, such as the pathophysiological findings in the glutamatergic and immune system. In this vein, the fast-acting antidepressant Ketamine arises as an option in severe and refractory patients with MDD. Also, the better understanding of the latter pathophysiological mechanism could shed some light on how to address cognitive and functional impairment associated to the illness progression that take place in some patients¹⁶.

In summary, the book "Treatment-Resistant Mood Disorders" provides a much-needed overview of all current aspects related to treatment resistance in the mood disorders. It, therefore, will be of great value to clinicians, researchers, and public health officials in helping to fundamentally advance the field of psychiatric refractory treatment.

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The effectiveness of substance abuse treatment: development of a brief questionnaire

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Abstract

Background: Practitioners need brief instruments to monitor outcomes in both treatment of drugs and alcohol addiction because they are useful to guide decision making in a short time. **Objectives:** This study aims to develop a brief questionnaire, based on Client Evaluation of Self and Treatment, to evaluate the treatment effectiveness in drug and alcohol addiction treatment settings. **Methods:** A cross-sectional study using a convenience sample (N = 608) recruited from Division for Intervention on Addictive Behaviours and Dependencies (DICAD – ARS North). **Results:** The results show a new four-factor solution that accounted for 54.4% of the total variance and that provides the best fit to the data ($\chi^2/df = 1.72$, CFI = .94, GFI = .91, RMSEA = .048 [.040-.057]; prmse = .623). It also revealed a high internal consistency ($\alpha = .82$). It was found a significant negative correlation ($r = -.52$, $p < .01$) between the final version of the instrument and a self report measure of psychopathology symptoms. **Discussion:** This brief questionnaire, with good psychometric properties, can be useful to provide a viable and rapid feedback of treatment outcomes. Further studies should be performed to continue the evaluation of the reliability of this measure.

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Keywords: Addiction, treatment effectiveness, psychopathology, psychometric proprieties.

Introduction

There have been significant changes in addiction treatment over the past three decades, where has been a significant movement from inpatient to outpatient programs. However, while treatment programs have changed over time, monitoring the effectiveness during the implementation of these programs has been little explored both by researchers and practitioners¹. There are two underlying main approaches to conceptualize the treatment effectiveness. One is the rehabilitation-oriented model is the traditional paradigm where the method used to evaluate the effectiveness of addiction treatment is based on post-treatment follow-up outcomes, assuming that benefits were attained during treatment, and positive changes have occurred by the end of the treatment, and it is expected sustained abstinence at the time of follow-up².

This method has been used in the case of residential treatment, where drugs are not available in the treatment setting, and the effectiveness outcome is evaluated for a substantial follow-up period of time. However, the limitation of this method is the excessive attention to the sustained and complete recovery from a substance use as criterion of treatment effectiveness. According to White³ the problem is that “groups like Narcotics Anonymous (NA) have defined recovery in terms of abstinence from drug use, but addiction scientists have generally defined recovery from illicit drug dependence in terms of problem resolution rather than absence of drug use”. Thus, this conceptualization “would allow measuring levels of outcomes over time and answer questions about the viability of particular problem-resolution strategies for particular populations”³. In addition, the post-treatment follow-up method has other several limitations. The evaluations are usually conducted by an external researcher from the treatment team³, who do not measured patient changes during treatment. When participants are not located or refuse to participate at follow-up evaluations, the internal and external validity of the collected data could be compromised due to the characteristics of those participants who drop out (e.g., involved in antisocial and criminal behaviors)⁴. Finally, many complex ethical issues arise from the follow-up evaluations, in part, due to the assertive methods required to generate high follow-up rates⁵.

Other approach that has been suggested by researchers is the alternative method of evaluating the treatment effectiveness based on the monitoring method instead of follow-up results. This new conceptualization was emerged from two changes, namely the change of the health-care delivery system that moved from residential care to outpatient setting, where nowadays practitioner’s need for more economical, rapid and clinically relevant information to guide decision making, and the transition of the recovery definition from medicalized term to a problem-solving process, and a psychosocial perspective^{2,3}. The proposal called “concurrent recovery monitoring” (CRM)² could be described as a brief and repeated evaluations, relatively easy to collect, concurrent with treatment to monitor and assist patient change, toward clinical and social outcomes, and more relevant and in time information to guide the decision making in a more effective way². For instance, clinical decisions about which specific treatments are more suitable according to the different patterns of drug or alcohol use and the different characteristics of drug users⁶. Monitoring can also optimize the results of treatment⁷ and monitor the need and the readiness for change in programs and organizational factors⁸ and contribute to retention in treatment⁹. Further, the monitoring method can overcome the ethical problems of complex and large assessments, including the burden of time and efforts to generate high follow-up rates⁵. However, the practitioners need economical, rapid and clinical reliable methods to guide decision making in a short time period without compromising the patient attendance and participation in treatment. Complex or lengthy assessment measures may also lead to staff noncompliance¹⁰. On the other hand, the monitoring system can be burdensome for clinical staff in cases of large time-consuming intake, weekly and follow-up assessments, and can compromise the quality of data through a monitoring system¹¹. The solution appears to be the use of self-report questionnaires that took a short-time to be completed, not requiring the attendance of the staff member in training program, as in the case of interviews, and are well appropriate to systems of care¹⁰.

Machado *et al.*¹ conducted a study with individuals undergoing dependence treatment, where they created a software that allows building a database for monitoring the intervention efficacy in clinical practice. For that, the authors used the following instruments:

(1) Drug Abuse Screening Test – Portuguese version (DAST) – a dichotomous 20-item scale to assess the severity level of consumption. It evaluates the consequences related to consumption during the last 12 months such as physical and psychological symptoms, social and relational aspects, among others; (2) Outcome Questionnaire – Portuguese version (Q-45), a 45-item questionnaire that provides a reliable assessment of various aspects of the adjustment level and psychosocial disturbance of individuals; (3) The Inventory of Drug-Taking Situations – Portuguese version (IDTS) – an instrument consisting of 50 items that describes potential drug use situations over the past year; it allows to recognize problematic situations and anticipate risk situations; (4) Consumer Satisfaction Questionnaire – Portuguese version (CSQ-8), an 8-item instrument to explore the degree of patient satisfaction regarding to treatments and services received and their impact on the patient's life. This study brings a clear progress in terms of research in this area in Portugal.

However, the administration of this wide array of assessment tools leads to a final database of about 123 items, making it difficult to apply on a regular basis in the clinical setting. On the other hand, if we choose not to apply the same instruments in all stages of evaluation/monitoring we are not able to compare results of the various moments of administration, compromising the effective therapy evolution of individual consumers during their treatment.

There are other instruments available to monitor the effectiveness of treatment programs. Marsden *et al.*¹² validated, for the European context, the Treatment Perceptions Questionnaire (TPQ). They also validated the Maudsley Addiction Profile (MAP), which adds some of the most relevant performance indicators in the evaluation of treatment outcomes. Notwithstanding, other important indicators of effectiveness (including the therapeutic relationship, the involvement or active participation in treatment, the social support network^{7,13-15}, psychopathological symptoms, negative affects, or treatment orientation¹⁶⁻¹⁹ are missing in this questionnaire.

Recently, studies conducted by Joe *et al.*⁷ and Simpson¹⁴ validated the Texas Christian University (TCU) Client Evaluation of Self and Treatment (CEST) a multidimensional instrument covering the main indicators of effectiveness of drug and dependence treatments that can and should be administered in repeated evaluations during the treatment process. The CEST was developed under the DATAR project, founded by the National Institute on Drug Abuse in 1993 (Grant No.DA13093). The CEST has originally 130 items divided into 17 dimensions, taking 30 to 40 minutes to complete, which is its biggest limitation.

So, we aimed to develop a short self-report measure, suitable for both inpatient and outpatient programs, encompassing evaluating of critical indicators of treatment effectiveness, using a problem-solving and a psychosocial models. For that, we selected the previous Portuguese version²⁰ of Texas Christian University – Client Evaluation of Self and Treatment – TCU – CEST. We also aimed to examine the validity of the new instrument comparing it with a psychopathology self-report measure, similarly to previous studies of the TCU-CEST^{7,14}.

Methods

Participants

Six hundred and eight subjects were recruited from Intervention Service on Addictive Behaviours and Substance Dependence (SICAD) – Regional Northern Section, in Portugal. The convenience sample was recruited from 3 main treatment settings: outpatient's drug addiction treatment (64%; n = 389); outpatient's alcohol dependence treatment (14%; n = 85), and inpatient's drug and alcohol dependence treatment (22%; n = 134).

We selected patients who were in treatment for, at least, one month. Furthermore, the researchers took into account changes resulting from psychopathology or recent consumption, which could interfere with the normal completion of the questionnaires

Procedures

After we obtained permission from the authors to use The TCU-CEST, SICAD and DICAD, then the study was submitted to the ethics committee of the Faculty of Psychology and Education Sciences (University of Porto), which approved the study.

Researchers certified on addiction problems administered the instruments at the facilities of DICAD – North Regional Health Administration after the participants signed the free consent inform about the research. The confidentiality was ensured to all participants.

Materials

Socio-Demographic Questionnaire. This questionnaire included information about birth date, gender, age, birthplace, treatment program, treatment time and finally, the identification of primary substance of abuse.

Brief Symptoms Inventory (BSI)^{21,22}. This is a reduced version of the Symptom Check List 90 Revised (SCL-90-R), a self-report inventory consisting of 53 items. The participant must specify the degree to which each problem has affected them over the past week, on a Likert-type scale (1 – Never, 2 – Rarely, 3 – Sometimes, 4 – Often, 5 – Very often). This inventory assesses psychopathological symptoms along nine basic dimensions (somatization, obsession-compulsion, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation and psychoticism) and three global indices (positive symptoms distress index – PSDI, global severity index – GSI, and positive symptom total – PST). In the present study, the various dimensions have an internal consistency ranging from moderate to high, with Cronbach's alpha values between .70 to .85. The internal consistency of the overall BSI in this sample was .96.

Texas Christian University (TCU) – Client Evaluation of Self and Treatment (CEST)^{7,14}. This instrument was developed as part of National Institute on Drug Abuse (NIDA). The original CEST is a 129-item self-rating instrument that includes 17 scales measuring patient functioning and treatment perceptions. Psychometric properties (including reliability and construct validity) of the scales are examined in Joe *et al.*⁷ and acceptable reliabilities (.70 or above) were generally reported, and construct validity was also demonstrated. The response format is a 7-point Likert scale (1 – I strongly disagree to 7 – I strongly agree). We used the Portuguese version²⁰ that included 101 items that match the original 4 dimensions and 13 subscales, with reasonable to good internal consistency values (ranging from .54 to .89), namely, (a) Treatment motivation dimension; (b) Psychological functioning dimension; (c) Social functioning dimension; and (d) Treatment engagement dimension

Statistic analysis

We used the Statistical Package for Social Sciences – SPSS (SPSS Inc., Chicago, IL, version 19.0) to perform the analyses. Concerning the psychometric sensitivity of the items, we found a high kurtosis ($|ku| > 7$) for item 62 and a high skewness ($|sk| > 2$) for items 8, 15, 26, 54, 57, 62, 79, 104 and 127²³. Without these items, we sought to establish the factor validity of the questionnaire through the Exploratory Factor Analysis (EFA), using the sample of 296 patients in treatment. In conducting the EFA, we used for factor extraction the principal axis factoring method and oblimin rotation with Kaiser normalization. Following the recommendations of Dziuban and Shirkey²⁴, before the analysis, we explored the psychometric adequacy of the items. Next, we performed a confirmatory factor analysis through AMOS software. We also screened for major violations of normality, taking into account the absolute values of kurtosis ($ku < 7$) and skewness ($sk < 2$)²³. The hypothesized model obtained through the EFA was evaluated using indices and respective values for an acceptable fit²⁵: $\chi^2/df < 5$ ²⁶ Comparative Fit Index – CFI > 0.90 ; Goodness Fit Index – GFI > 0.90 ²⁷ Standardized Root Mean Square Residual – SRMR < 0.10 ²⁸, and Root Mean Square Error of Approximation – RMSEA

< 0.08²⁶. A 90% confidence interval (Low90 and Hi90) was used to assess the precision of the RMSEA estimate²⁹. We also considered p Close Fit – prmsea > 0.50²⁹.

Results

Regarding the sample, participants from outpatient's drug addiction treatment included mainly men (89.4%), with ages ranging from 18 to 61 ($M = 39.7$; $SD = 7.8$). The psychoactive substance reported as the primary drug of abuse prior to treatment was heroin for 58% of the sample, followed by poly-consumption (19.8%), cocaine (19.3%), hashish (2.1%) and replacement psychotherapeutic drugs – methadone/Subutex – for 0.3% of this sample. The mean duration of treatment at the time of questionnaire administration was 40.61 months ($SD = 40.9$). The sample collected in outpatient's alcohol dependence treatment included mostly men (82.4%), with ages ranging from 28 to 73, ($M = 47.3$; $SD = 9.4$). The psychoactive substance reported as the primary drug of abuse prior to treatment was alcohol for 100% of the sample. The mean duration of treatment at the time of questionnaire administration was 32.1 months ($SD = 39.9$). Finally, the inpatient's drug and alcohol dependence treatment sample included mainly men (90.1%), with ages ranging from 18 to 60 ($M = 39.7$; $SD = 8.5$). The psychoactive substance reported as the primary drug of abuse prior to treatment was alcohol for 56.4% of the sample, followed by heroine (18.8%), cocaine (9.8%), psychotherapeutic drugs – methadone/Subutex (9%), poly-consumption (4.6%), and other unspecified psychotherapeutic drugs (1.5%). The mean duration of treatment at the time of questionnaire administration was 2.6 months ($SD = 8.9$). Further, the total sample of 608 participants was randomly divided

into two subsamples ($N = 296$ and $N = 312$) to properly perform the exploratory and confirmatory factor analyses.

Exploratory factor analysis

Bartlett's Test of Sphericity was significant at $p = .000$, indicating a good correlation between the variables and the adequacy of the EFA to this scale. The Kaiser-Meyer-Olkin index was higher than the recommended value of .50 ($KMO = .822$). This last value showed us that the results obtained can be considered good according to Marôco³⁰ and Pestana and Gageiro³¹. Communalities coefficients ($h^2 > .40$) were also taken into account to assess the psychometric qualities of the instruments³². Nevertheless, we chose to keep the items with communalities above .30 if they are theoretically justified. According to Cattell's scree plot graphic³¹, there are four to six main factors. We ran EFA, establishing 4 factors because the theoretical model of the original version also showed 4 overall factors⁷. The four-factor solution accounted for 29.9% of the total variance. However, some items had low communality values ($h^2 < .40$). In this process, we eliminated the items with poor results ($h^2 < .40$ if they are not theoretically justified) and ran the EFA repeatedly until we found a final model in which all items showed adequate results (Table 1). In this four-factor solution all items presented communality values above .35 and factor loadings ranging between .49 and .90 (Table 1). The final EFA revealed a new four-factor solution that accounted for 54.4% of the total variance. We renamed some of the subscales since there is a new combination of items: Therapeutic involvement (26.6%); Negative affects (12.4%); Social support (9.2%); and Peer support (6.2%).

Table 1. Final Exploratory Factor Analysis: communalities and factor loading by item ($N = 296$)

	h ²	Component			
		1	2	3	4
84. [Your counselor respects your opinions]	.562	.783	.021	-.036	-.145
63. [Your counselor helps you develop confidence in yourself]	.654	.780	.029	.067	.015
30. [You are satisfied with this program]	.594	.761	-.020	-.019	.057
80. [The staff here is good at doing its job]	.576	.756	-.071	-.113	.102
43. [Your counselor is sensitive to your problems]	.537	.745	-.048	-.142	.086
21. [You are motivated by your counselor]	.547	.739	.050	.046	-.085
2. [You trust your counselor]	.526	.734	.040	.028	-.105
38. [Your counselor recognizes the progress you make in treatment]	.524	.691	-.024	.057	.031
20. [This program is organized]	.480	.644	.039	.032	.124
115. [You have a good personal counseling at this program]	.423	.625	-.090	.018	.017
67. [You have made progress in understanding your behavior]	.371	.493	.059	.219	.015
105. [You feel nervous]	.623	.046	.777	-.010	-.105
36. [You feel a lot of anger inside you]	.554	-.037	.732	-.049	.144
70. [You feel anxious]	.484	-.053	.694	.027	.056
92. [You get mad easily]	.470	-.026	.676	.104	-.092
41. [You have a hot temper]	.503	.046	.657	.270	-.182
90. [You worry or brood a lot]	.425	.052	.644	-.034	.143
74. [You feel sad]	.490	-.072	.589	-.289	.011
76. [You feel extra tired]	.343	-.028	.501	-.244	.001
95. [You have people close to you who help you develop confidence in yourself]	.722	.050	.036	.831	.009
64. [You have people close to you who understand your situation and problems]	.636	-.040	-.074	.794	.031
107. [You have people close to you who respect your efforts in this program]	.725	.120	.013	.786	.059
18. [You have people close to you who help you stay away from drugs/alcohol]	.479	.004	.014	.694	-.008
29. [You have people close to you who can always be trusted]	.470	-.061	-.012	.686	.081
77. [You have improved your personal relationships with other people]	.425	.070	-.043	.604	.053
58. [Other clients at this program care about your situation and problems]	.801	-.015	.032	.022	.895
72. [Other clients at this program are helpful to you]	.777	-.017	-.005	.072	.868
99. [You have developed positive trusting friendships while at this program]	.518	.215	.024	.212	.546

Note: Boldface indicates the items belonging to the factor.

Confirmatory factor analysis

All items were distributed within the normality range ($|ku| < 4.601$ and $|sk| < 1.899$). Sixteen outliers were found using Mahalanobis squared distance (p_1 and $p_2 < 0.00$)²⁵. Because the analysis of the model fit without outliers showed similar results, we decided not exclude these cases from the analysis³⁰. The model obtained by the EFA with 4 factors and 28 items was tested (Figure 1). The hypothesized model revealed a poor global fit (Table 2). However, we have analyzed modification indices and we proceeded to the change of paths only when if it made sense according to the theoretical premises: the regression values show us that items 20, 21, 29, 43, 77 and 99 are repeatedly associated with items outside the factor they belong to, thus revealing their multidimensionality (see contents of the items in attachment file). Consequently, we decided to remove these items from the model. The modification indices also suggested covariance between the errors of items 74 ↔ 76, 41 ↔ 92 (see contents of the items in attachment file). Following these changes, we obtained a short version with 22 items. For this new version, results allow us to classify the model (Figure 2) as a whole as acceptable/good ($\chi^2/df = 1.724$, CFI = .941, GFI = .907, SRMR = .155, RMSEA = .048 [0.040 - .057]; prmse = .623)³³.

Reliability (Cronbach's alpha)

According to the recommended default value of $> .70$ ³¹, the analyses of the values obtained showed us that the *Therapeutic involvement*, *Negative affects*, *Social support* and *Peer support* subscales of new version (22 items) have, respectively, Cronbach's alpha values of .87, .82, .85 e .83. The global instrument has also a high internal consistency ($\alpha = .82$).

Convergent validity

Correlation coefficients are reported in tables 3 e 4. The results show that there is a positive and significant association between all subscales and the total score of the new instrument (ranging from $r = .45$ to $r = .68$, $p < .01$), except for the subscale *Negative affects*, whose association is significant, but negative, as expected by theory ($r = -.74$, $p < .01$) (Table 3). We also found a significant negative association between the total score of the new instrument and the General Symptom Index of BSI (BSI-GSI) ($r = -.52$, $p < .01$), as well as between the total score of the new instrument and all BSI subscales ($p < .01$) (Table 4). In turn, the subscales *Negative affects* and *Social support* are significantly associated not only with the BSI-GSI ($r = .59$, $p < .01$ and $r = -.26$, $p < .01$), but with all dimensions of the BSI as well ($p < .01$) (Table 4).

Discussion

The main goal of this article was to develop a brief questionnaire of treatment monitoring, suitable for both inpatient and outpatient programs, to assess critical indicators of treatment effectiveness in a short time period. The choice of the TCU-CEST instrument was based upon four basic criteria: (a) adequate psychometric properties found in the original instrument, (b) several TCU-CEST subscales have been applied to a variety of dependence treatment programs, (c) wide assessment of several efficacy indicators, and (d) confirmed usefulness in clinical practice and in the present changes in treatment programs^{7,14}. We started from a theoretical model of this original CEST^{7,14}, and the Portuguese version of Moura et al.²⁰, to found a brief questionnaire to evaluate the treatment effectiveness of substance abuse, using both inpatient and outpatient samples, and subsequently EFA and CFA analyses. According to our purposes, we found a different factor structure when compared to the original instrument, with a four-factor model from EFA analyses. These four factors also showed adequate

internal reliability. The adequacy of this structure to a different sample was confirmed through the CFA. Nevertheless, a model re-specification was necessary. We believe that the statistical model allowed us to find a different version due to the inclusion of patient characteristics of different treatment settings, compared to the original instrument.

Despite this, our final model covers the main treatment effectiveness areas pointed out in literature. The first factor, identified as *Therapeutic involvement* dimension, includes items intended to measure treatment engagement, treatment satisfaction and counseling rapport. The second factor, identified as *Negative affects* dimension, includes items to measure the psychological functioning in terms of depression, hostility and anxiety. Third and fourth factors, originally identified as *Social* and *Peer support* scales, respectively, seek to measure social and contextual factors that also affect recovery process dynamics⁷. Former instruments are extensive, which takes a long time to be completed and analyzed, like the software developed by Machado et al.¹, where several instruments were combined resulting in a 126-items instruments. Besides, these instruments don't include some important constructs stressed by literature such as social and peer support network^{7,14}, the therapeutic relationship, the involvement or active participation in treatment¹³⁻¹⁵, psychopathological symptoms or negative affects¹⁶⁻¹⁹.

In this way, when compared with others instruments, this new short-form presented here is a proper response since: (a) it is suitable for both inpatient and outpatient programs; (b) encompasses few, but critical indicators of treatment, using a problem-solving and a psychosocial models; (c) takes short time to be completed; and (d) allows building a database for the monitoring of intervention efficacy available in clinical practice.

Our second aim was to investigate the convergent validity of the brief instrument. There were significant associations of most of these subscales with each other and with the total score, suggesting the concordance of the subscales for the evaluation of different aspects of a common construct. Furthermore, we concluded that this study showed a significant correlation between the brief instrument and the BSI. The majority of the brief instrument subscales (75%) were significantly associated with at least five or more dimensions of the BSI, and half of the brief instrument subscales (50%) were significantly associated with all dimensions of the BSI and total score. Furthermore, the global score of the brief instrument was also significantly associated with all dimensions of the BSI and total score. Exceptionally, the scale *Peer support* was not significantly associated with any of the BSI's dimensions. Despite of the low probability that this subscale had any relation with psychopathological symptoms, it was significantly associated with the other subscales of the new instrument, as well as with the total score, being reasonable to keep this scale in the final instrument.

These results are consistent with the literature stating that psychopathology^{34,35} and comorbidity^{36,37} are very commons in this population. Psychopathology was one of the best predictors of the effectiveness of treatment programs³⁵, increasing the likelihood of treatment failure^{34,35}. Therefore, if this brief instrument is strongly and significantly associated with the BSI (a predictor of the effectiveness of treatment programs), these data seem to reinforce the potential of this version in the estimation of treatment efficacy. Considering the practical implications, this new brief questionnaire, with adequate psychometric properties, can be useful to provide a viable and rapid feedback instrument for counselors, treatment programs and policy makers, covering some of the main and most relevant areas related to the monitoring of drugs and alcohol treatment programs^{3,5,7-9}. Furthermore, this practice can also enable the adjustment of the interventions according to the users' needs and comorbidities^{7,9,14,20}. We also suggest that this instrument should be part of the daily work in clinical practice in Portugal. Thus, more studies may be conducted in context: measuring the treatment effectiveness and warning of the need for effective changes in the recovery process.

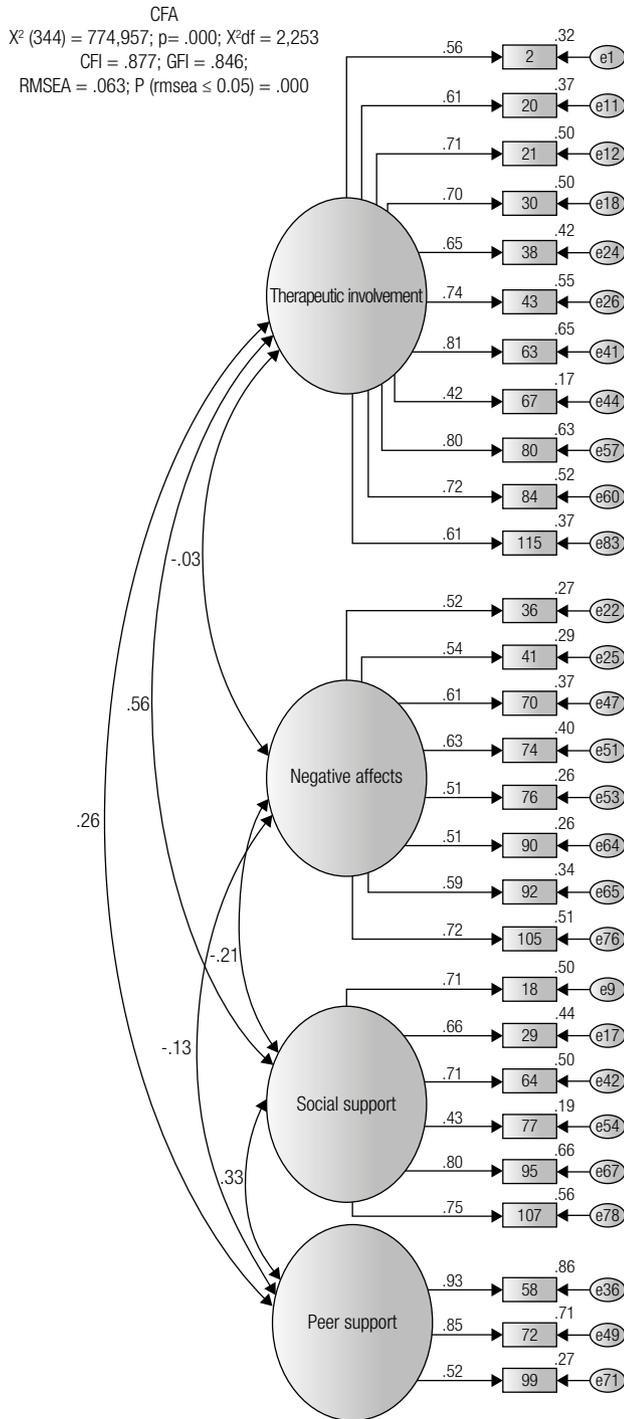


Figure 1. Model 1 – 4 correlated factors and 28 items.

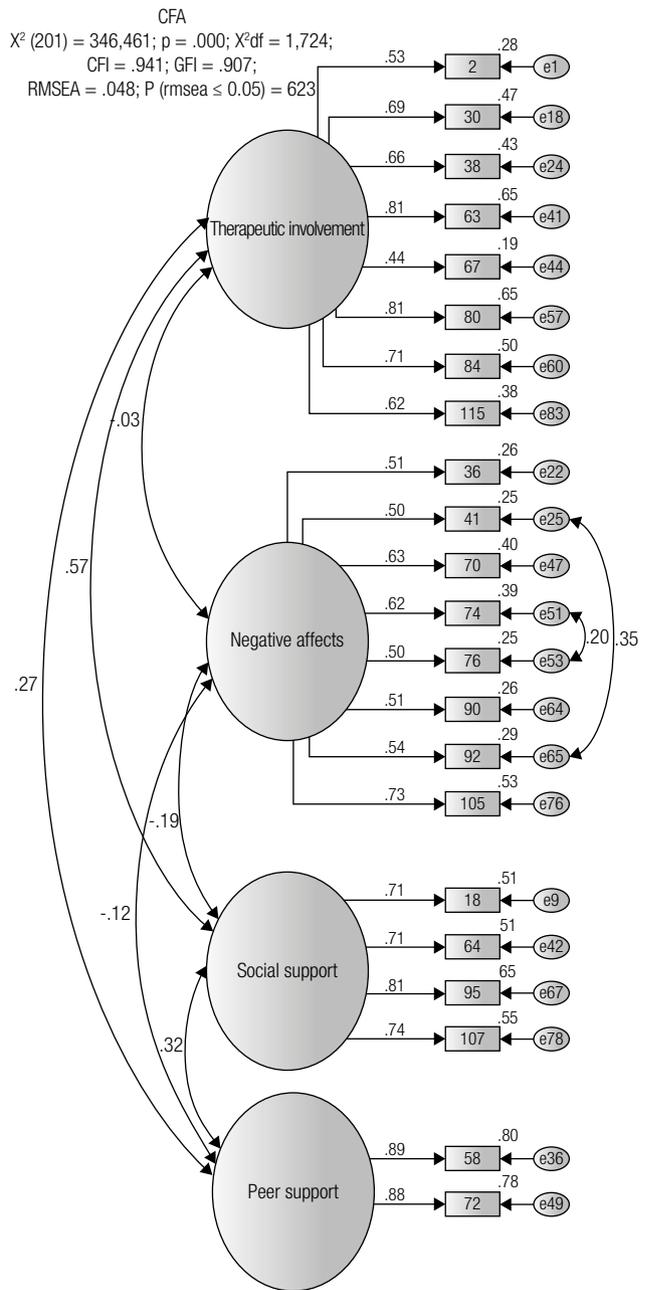


Figure 2. Model 2 – 4 correlated factors and 22 items.

Table 2. Confirmatory Factor Analysis: global adjustment indices (N = 312)

	χ^2	df	χ^2/df	CFI	GFI	SRMR	RMSEA	p rmsea
Model 1: 4 correlated factors (with 28 items)	775*	344	2.253	.877	.846	.178	.063	[.058; .069]
Model 2: 4 correlated factors (with 22 items)	346*	201	1.724	.941	.907	.155	.048	[.040; .057]

* $p < .001$.

Table 3. Correlation matrix of subscales

	Global score	Therapeutic involvement	Social support	Peer support
Global score				
Therapeutic involvement	.569**			
Social support	.678**	.494**		
Peer support	.454**	.225**	.285**	
Negative affects	-.736**	-.034	-.181**	-.065

**p < .01.

Table 4. Correlation matrix of brief questionnaire and BSI scales

	Global score	Therapeutic involvement	Social Support	Peer support	Negative affects
BSI-GSI	-.515**	-.128**	-.261**	-.011	.592**
Somatization	-.394**	-.132**	-.200**	-.037	.424**
Obsession-compulsion	-.345**	-.061	-.184**	.037	.420**
Interpersonal sensitivity	-.329**	-.047	-.161**	.070	.427**
Depression	-.515**	-.179**	-.313**	-.053	.521**
Anxiety	-.443**	-.079	-.183**	.025	.561**
Hostility	-.493**	-.146**	-.219**	-.035	.562**
Phobic anxiety	-.231**	-.027	-.134**	.023	.284**
Paranoid ideation	-.406**	-.069	-.233**	-.045	.458**
Psychoticism	-.403**	-.101*	-.171**	.017	.489**

** p < .01; * p < .05.

Limitations

First, these three major treatment settings are not necessarily representative of all treatment programs for drug or alcohol addiction in Portugal. Second, this short version does not measure the same number of dimensions of treatment efficacy as the original version. Thus, we can conceive it only as an important complementary tool for this assessment. Finally, more studies should be conducted in Portugal with this short version to assess temporal validation of this instrument, and to observe correlations with others indicators of treatment progress (such as attendance, time in treatment or completion of treatment) in order to underline its predictive capacity.

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Psychometric assessment of the Brazilian version of the Male Body Dissatisfaction Scale

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Abstract

Background: The study of male body image has increased substantially, but there are few assessment tools available for this population. The Male Body Dissatisfaction Scale (MBDS) has been widely used among students to research body image disturbances and eating disorders. However, the psychometric properties of this instrument have not been tested in the Brazilian context. **Objectives:** To explore the psychometric properties (convergent validity, internal consistency, test-retest reliability and factor structure) of the Brazilian version of the MBDS. **Methods:** Two-hundred sixty-four undergraduate students were evaluated. Pearson's correlation was used to test the convergent validity of the MBDS and the Drive for Muscularity Scale, the Swansea Muscularity Attitudes Questionnaire, the Rosenberg Self-Esteem Scale, the Beck Depression Inventory, the Eating Attitudes Test-26, and the Commitment to Exercise Scale. Test-retest reliability was evaluated using t-tests for repeated measures and by calculating the coefficient of intraclass correlation. Exploratory factor analysis was conducted, and Cronbach's α coefficients were determined. A significance level of 5% was adopted. **Results:** The MBDS had an adequate factor structure, with two factors explaining 52.67% of the total variance. It showed excellent internal consistency (Cronbach's α between 0.90 and 0.92), a high intraclass correlation coefficient (0.81), and convergent validity with the drive for muscularity, the psychological commitment to exercise, low self-esteem, and eating disorder risk behaviour measures. **Discussion:** The MBDS appears to be a valid and reliable tool for evaluating Brazilian male body image dissatisfaction.

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Keywords: Body image, men's health, psychometrics, validation, factor analysis.

Introduction

Body image dissatisfaction, a negative feeling about one's appearance¹ that has been previously associated with women², is currently being investigated in males in many countries³⁻⁵. In both women and men, body dissatisfaction is associated with low self-esteem, depressive symptoms and risk behaviours associated with eating disorders⁶.

The concern with physical appearance and body image is a reality in many developed and developing countries and is closely related to health and illness⁷. In Brazil, the body is a social status symbol, and physical appearance is an essential element in the construction of a national Brazilian identity⁸. The country was ranked first worldwide in the total number of plastic surgery procedures⁹, and it stands out for the number of surgical liposuction, blepharoplasty and rhinoplasty procedures performed, demonstrating the importance of physical appearance for Brazilians.

A population-based study conducted in Brazil⁵ found a 60.5% prevalence rate for body dissatisfaction among men. The study pointed to an association between weight dissatisfaction and physical inactivity, alcohol abuse, obesity and old age. The authors also found an association between dissatisfaction with muscularity and low body mass index and common mental disorders. Santos Silva *et al.*⁵ highlighted the need to assess body image dissatisfaction because of its influence on the individual's health and quality of life.

There are some concerns specific to the assessment of male body dissatisfaction. Cafri and Thompson¹⁰ highlighted the need to: a) assess satisfaction with muscularity, b) identify behaviours associated with body dissatisfaction, and c) evaluate satisfaction with specific body parts/regions, such as the shoulders, chest and arms. The authors¹⁰ emphasised that a concern with muscularity is the central aspect of male body image. It should also be noted that dissatisfaction with muscularity is a concern among individuals with muscle dysmorphia, a very specific type of body dysmorphic disorder

characterised by a fear of being too small and by perceiving oneself as small and weak even when one is actually large and muscular^{3,6}.

Several authors^{2,10-12} who were aware of these methodological concerns have contributed to psychometric assessment and/or discussions in the field of male body image assessment. Tod *et al.*¹² highlighted four instruments with good psychometric properties: the Drive for Muscularity Scale¹³, the Drive for Muscularity Attitudes Questionnaire¹⁴, Yelland and Tiggemann's¹⁵ Drive for Muscularity Scale, and the Swansea Muscularity Attitudes Questionnaire¹⁶.

Two of these instruments have been analysed psychometrically for use with Brazilian males: the Drive for Muscularity Scale and the Swansea Muscularity Attitudes Questionnaire¹⁷. However, it should be noted that both instruments were developed to assess the drive for muscularity, which is related to dissatisfaction with body muscularity but is a different construct. In a systematic review, Carvalho and Ferreira² pointed to the growth in the number of adapted and/or validated instruments for young Brazilian adults. However, despite the growing number of scales and questionnaires for evaluating male body image, none of these instruments allows the respondent to evaluate the relative importance of each item, which can contribute to overestimating or underestimating the value of an item in the total score.

Based on this premise and given the lack of instruments that specifically evaluate the construct of dissatisfaction with body muscularity, Ochner *et al.*¹⁸ developed the Male Body Dissatisfaction Scale (MBDS). Initial evidence of the validity of the MBDS¹⁸ included its good psychometric properties, with excellent internal consistency (Cronbach's $\alpha = 0.93$) and its convergent validity with self-esteem (Rosenberg Self-Esteem Scale; $r = -0.33$, $p < 0.05$), body self-esteem (Shape and Weight-Based Self-Esteem Scale; $r = 0.53$, $p < 0.01$; and Body Esteem Scale; $r = -0.29$, $p < 0.05$); and self-reported body satisfaction measures (0 to 100 points, $r = -0.52$, $p < 0.01$). In addition, the scale showed good temporal stability (test-retest) of

0.95 ($p < 0.0005$). Through exploratory factor analysis, Ochner *et al.*¹⁸ proposed a factorial structure with three factors: (1) musculature (items 4, 6, 7, 9, 12, 13, 16 and 24), (2) definition (items 1, 3, 10, 15, 17, 18, 20, 22 and 25) and (3) relative standing/external evaluation (items 2, 5, 8, 11, 14, 19, 21 and 23).

The MBDS was previously evaluated for use with young Brazilian adults (18-30 years old) through an analysis of its conceptual, semantic and instrumental equivalence and an analysis of its internal consistency¹⁹. Translation, back-translation, translation synthesis, expert committee evaluation, pre-test, and internal consistency analysis were performed. The MBDS was translated into and adapted to the Portuguese language while maintaining its 25 original items and was shown to be easily understandable with adequate internal consistency ($\alpha = 0.92$)¹⁹.

Although the instrument showed good initial validity, other indicators must also be evaluated. Therefore, the purpose of this study was to explore the psychometric properties (convergent validity, internal consistency, test-retest reliability, and factor structure) of the Brazilian version of the MBDS¹⁹. It is believed that such an instrument may be useful as an evaluation tool for clinical and epidemiological research.

Method

Participants and procedures

The sample was composed of 264 Brazilian men with a mean age of 20.13 years (standard deviation [SD] = 1.71 years; range 18-30 years) and a mean body mass index (BMI) of 23.12 kg/m² (SD = 3.07 kg/m²; range 16.78-41.22 kg/m²). BMI was calculated using self-reported weight and height. The participants were from diverse academic departments (Computer Science, Law, Civil Engineering, Electrical Engineering, Philosophy, Physiotherapy, Mathematics, Medicine and Psychology) at the Federal University of Juiz de Fora, Minas Gerais, Brazil and were selected by convenience based on their presence in the classroom and willingness to complete the questionnaires.

After the researchers contacted the course coordinators and teachers, the subjects were addressed in groups during class. They received information about the research objectives and the procedures to be followed, and the anonymity of each participant was ensured. All of the participants signed a written informed consent form authorising their voluntary participation. Then, the participants answered the questionnaires individually. The study was approved by the Research Ethical Board of Clinical Hospital, Medical School, University of São Paulo (protocol number – 0586/08).

Instruments

The Brazilian version of the MBDS¹⁹ contains 25 items rated on a 5-point scale ranging from 1 (always/strongly agree) to 5 (never/strongly disagree); 13 items were reverse-scored (items 4, 5, 6, 7, 9, 10, 12, 13, 16, 17, 22, 24 and 25). In addition to the evaluation along the 5-point Likert scale, the participants rated the importance of each item to them on a scale of 1 to 10. To calculate the total score, the value of each item (degree of importance) was divided by 10 and then multiplied by the Likert scale response to the item (1 to 5). The total MBDS score can range from 2.5 to 125, with higher scores indicating greater body dissatisfaction¹⁸.

The Drive for Muscularity Scale (DMS)¹³ was used to assess the drive for muscularity. The DMS is a self-report scale consisting of 15 items answered using a 6-point Likert-type response format (1 = always to 6 = never). Total scores range from 15 to 90 points. Higher scores represent more troubling attitudes and behaviours toward muscularity. The scale was translated and adapted for young Brazilian adults and had good psychometric properties¹⁷. The DMS was used to test the convergent validity of the MBDS.

The Swansea Muscularity Attitudes Questionnaire (SMAQ)^{16,17}, another measure that assesses the drive for muscularity, was used to test the convergent validity of the MBDS. The SMAQ¹⁷ consists

of 20 items answered using a 7-point Likert-type response format (definitely, strongly agree, agree, neutral, disagree, strongly disagree and definitely not). The total score ranges from 20 to 140 points. Higher scores indicate a higher drive for muscularity.

The Rosenberg Self-Esteem Scale (RSS)^{20,21} is a widely used measure with strong reliability and validity²¹. The RSS consists of 10 items rated on a 4-point scale ranging from 1 (strongly agree) to 4 (strongly disagree), with a total score ranging from 10 to 40 points. Higher scores indicate a more positive sense of self. We used the RSS²¹ to test the convergent validity of the MBDS.

To evaluate depressive symptoms, we used the Beck Depression Inventory (BDI)²². The instrument consists of 21 items rated on a 4-point scale ranging from 0 to 3. The total score can range from 0 to 63 points, with higher scores indicating greater degrees of depression. We used the Brazilian version of the BDI²³ to test the convergent validity of the MBDS.

The Eating Attitudes Test (EAT-26)²⁴ is a widely used measure of symptoms and troubling characteristics of eating disorders that displays good psychometric properties. The EAT-26 is a self-report instrument comprising 26 items rated with a 3-point Likert scale format (0 = never, rarely and very rarely, 1 = often, 2 = very often; 3 = always). Item 25 is reverse-scored. According to Nunes *et al.*²⁵, the EAT-26 has good psychometric properties and satisfactory internal consistency. The EAT-26 was used to assess the convergent validity of the MBDS.

Males with high body dissatisfaction generally engage in regular physical exercise (i.e., weightlifting)⁶. To assess this characteristic, we used the Commitment to Exercise Scale (CES)²⁶ as a measure of convergent validity. The CES is a visual analogue scale consisting of 8 questions that refer to an individual's commitment to and behaviours and attitudes towards physical exercise. Each question presents a 155-mm line with two response options, one at the beginning and one at the end of the line. The distance between the beginning of the line and the point the respondent marks is the score for each item. Scores range from 0 to 1,240 points, and the higher the score, the higher the respondent's degree of psychological commitment to physical exercise²⁶.

Data analysis

Descriptive analyses (mean, standard deviation, minimum and maximum value) were performed for the scores obtained from the MBDS, DMS, SMAQ, RSS, BDI, EAT-26 and CES. To assess the reliability of the applied instruments, Cronbach's α was estimated for each scale; the results are reported in table 1. Cronbach's α higher than 0.70 were considered adequate²⁷.

The Kolmogorov-Smirnov test was used to determine normality in the data distribution. Evidence of convergent validity was evaluated with parametric statistical analyses using Pearson's test of association between the scores of the instruments (DMS, SMAQ, RSS, BDI, EAT-26 and CES) and the MBDS. Correlations of 0.20, 0.40, and 0.60 were considered small, moderate, and strong, respectively²⁸.

To determine the test-retest reliability of the MBDS, a subset of the sample was randomly selected to re-take the test after two weeks²⁹. Fifty-three subjects participated in this phase of the study. They had a mean age of 19.89 years (SD = 1.76 years) and a mean BMI of 22.81 kg/m² (SD = 2.94 kg/m²). The MBDS test-retest reliability was evaluated by comparing the scores obtained (Student's *t* test for paired measures) between the two points in time and calculating the intraclass correlation coefficient (ICC). In addition, the internal consistency was verified by calculating Cronbach's α -coefficient for the two time points²⁹.

The MBDS met the standard criteria for multivariate normality with a Mardia coefficient near zero²⁹. An exploratory factor analysis (EFA) of the MBDS was then conducted. For the initial MBDS validity analysis, Ochner *et al.*¹⁸ included a small sample (fewer than 100 individuals), which some authors^{29,30} consider the minimum sample size for the EFA. A ratio of 5 to 20 individuals for each item of the

instrument, with 10 subjects per item considered an appropriate value^{29,30}, is indicated for validity analyses. The MBDS consists of 25 items, which requires a minimum of 250 subjects for the factor analysis. For this reason, the factor structure used in the original study of the MBDS¹⁸ was not considered as a basis for the EFA of the Brazilian version.

Therefore, an EFA was conducted using principal components analysis, followed by Varimax orthogonal rotation and the use of Kaiser criterion (minimal eigenvalue = 1) for the factor extraction²⁹. The data's suitability for this analysis was assessed using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity. The factor loading matrix was analysed to identify the items and their correspondence with the factors. A cut-off point of 0.40 was used for the item loading values³⁰. Cronbach's α was evaluated for each identified factor to determine the internal consistency.

SPSS v.17.0 software was used for all of the analyses, and a significance level of 5% was adopted.

Results

Descriptive analysis and convergent validity

The scores obtained and the correlations between the instruments are summarised in table 1. It is noteworthy that the instruments showed a significant variation in the scores obtained that comprised almost all possible scoring variations for each instrument (minimum score to maximum score). It can also be noted that all of the instruments had adequate internal consistency²⁷.

As expected, the MBDS was associated with almost all of the instruments, indicating convergent validity with various measures (Table 1). Following the cut-offs indicated by Tabachnick and Fidell²⁸, the MBDS showed a direct and strong association with the drive for muscularity measures, the DMS and the SMAQ, and the psychological commitment to exercise. A moderate association was also found between the MBDS and eating disorder risk behaviours, and a small and inverse association was found with self-esteem. Only depressive symptoms (BDI) were not associated with the MBDS.

Table 1. Descriptive statistics, Cronbach's α and correlations (n = 264)

Measure	M	SD	Min-Max	Cronbach's α	Correlation with MBDS
MBDS	47.76	20.19	2.90-102.20	0.92	-
DMS	41.34	16.13	15-84	0.90	0.68*
SMAQ	57.23	18.37	20-100	0.95	0.77*
RSS	25.41	2.95	10-35	0.80	-0.14**
BDI	6.46	4.63	0-24	0.76	0.08
EAT-26	11.29	8.45	0-51	0.82	0.27*
CES	52.06	28.62	0-145.90	0.83	0.60*

M: mean; SD: standard deviation; Min: minimum; Max: maximum; MBDS: Male Body Dissatisfaction Scale; DMS: Drive for Muscularity Scale; SMAQ: Swansea Muscularity Attitudes Questionnaire; RSS: Rosenberg Self-Esteem Scale; BDI: Beck Depression Inventory; EAT-26: Eating Attitudes Test-26; CES: Commitment to Exercise Scale.

* $p < 0.001$.

** $p < 0.05$.

Reliability

The MBDS demonstrated very good two-week test-retest reliability. There were no differences ($p = 0.13$) between the scores obtained at the first and second moment. The intraclass correlation coefficient (0.81) and Cronbach's α (moment 1 = 0.90 and moment 2 = 0.92) also indicated good test-retest reliability.

Exploratory factor analysis

The Kaiser-Meyer-Olkin measure of sampling (0.89) and Bartlett's test of sphericity ($\chi^2(300) = 4367.835$; $p < 0.001$) revealed that the data

were suitable for factor analysis. In determining how many factors to retain, a scree plot was also examined, and an item analysis was conducted for various factor solutions. The scree plot suggested four possible factor solutions (Figure 1). The 2-factor model was retained because this model provided the clearest and parsimonious item loadings. In particular, based on examination of the 3- and 4-factor solutions, it was apparent that many of the significant items loaded on several factors, or a single item was saturated by a single factor.

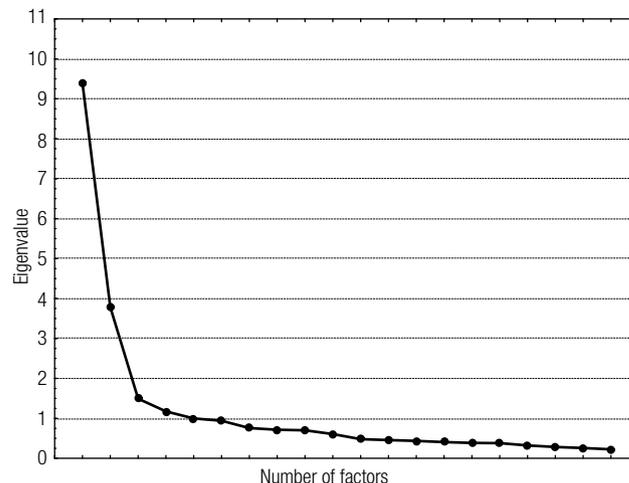


Figure 1. Scree plot of the MBDS.

The model obtained in the EFA consisted of two factors: Factor 1 ("Dissatisfaction with body muscularity"; eigenvalue = 9.38) and Factor 2 ("Positive muscle attributes"; eigenvalue = 3.78). Together, these factors explained 52.67% of total variance. The internal consistency of these two factors was considered adequate (Table 2).

Discussion

The interest in the study of body image in Brazil has been increasing. However, few tools are available for assessing male body image², and none of the available instruments allows the individual to evaluate the degree of importance of the items. The MBDS places special emphasis on addressing the potential shortcoming of other rating scales and allows each item to be weighted according to individual relevance. For these reasons, the purpose of this study was to examine the convergent validity, internal consistency, test-retest reliability and factor structure of the MBDS¹⁹ in Brazilian men.

Regarding convergent validity, the MBDS had direct and strong associations with several measures. As an example, we can mention its relationship with drive for muscularity (DMS and SMAQ) and psychological commitment to exercise (CES). These results support the findings of Murray *et al.*⁶, which indicated that body dissatisfaction was strongly related to the drive for muscularity and exercise addiction/dependence.

The MBDS was also negatively associated with self-esteem (RSS) and directly associated with eating disorder risk behaviours (EAT-26). These results were also observed in Murray *et al.*'s study⁶. Both, Ochner *et al.*¹⁸ and Rousseau *et al.*³¹ found a negative association between the MBDS and self-esteem and body self-esteem. However, Ochner *et al.*¹⁸ identified a marginal association ($p = 0.07$) between the MBDS and eating disorder risk behaviours (EAT-26; $r = 0.32$).

The results indicated that the Brazilian version of the MBDS has good temporal stability with a high intraclass correlation coefficient and adequate Cronbach's α . The principles of validity and reliability are fundamental cornerstones of the scientific method and are essential to the correct assessment of male body image and to strategies for clinical and epidemiological assessment. Similarly, the MBDS's assessment of each item's degree of importance in addition to the Likert scale responses increases the scale's reliability and avoids over- or underestimating an item's contribution to the total score.

Table 2. The items from the Brazilian version of the Male Body Dissatisfaction Scale: factor loadings, Cronbach's α and explained variance obtained from the exploratory factor analysis

Item	Factor 1	Factor 2
1. I am happy with how much muscle I have compared to how much fat I have.		0.73
2. Other people think I have a good body.		0.74
3. I am a good weight for my height.		0.54
4. I wish I had more muscular arms.	0.77	
5. I am hesitant to take my shirt off in public because people will look at my body.	0.40	
6. I fantasise about having more muscle.	0.71	
7. I have thoughts of dissatisfaction with my body.	0.73	
8. I think I have a generally attractive body.		0.83
9. I wish I had more of a V-shaped torso (upper body).	0.52	
10. I wish I could become more toned to accentuate the muscle I do have.	0.75	
11. I am more muscular than the average male my age.		0.72
12. I worry about being more muscular.	0.80	
13. I wish I had bigger biceps.	0.81	
14. I think my pectoral (chest) muscles are well developed.		0.72
15. I have a "six-pack" or "washboard stomach".		0.68
16. Others would find me more attractive if I had more muscle.	0.75	
17. I wish I could lose more fat.	0.50	
18. My body looks healthy.		0.58
19. I like to show off my body.		0.44
20. The shape of my body is one of my assets.		0.69
21. I look like I could lift more weight than the average male my age.		0.56
22. I wish I had better muscle definition.	0.77	
23. My body is sexually appealing to others.		0.67
24. I think about how different my body looks from what my ideal body would look like.	0.79	
25. I wish I could build a better body for myself.	0.70	
% explained variance.	37.54	15.13
Cronbach's α .	0.90	0.92

Factor 1: "Dissatisfaction with body muscularity"; Factor 2: "Positive muscle attributes".

With respect to the EFA, Bartlett's test of sphericity was significant, and the KMO measure was appropriate. The analysis indicated the presence of two factors named according to the items that comprised them. As previously noted, Ochner *et al.*¹⁸ used a reduced sample for the factor analysis; for that reason, a new EFA was performed for the Brazilian version of the MBDS. Rousseau *et al.*³¹ evaluated the factor structure of the MBDS for French adults through exploratory and confirmatory factor analysis. In the French study³¹, the EFA revealed two factors, "Dissatisfaction with body muscularity" (eight items: 4, 6, 9, 10, 12, 13, 16 and 22) and "General body appearance dissatisfaction" (10 items: 1, 2, 3, 5, 7, 8, 15, 17, 19 and 23), which explained 42.7% of the total variance of the MBDS. Seven items were excluded because they systematically loaded on several factors (4) and because they were identified before the breaking point of 0.40 (3)³¹.

Although some items from the French version loaded to factors similar to those on the Brazilian version of the MBDS, our study's solution (two factors) fit the data better than the alternative solutions (3-4 factors). Therefore, the naming of the factors that Rousseau *et al.*³¹ suggested was not considered appropriate. In addition, the factor structure identified in the present study kept the scale's original 25 items, which is important because it allows comparisons between groups from different countries, cultures and languages. Therefore, when possible, it is desirable to maintain compatibility between the original instrument and the version adapted for other cultures.

There are limitations to this study that are important to acknowledge. First, a convenience sample was used, a fact that compromises the generalisability of the results and does not represent cultural diversity. Second, the EAT-26 was used as a proxy for eating disorder risk behaviours to test convergent validity. Although the instrument has demonstrated good psychometric properties, it has high sensitivity and low specificity²⁵. Future studies should try to assess the discriminant validity of the MBDS by comparing a group with eating disorders (correctly identified via clinical interview) with a group without it. Third, a doubly indirect method (BMI) was used to estimate nutritional status in undergraduate students; therefore, the results are subject to measurement errors. Lastly, we note the need to conduct a confirmatory factor analysis; however, doing so would require a sample of approximately 250 individuals^{29,30}. A confirmatory factor analysis with a large sample is planned, and further testing with a heterogeneous sample is required to determine the applicability of the MBDS to more diverse populations. In this sense, a diverse sample including men from different university courses and a variety of other socio-demographic characteristics (race, relationship and socio-economic status) should be taken into account.

Despite these limitations, this study presents empirical results that demonstrate the good validity and reliability of the MBDS¹⁹ for evaluating male body dissatisfaction in young Brazilians, thus providing an important tool for clinical and epidemiological research.

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Social support and bipolar disorder

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Abstract

Background: Bipolar disorder is a chronic condition that affects the functioning of its carriers in many different ways, even when treated properly. Therefore, it's also important to identify the psychosocial aspects that could contribute to an improvement of this population's quality of life. **Objective:** Carry out a literature review on the role of social support in cases of bipolar disorder. **Method:** A research on the following online databases PubMed, Lilacs and SciELO was conducted by using the keywords "social support" or "social networks" and "mood disorders" or "bipolar disorder" or "affective disorder," with no defined timeline. **Results:** Only 13 studies concerning the topic of social support and BD were found in the search for related articles. Generally speaking, the results show low rates of social support for BD patients. **Discussion:** Despite the growing interest in the overall functioning of patients with bipolar disorder, studies on social support are still rare. Besides, the existing studies on the subject use different methodologies, making it difficult to establish data comparisons.

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Keywords: Social support, social networks, bipolar disorder, mania, bipolar depression.

Introduction

Bipolar disorder (BD) is a chronic, recurring illness, with estimated prevalence rates of 2%, when considering the classic presentation of symptoms, and of around 2% in its subsyndromic forms¹. The evolution and course of the disease can vary widely among individuals. Nevertheless, a frequently seen aspect is difficulty in readjusting properly to the social environment. This happens because of the negative impacts bipolar disorder has on the overall functioning of the person, including troubles in the workplace, low life satisfaction and difficulty in interpersonal relationships^{2,3}.

Despite the use of adequate drug treatments, many times the course of BD is characterized by persistent symptoms and by high rates of relapse, recurrence and hospitalizations. After the acute phase, although the individual may recover substantially, reaching a state of symptomatological remission, the patient still suffers from the negative impact of the disease, presenting with cognitive dysfunction and losses in social and work spheres with subsequent loss in quality of life (QOL). The subsyndromal symptoms, especially depressive ones, may remain and thus entail a higher frequency of recurrences, with exacerbation of symptomatology and a decrease in one's general health^{4,5}.

Within this context, the topic of QOL, considered an important indicator of the level of efficacy and efficiency of medical treatment, has been gaining relevance in research. Currently, there has been significant evidence in favor of evaluating QOL in people with BD, since the patient's follow-up should not be restricted to symptom evaluation alone, but the physician ought to, as well, aim at understanding and measuring the disorder's impact on the psychosocial parameters of the patient⁶.

Among the constructs that measure the psychosocial aspects, two different, albeit related, concepts are pointed out: 1- structural social support (social network) and 2- functional social support. The structural social support, which entails the quantitative aspect of social contacts, is defined as the number of people with whom the individual maintains contact or a social bond, and who might or might not offer help. The functional social support comprises the

qualitative dimension of the social network, referring to the resources made available to people in time of need, such as emotional, material and affective assistance. Furthermore, social support refers to the individual's perception as being of value within the context of the groups in which he or she participates⁷.

In order to understand the association between the types of social support and physical and mental health, the use of measures that assess the individual's perception and encompass the highest possible number of domains is recommended. There should also be a focus on the types of support that are related to positive results in health⁸.

Data in the literature regarding social support for those with mental illnesses indicate that it is possible to mitigate the negative impact of life's stress-causing events, including the symptoms brought about by the illness. The lack of help from third parties is a risk factor for symptom recurrence and results in poor prognoses for mental illness. At the same time, the set of dysfunctional symptoms, such as irritability, intolerance, and arrogance present in the acute phases of mania or hypomania, decreases one's capacity in maintaining the ability to deal with others, and, subsequently, may contribute to the reduction of social support. This bidirectional relation should be highlighted⁹⁻¹¹.

Regarding social support and BD, assistance from family and friends seems to have positive effects in preventing a relapse, as well as on better treatment adherence and improved functionality of the individual. Although there are favorable empirical results corroborating the position that satisfactory social support provides beneficial consequences, the data concerning this topic are still inconsistent. Therefore, a sparse number of studies have been cautiously conducted, evaluating the patients in symptomatological remission. Moreover, the studies present small sample sizes and do not emphasize the development of strategies to broaden social resources for clinical practice guidelines¹²⁻¹⁴.

Traditionally, health care has been assessed and its results interpreted by means of clinical measures, such as treatment response. Thus, BD treatment, possibly up until the 1980s, when the first article on BD and social support appeared, was perceived in a reductionistic way, through clinical response measures, evaluating only the intensity of manic and depressive symptoms¹⁴.

With the advance of pharmacotherapy, those suffering from chronic illnesses, including BD, began to see the symptoms of their illnesses being managed, and consequently, they gained a longer life expectancy. However, this does not necessarily mean better QOL. Thus, research on social support emerged from the gaps where researchers recognized the need to broaden knowledge concerning multifactorial models of BD etiology, treatment and prognosis¹⁴.

The initial instruments to measure social support encompassed simple indices that covered only the presence or absence of spouse, the availability of a confidant in a crises situation, the family composition and/or involvement in social activities. These measures had limitations, since they did not inform on the quality of these relationships or specify the mechanisms through which the social network components work as a support system. In choosing the instrument evaluating social support in the research, it is important to consider the structural and functional aspects of the social relationships. Moreover, this instrument should be duly translated and validated for the studied population, before its utilization. Furthermore, the chosen scale should present a good level of reliability in monitoring social support^{7,8}.

The relationship between social support, QOL, and BD, within a broader context of evaluation, is still not entirely clarified; therefore, it is crucial to conduct a better investigation of the aspects that might influence symptom exacerbation. Equally important is to know how social support functions, leading to better control of BD and a decrease in impairment in the lives of those suffering from BD, as well as their family members. So, this paper aims to review all the aspects about social support in BD patients.

Subjects and methods

A classical review of the literature was performed, using as the database: PubMed, Lilacs and SciELO. For the selection of studies the following inclusion criteria were used: articles discussing social support and BD, such as clinical trials, reviews, case reports, conceptual papers published in English, Portuguese or Spanish, with no defined timeline. The following "Medical Subject Headings" (MeSH) were used: "social support" OR "social networks" AND "mood disorders", OR "bipolar disorder" OR "affective disorder". Bibliographical references of the attained articles were also consulted, in order to locate articles that were not identified in the primary electronic search. Exclusion criteria were: articles that are not available in full and those that do not measure social support with specific scales. Regarding the eligibility criteria, a review was made of the titles and abstracts of the retrieved studies and selected items for full-text reading. The selected studies were evaluated with respect to the inclusion criteria.

Results

A total of 246 articles were found in the database searches and hand-searches. However, most of these studies were not specifically on the topic. So, 14 of these were deemed potentially relevant. One of them was a quality analysis study. The selected studies were evaluated with respect to the inclusion criteria and then only 13 studies concerning the topic of social support and BD were used in the search for related articles. The flowchart shows this process (Figure 1). Generally speaking, the results show low rates for social support for BD patients (Tables 1 and 2).

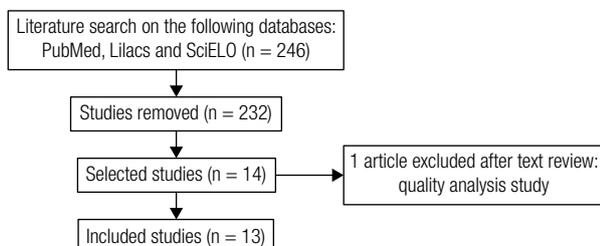


Figure 1. Flowchart detailing inclusion and exclusion selection criteria.

Discussion

The first study that investigated social support and BD was published in 1985 and showed the relevance of psychosocial treatments in association with medication, in controlling BD. In this study, 60 BD patients were evaluated, according to the criteria of the third revision of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III), by way of the Personal Resources Inventory (PRI), and the results showed that the use of lithium was related to high rates of social support. The researchers highlighted the importance of psychosocial variables in the course of treatment response, pointing out that social support is a part of confronting mechanisms, which positively influence the patient's prognosis¹⁵. These data were corroborated in another cross-sectional study evaluating 118 BD patients taking lithium, through the Social Support Questionnaire (SSQ), revealing that high rates of social support contributed to a decrease in mania and depression¹⁶.

Thus emerged the interest in measuring social support, seeing as the medication is not the only influence in treatment response. In 2003, research investigating the effects of social support in the remission and relapse of BD, using the Interview Schedule for Social Interaction (ISSI) and the Interpersonal Support Evaluation List (ISEL), showed that the presence of social support is important in reaching remission and that having a partner at the onset of the disease was associated with a higher chance of reaching total symptom remission, when compared to those who had no partner. Patients who were in partial remission of symptoms also reported less social support. Thus, several explanations were put forward and should be taken into consideration: insufficient social support contributes to partial recovery; more severe course of illness results in one's diminished capacity to socialize; partial remission and a low index of social support have common causes, for example, factors related to personality; and patients with partial remission of symptoms may be underestimating their support¹⁷.

Three cross-sectional studies determined that bipolar patients receive less social support, when compared to controls. One of these studies investigated the role that social support played in BD patients, age 50 or older, through the Duke Social Support Index (DSSI). The study subjects were community residents and recruited at psychiatric units: 29 who had BD were older than 50: 56 who had BD were young adults (between 18 and 49) and 23 were healthy controls. Of these, 20 were in mania, 24 were in the depression phase and 49 were euthymic, although there was not the criterion or the instrument to evaluate euthymia. The results showed that: compared to the control group, the older BD patients had a diminished perception of social support in spite of the difference in the number of social interactions, size of social network or quantity of instrumental social support they received. Furthermore, compared to healthy controls, the young adult BD patients also had an inadequate perception regarding social support and there was a reduced number of social interactions, although they did not present differences in the size of the social network and instrumental support they received. The group of older BD patients, compared to the group of young adults, had a similar and inadequate perception regarding social support. Ultimately, no differences were reported in the social support scales between the older group with BD, based on the age at diagnosis¹⁸.

In 2004, Wilkins related BD, work and social support, and determined that one in four employed people with BD type I stated never, or almost never, having received social support in their lives. Moreover, he proved that social support is fundamental in helping reduce the negative impacts that BD symptoms may cause in seeking and keeping a job. Despite the great need for assistance, BD type I patients have a low level of social support. The possibility of never getting married, separate or getting divorced is relatively higher in those with BD than in people without this disorder. Most likely, this reflects the disorder's effects on more intimate relationships. Despite the large sample size, this study has relevant limitations, such as the use of in-person diagnostic interviews and over the telephone (86%), the non-stratification of people with BD type I, II and the types related to substance use or general medical conditions, which hinders the comparison with other studies¹⁹.

Table 1. Social support in bipolar disorder patients (1985 to 2000)

Authors	Study design	Sample	Instruments	Results
O'Connell <i>et al.</i> , 1985	Cohort (1 year)	60 BD type I patients, without confirmation of euthymia	RDC PRI	Low social support influences recurrence of manic and depressive episodes Greater social support is associated with good treatment outcome with lithium
Romans and McPherson, 1992	Cross-sectional	52 euthymic BD patients; 47 random community sample	RDC ISSI	BD patients have impoverished social relationships, when compared to a random community sample Manic episodes seem to have more detrimental effect on social relationships than depressive episodes do
Staner, 1997	Cohort (2 years)	27 recovered BD patients; 24 recovered unipolar patients and 26 healthy controls	RDC. HDS e BMS SSNI	Social support is unable to predict new episodes in this sample. It is not a major factor in the recovery of the individual
Kulhara <i>et al.</i> , 1999	Cross-sectional	118 BD type I and II patients, without confirmation of euthymia	ICD SSQ	Low social support influences recurrence of manic and depressive episodes Social support significantly correlates to response to lithium. The more social support, the better response to lithium
Johnson <i>et al.</i> , 1999	Cohort (6 months)	59 BD type I patients, without confirmation of euthymia	SCID ISEL ISSI	Individuals with high social support recover more quickly from mood episodes and are less vulnerable to increases in depression over time
Johnson <i>et al.</i> , 2000	Cohort (9 months)	31 BD type I patients	SCID ISEL	Social support components and self-esteem were not linked with follow-up mania symptoms, but they have a protective effect against depression

Research Diagnostic Criteria (RDC); Personal Resources Inventory (PRI); Interview Schedule for Social Interaction (ISSI); Hamilton Depression Scale (HDS); Bech-Rafaelsen Mania Scale (BMS); Social Support Network Inventory (SSNI); International Classification of Diseases (ICD); Social Support Questionnaire (SSQ); Interpersonal Support Evaluation List (ISEL); Structured Clinical Interview for DSM-IV (SCID).

Table 2. Social support in bipolar disorder patients (2003 to 2013)

Authors	Study design	Sample	Instruments	Results
Johnson <i>et al.</i> , 2003	Cohort (1 year)	94 BD patients, without confirmation of euthymia	ISEL ISSI	Social support is lower in patients with BD in partial recovery than those in full recovery Patients with relapses have lower levels of social support compared with patients who did not relapse
Beyer <i>et al.</i> , 2003	Cross-sectional	29 older BD patients, 56 younger BD patients, without confirmation of euthymia, 23 healthy controls	SCID MMSE DSSI	Both older and younger BD patients perceived their social support as inadequate compared with controls of similar age
Wilkins, 2004	Cross-sectional	BD type I patients	CIDI MOSSS	BD type I patients have low social support
Cohen <i>et al.</i> , 2004	Cohort (1 year)	52 BD type I patients, without confirmation of euthymia	SCID SSI	Higher levels of stress and perceptions of less available and poorer quality close relationships are associated with recurrence
Strauss and Johnson, 2006	Cohort (6 months)	58 BD type I patients	SCID HDS BMS ISEL	Stronger treatment alliances were associated with higher levels of patient social support
Weinstock and Miller, 2010	Cohort (1 year)	92 BD type I patients during an acute episode	HDS BMS ISEL	Social support emerged as a unique predictor of depression at the 1-year follow-up Low levels of social support may place individuals with BD at risk for subsequent depressive symptoms
Eidelman <i>et al.</i> , 2012	Cross-sectional	35 euthymic BD type I patients and 38 healthy controls	SCID IDS-C YMRS ISEL	BD patients have more deficient social support compared to controls

Interpersonal Support Evaluation List (ISEL); Interview Schedule for Social Interaction (ISSI); Structured Clinical Interview for DSM-IV (SCID); Mini-Mental Status Examination (MMSE); Duke Social Support Index (DSSI); Hamilton Depression Scale (HDS); Bech-Rafaelsen Mania Scale (BMS); Scale of Supportive Interactions (SSI); Composite International Diagnostic Interview (CIDI); Medical Outcome Social Support Scale (MOSSS); Clinician Rated Inventory of Depressive Symptomatology (IDS-C); Young Mania Rating Scale (YMRS).

A more recent cross-sectional study compared 35 people with BD in symptomatological remission and 38 healthy controls, relating social support and social tension with parameters of sleep and social rhythm. The Clinician Rated Inventory Depressive Symptomatology (IDS-C), the ISEL and the Young Mania Rating Scale (YMRS) were administered on the first visit and then 28 days later, in order to assess depressive and hypomania symptoms. The results showed that social support was lacking in those with BD, when compared to the control group. Furthermore, this research confirmed that social support represents a clinically relevant psychosocial factor, which

fosters a significant impact on the lives of those with BD, even those evaluated in a state of euthymia¹³.

The studies on social support and BD also showed positive responses to social support during a depressive episode. Four studies confirmed that social support has an influence on the recurrence of the depressive episode. One of the studies investigated the effect of social support on symptom severity and episode recurrence of the disorder. They prospectively evaluated 59 people with BD type I, in symptomatological remission or not, by means of the ISEL, the ISSI and the Bedford College Life Events and Difficulties Schedule (LEDS),

determining that the individuals with high social support recovered more rapidly from mood episodes and were less vulnerable to the recurrence of depressive episodes. These results highlight that the positive and negative aspects of social relationships are important determinants of mood symptoms²⁰.

Another prospective study by this group evaluated the presence of manic and depressive symptoms in 31 people with BD type I, through the ISEL and the Rosenberg Self-Esteem Scale (RSE), which measures self-esteem. It was shown that these psychosocial factors only have influence on the course of bipolar depression and not on mania. Thus, these studies suggested that social support is a significant factor in diminishing the severity of depressive episodes over time¹⁸. In fact, a study evaluating 52 people with BD, with a follow-up of one year, which analyzed the effects of stressors and of social support in the course of the illness, showed that high levels of stress as well as lower availability and quality of the patient's interpersonal relationships predict depressive relapse, even when under a physician's care. However, the follow-up period of only one year and the small sample size were limitations of this study, which hindered the detection and analysis of this interference on manic episodes²¹.

Remaining on this line of study, Weinstock and Miller monitored 92 BD type I patients during one year, with the aim of evaluating the relation between family functioning, social support (by way of the ISEL scale) and functional impairment during the course of BD. For this, they recruited patients during acute mood episodes, where they took part in clinical screening with pharmacological and family interventions, or with pharmacological ones alone. In this study, social support emerged as the only predictor of depressive symptomatology, without, however, having any influence on mania. This result is consistent with previous studies that showed that a low index of social support fosters a subsequent risk of depressive symptoms in people with BD. However, further investigation is necessary to see whether some component of the support might also positively affect the course of manic episodes¹¹.

Thus, social support has become a relevant variable in the control of BD, for not only was it observed that the presence of said support exerts a protective effect, but also that BD may impair the social support of patients with BD. A study evaluating social network and social support, through the Interview Schedule for Social Interaction (ISSI) scale, showed that being married and having a good job broaden social interactions, increasing the possibility of good social support. In this study, patients with predominantly manic symptoms obtained a lower score on social interaction than those with depressive symptoms. This result reflects the negative social repercussion that mania causes, since during a manic episode the individual may challenge, humiliate and assault friends or family members, causing them to keep their distance. Moreover, it was observed that the older the person was and the longer time of the illness duration, the lower the index of social support. In this study, care was taken to clinically evaluate whether the patients were in [euthymia?], however, no euthymia rating scale was administered²².

In this review, only one study showed the positive effect of social support in mania. Strauss and Johnson investigated (through the ISEL) the influence of social support, among other variables, on 58 people with BD, for the therapeutic alliance. In fact, the findings of this study showed that strong alliances are associated with greater social support. Thus, one can relate these results with other studies that raise the importance of social support in BD. Furthermore, these researchers concluded that strong alliances predict a lower frequency of negative attitudes regarding medication, less stigma relating to BD, as well as the possibility of helping to reduce symptoms over time²³.

Generally speaking, among the articles selected for this review, only one showed that social support is not an important factor in the individual's recovery. In this article, self-esteem, social adjustment, social support and attributional style were compared with healthy controls, bipolar and unipolar patients in prophylaxis with lithium or antidepressant, and there was no interference of the presence of social support in the drug response. Nevertheless, a substantial

limitation was the small sample size. Thus, one might question the representativeness of the sample and the strength of this study²⁴.

Despite growing interest in the overall performance of someone with BD, aiming at full recovery, the studies on social support are still scarce and unsubstantial. Most of them suggest that patients with greater social support present fewer recurrences and relapses of depressive episodes, particularly. However, there is still little evidence regarding social support and mania prevention. Thus, it is important to investigate whether there is a social support domain that intervenes in the course of manic episodes.

Thus, assessments of psychosocial parameters, as well as the impact of interventions in this area, are necessary in order to integrate the current perspective of the interactions of social, psychological and biological factors within the course and prognosis of BD. Interventions focusing on interpersonal relationships, such as family therapy and interpersonal psychotherapy, might be especially important to consider within this context².

This review has limitations. It is not a systematic review and meta-analysis, since the topic SS in bipolar disorder has few studies and these present different methodologies that hinder data comparison. However, there are strengths: it is a very careful review puts forward important points about this issue, since SS has been gaining attention in the attempt prevent relapse and to promote good outcome of the BD treatment. Therefore, it can be useful to generate future studies.

Conclusions

Research related to social support and BD are inconsistent and have very diverse methodologies; at times, with small sample sizes, where patients are evaluated in the acute phase and with different subtypes of BD (types I and II). Along this line, studies conducted on symptomatic patients are biased, seeing as one's perception is normally distorted during times of depression and mania. Nonetheless, despite these difficulties, it can be pointed out that social support has a protective function in the course of BD, granting benefits to the patient. Thus, it is extremely relevant to conduct studies on euthymic patients, in order to investigate the different domains of social support and their correlations with BD episodes.

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Happiness and health in psychiatry: what are their implications?

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Abstract

Background: Happiness is a lasting state and is associated with the absence of negative emotions, the presence of positive emotions, life satisfaction, social engagement and objectives in life. Researchers have demonstrated the benefits of happiness in many aspects of life, but few studies have been conducted within psychiatry. **Objectives:** To develop a critical literature review of studies on happiness and health in order to bring some further and useful information to psychiatry updating the article “Happiness: a review” published in 2007 in *Revista de Psiquiatria Clínica*. **Methods:** Computational searching was undertaken of digital data basis (PubMed and SciELO) using the keywords “happiness” and “health”. One hundred twenty-seven papers published between 2004 and 2014 were found, but only 76 had the keywords in the title or abstract and with this were selected. **Results:** Personality traits, such as self-direction; being married; being involved in physical and leisure activities; higher educational backgrounds and intelligence quotient; religiosity, volunteering and altruism; good physical and mental health; were positively related to happiness. **Discussion:** Analysis of the concept of happiness and its associated emotions may be more complex than describing the symptoms of psychiatric disorders. Despite this, the study of happiness brings several positive implications for psychiatry.

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Keywords: Happiness and health, subjective well-being, happiness, mental health.

Introduction

Happiness is the main objective of human existence¹. According to many authorities including Greek philosopher Aristotle, all human behavior aims to achieve happiness^{2,3}. However, Seneca pointed out that reaching happiness is a challenging task, since it is difficult to find what makes life happy; and, many times, the more happiness is searched for, more elusive it becomes⁴. In this sense, Socrates explained to Fedro that reflection about the truth would nourish the soul; whereas philosophy would be the adequate tool to achieve this goal⁵.

Happiness was first investigated as an object of philosophical study. Only in the middle of the last century some empirical studies within the health and associated fields of knowledge started to appear^{6,7}. For this reason, the World Health Organization (WHO) has included and emphasized happiness as an important factor within the concept of health^{1,8,9}. Most studies on happiness are in the field of psychology¹⁰ and economics^{10,11}. In psychology, for example, the concept of positive psychology has emerged^{12,13}; according to Seligman (2011), this is an area that studies what is *right* in humans as their positive attributes, that is, their active psychological characteristics and strengths. Positive psychology advocates that promoting mental health involves the promotion of psychological resources, improving the quality of life and preventing mental disorders, especially those disorders that have a strong environmental burden, thereby promoting happiness. Thus, the contributions of positive psychology can and should be considered by psychiatric clinicians and those in general medicine^{15,16}.

In this context, happiness can be defined as a fundamental emotion characterized as a lasting state which is combined with: (i) the absence of negative emotions; (ii) the presence of positive emotions; (iii) life satisfaction; (iv) social engagement and (v) objectives in life^{8,17-19}. Another concept that has been largely used for defining happiness within the specialized literature is *subjective well-being*^{6,8,13,19}.

It is relevant to mention that the concept of *quality of life* is a broader terminology, also involving happiness itself¹⁹.

In order to use a holistic approach to promote health (i.e., taking into account all factors that influence health), it is important to understand how a healthy person behaves and how positive emotions can contribute to this process. In this sense, as proposed by Seligman (2011), treatment is not just fixing what is broken; rather, it involves nurturing what is best within ourselves¹⁹. Undoubtedly, the actual psychiatric medical model that mainly focuses on the diagnosis and treatment of mental disorders, has been immensely helpful to many patients; nevertheless, it is believed that it is necessary to move forwards, and this will bring benefits to all, including those with a psychiatric diagnosis¹⁵.

Based on this, the main goal of this paper is to conduct a critical literature review concerning happiness and health which may be useful for the expansion of psychiatric practice, and also to update the article published in 2007 in the *Revista de Psiquiatria Clínica* titled “Happiness: a review”¹⁸.

Methods

Computer searches were carried out within the PubMed data basis, using the keywords “happiness” and “health”, during August, 2014; and in the SciELO data basis with the same keywords during November, 2014. Filters were applied, requiring that the keywords appeared in the title or abstract and that the articles had been published between September 2004 and February 2014. From the PubMed, initially 80 papers were related to this topic. After a preliminary analysis, ten papers were excluded from this sample because of the following reasons: (i) four did not cite the word happiness either in their titles or in their abstracts; (ii) two concerned topics only related to, but did not directly concern, happiness and health; (iii) four were informative articles (Figure 1). Regarding the SciELO data basis, 47 papers were found; however, only six contained the word happiness in their titles and/or abstracts.

In addition to these searches, another was performed using the reference lists of the papers already selected. This was rewarding in allowing us to identify the classic work provided by significant

authors in this field, such as Martin Seligman, Robert Cloninger and Ruut Veenhoven, as well as the importance in this context of the WHO (Table 1).

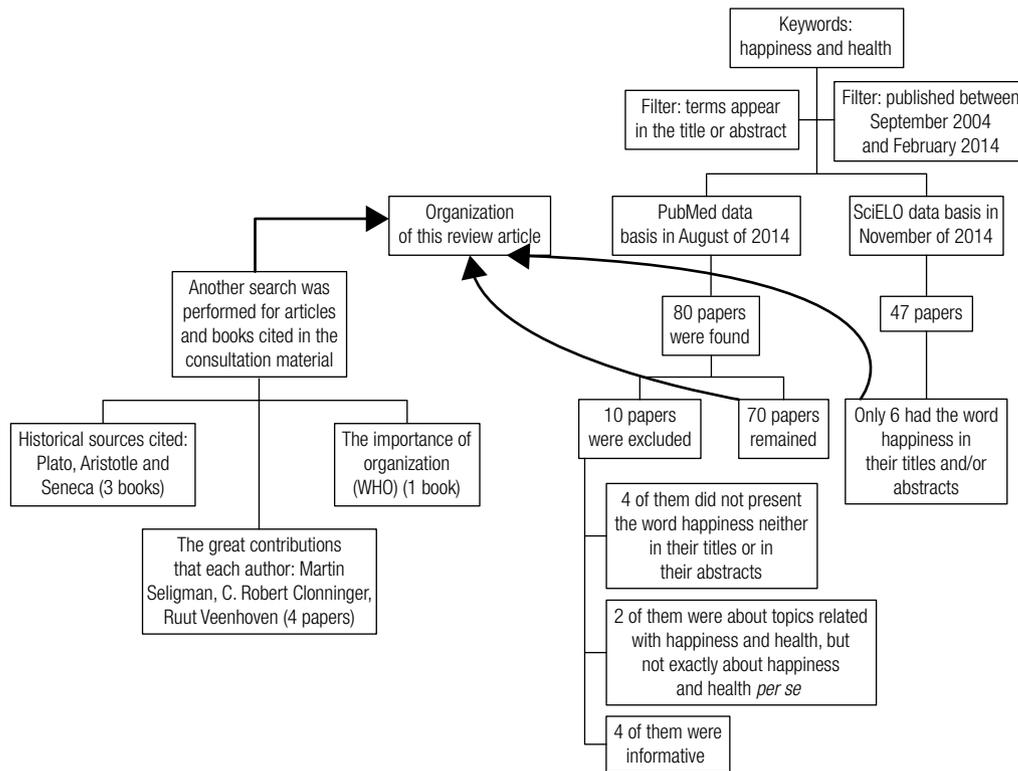


Figure 1. Flowchart of search data.

Table 1. Papers from 2013 to 2014 selected for this review

Author	Title	Year	Sample	Main findings	Main limitations	Conclusion
Ali A, Ambler G, Strydom A, Rai D, Cooper C, McManus S, et al.	The relationship between happiness and intelligent quotient: the contribution of socio-economic and clinical factors	2013	The authors analysed data from the 2007 Adult Psychiatric Morbidity Survey in England (6870 participants aged 16 years or over and living in private households were included in the study)	Those in the lowest IQ range (70-99) reported the lowest levels of happiness compared with the highest IQ group (120-129)	The use of a single question to measure happiness. It is easier for people with lower IQ to understand compared with using a detailed inventory, however the subjective nature of the happiness measure may affect its validity and the use of a single-item question may be less valid in those with higher IQ	Those with lower IQ are less happy than those with higher IQ. Interventions that target modifiable variables such as income and neurotic symptoms may improve levels of happiness in the lower IQ groups
Baruch Y, Swartz M, Sirkis S, Mirecki I, Barak Y	Staff happiness and work satisfaction in a tertiary psychiatric centre	2013	209 staff (185 nurses, 110 administrative staff, 61 psychiatrists, 35 psychologists, 20 social workers and 39 others) at a large university-affiliated tertiary care psychiatric centre	Highest levels of happiness were reported by psychologists and social workers and the lowest by nursing staff. Work orientations as a "job", "career" and a "calling" also differed between sectors with the highest levels of work as a "calling" reported by psychiatrists and the lowest by administrative staff	Less than half of all staff participated, the questionnaires chosen were brief and designed for survey purposes rather than in-depth evaluations	Satisfaction with life is not "driven" by work orientation. Psychiatrists perceive their work as a calling but do not seem to benefit from this in their satisfaction with life Improving staff happiness may contribute to increase in moral and counter burnout

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Author	Title	Year	Sample	Main findings	Main limitations	Conclusion
Binder M, Coad A	"I'm afraid I have bad news for you..." Estimating the impact of different health impairments on subjective well-being	2013	100,265 observations from the British Household Panel Survey (BHPS) database (1996-2006)	The strongest negative effect in happiness is for alcohol and drug abuse, followed by anxiety, depression and other mental illnesses, stroke and cancer A puzzling asymmetry was detected: strong adverse reactions to deteriorations in health appear alongside weak increases in well-being after health improvements	The measure of life satisfaction was made from a single question. Subjective well-being questions were elicited via self-completion, while health condition answers by an interviewer. Bias could result if individuals systematically answer health questions differently in the interviewer's presence	Bad health decreases individuals' happiness differently
Brasseur S, Grégoire J, Bourdu R, Mikolajczak M	The Profile of Emotional Competence (PEC): development and validation of a self-reported measure that fits dimensions of emotional competence theory	2013	Five samples for a total of 5676 subjects (4753 women and 923 men, aged 15 to 84 years) in USA	The authors developed and validated in four steps a complete (albeit short: 50 items) self-reported measure of EC: the Profile of Emotional Competence	----	Analyses performed on a representative sample of 5676 subjects revealed promising psychometric properties. The internal consistency of scales and subscales alike was satisfying, factorial structure was as expected, and concurrent/discriminant validity was good
Chen H, Pine DS, Ernst M, Gorodetsky E, Kasen S, Gordon K, et al.	The MAOA gene predicts happiness in women	2013	Data (The Children in the Community-CIC) for this study were drawn from the 345 Caucasian subjects include 193 women and 152 men who were assessed for MAOA genotype in 2010 at mean age of 38 and happiness in 2004 at mean age of 33	In women, low expression of MAOA (MAOA-L) was related significantly to greater happiness after adjusting for the potential effects of age, education, household income, marital status, employment status, mental disorder, physical health, relationship quality, religiosity, abuse history, recent negative life events and self-esteem use in linear regression models. In contrast, no such association was found in men	There is no single "happiness" gene and likely to be a set of genes whose expression influences subjective well-being. Future work should attempt to identify other genes that are associated with human happiness	This new finding may help explain the gender difference on happiness and provide a link between MAOA and human happiness
Christakis NA, Fowler JH	Social contagion theory: examining dynamic social networks and human behavior	2013	The authors describe the methods we have employed (and the assumptions they have entailed) to examine several datasets with complementary strengths and weaknesses, including the Framingham Heart Study, the National Longitudinal Study of Adolescent Health, and other observational and experimental datasets that we and others have collected	The authors describe the regularities that led them to propose that human social networks may exhibit a "three degrees of influence" property, and they review statistical approaches we have used to characterize interpersonal influence with respect to phenomena as diverse as obesity, smoking, cooperation, and happiness	---	The authors do not claim that this work is the final word, but they do believe that it provides some novel, informative, and stimulating evidence regarding social contagion in longitudinally followed networks. Along with other scholars, they are working to develop new methods for identifying causal effects using social network data, and they believe that this area is ripe for statistical development as current methods have known and often unavoidable limitations

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Author	Title	Year	Sample	Main findings	Main limitations	Conclusion
Doherty M, Kelly BD	When Irish eyes are smiling: income and happiness in Ireland, 2003-2009	2013	Data from the European Social Survey (ESS) relating to self-rated happiness and social and psychological correlates of happiness in Ireland in 2003 (n = 2,046), 2005 (n = 2,274), 2007 (n = 1,794) and 2009 (n = 1,764)	There was a slight decline in happiness between 2005 and 2009, as mean self-rated happiness score changed from 7.94 (2005) to 7.55 (2009). Satisfaction with health had the strongest association with happiness in 2003, 2005 and 2007. Satisfaction with income, relative to other variables, increased over time and in 2009 had the strongest association with happiness	Absence of data relating to certain variables that have been associated with happiness in previous studies. This study was also limited in its ability to assess religiosity in people of no religion, but this is due to the limitations of the ESS	Despite dramatic changes in economic circumstances and a slight decline in happiness, the Irish continued an historic tradition of rating ourselves as generally very happy
Eisenberg D, Golberstein E, Whitlock J L, Downs MF	Social contagion of mental health: evidence from college roommates	2013	Data come from online surveys of first-year college students. The authors conducted the surveys at two large and academically competitive universities: one public school with approximately 6000 first-year students (hereafter "university A"), and one private school with approximately 4000 first-year students ("university B"). The authors fielded the baseline survey in August 2009, shortly before students arrived at college, and the follow-up survey in March–April 2010, shortly before the end of the academic year	Findings are consistent with no significant overall contagion of mental health and no more than small contagion effects for specific mental health measures, with no evidence for happiness contagion and modest evidence for anxiety and depression contagion. The similarity of baseline mental health predicts the closeness of roommate relationships, which highlights the potential for selection biases in studies of peer effects that do not have a clearly exogenous source of variation	Perhaps the most important question about the results of this study is how they generalize to other social contexts. Contagion may be quite different across other social ties, particularly more intimate relationships such as spouses, siblings, and longtime friends. Contagion may also vary considerably by age group, considering how people's social relationships and networks evolve during their lifetime	These results suggest that mental health contagion is lower, or at least more context specific, than implied by the recent studies in the medical literature
Gana K, Bailly N, Saada Y, Joulain M, Trouillet R, Hervé C, Alaphilippe D	Relationship between life satisfaction and physical health in older adults: a longitudinal test of cross-lagged and simultaneous effects	2013	The study included 899 participants aged 64 to 97 years and assessed 5 times over an 8-year period	Both cross-lagged and simultaneous coefficients indicated that poor health significantly predicted subsequent levels of life dissatisfaction, but life satisfaction did not predict subsequent levels of health	Cross-lagged and simultaneous structural models provide tests of reciprocal influences between constructs over time, not of causality. The assessment of self-perceived health with a one-item question is also disputed	These findings contradict, at least in this older sample, the postulates of positive psychology, and support the bottom-up approach to well-being as well as the popular adage, "As long as you've got your health"
Gruber J, Kogan A, Quoidbach J, Mauss IB	Happiness is best kept stable: positive emotion variability is associated with poorer psychological health	2013	Study 1 included a sample of 244 adult participants from the Denver, Colorado, community. Study 2 consisted of 2,391 francophone adults recruited through a large online study mentioned during the French TV show <i>Leurs Secrets du Bonheur</i>	Greater macro- and microlevel variability in positive emotion was associated with worse psychological health, including lower well-being and life satisfaction and greater depression and anxiety (Study 1), and lower daily satisfaction, life satisfaction, and happiness (Study 2)	Cross-sectional study	Taken together, these findings support the notion that positive emotion variability plays an important and incremental role in psychological health above and beyond overall levels of happiness, and that too much variability might be maladaptive

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Author	Title	Year	Sample	Main findings	Main limitations	Conclusion
Kang Y, Gruber J	Harnessing happiness? Uncontrollable positive emotion in bipolar disorder, major depression, and healthy adults	2013	Participants included adults with bipolar I disorder (BD; n = 32), major depression (MDD; n = 32), and or nonpsychiatric controls (CTLs; n = 31)	Across all participants, reliving a controllable positive emotion experience was associated with exhibited increased respiratory sinus arrhythmia, an autonomic marker of regulatory control. Interestingly, only the MDD group reported increased positive emotion and decreased cardiovascular arousal when reliving an event involving uncontrollable positive emotion, compared to the BD and CTL groups	Emotion control was self-defined by the participants in this study, so we cannot know precisely how successful people actually were in controlling their emotions in the recalled events	These findings suggest that although controllable positive emotion experiences may be adaptive for most, individuals with a history of restricted affect and depressed mood may actually derive more pleasure from times of unharnessed happiness
Lehmann BA, Bos AER, Rijken M, Cardol M, Peters GJY, Kok G, Curfs LMG	Ageing with an intellectual disability: the impact of personal resources on well-being	2013	Longitudinal survey data on 667 people with a mild or moderate intellectual disabilities (ID) were acquired via interviews in 2006 and 2010	Age is positively related to decreased mobility and auditory disabilities and negatively related to independent living, autonomy in how one spends one's leisure time and autonomy in decision-making. Longitudinal analyses demonstrated that, with the exception of health that deteriorated, and social satisfaction that improved, almost all variables remained stable over the 4-year period. Further, good physical health in 2006 predicted happiness in 2010	Most of the items were dichotomous as asking people with ID to answer questions is not always easy Some associations were barely significant and had weak effect sizes and should therefore be interpreted with caution	Despite the fact that age is associated with poorer physical and mental health and a smaller social network, this study showed that older people with ID have relatively high levels of well-being
Mitchell L, Frank MR, Harris KD, Dodds PS, Danforth CM	The geography of happiness: connecting twitter sentiment and expression, demographics, and objective characteristics of place	2013	This article combining (1) a massive, geo-tagged data set comprising over 80 million words generated in 2011 on the social network service Twitter and (2) annually-surveyed characteristics of all 50 states and close to 400 urban populations	Happiness within the US was found to correlate strongly with wealth, showing large positive correlation with increasing household income and strong negative correlation with increasing poverty. Happiness anticorrelates significantly with obesity	There are a number of legitimate concerns to be raised about how well the Twitter data set can be said to represent the happiness of the greater population. Furthermore, the fact that the authors collected only around 10% of all tweets during the calendar year 2011 means that their data set is a non-uniform subsample of statements made by a non-representative portion of the population	The results show how social media may potentially be used to estimate real-time levels and changes in population-scale measures such as obesity rates
Proulx CM, Snyder-Rivas LA	The longitudinal associations between marital happiness, problems, and self-rated health	2013	The sample included 707 continuously married adults who participated in all six waves of the Marital Instability Over the Life Course panel study. Participants averaged 35 years in age at the first wave and were continuously married to the same spouse over the 20-year period	Unidirectional coupling existed for marital happiness and self-rated health only, such that higher levels of marital happiness predicted subsequent elevations in self-rated health over time. No evidence was found for bidirectional coupling between marital problems and self-rated health	Findings cannot be generalized to all married individuals, a focus on people who were married continuously across 20 years provides evidence of the associations between marital happiness and self-rated health in long-term marriages. All health and marital quality variables were self-reports, and objective and observational measures, respectively, may yield different results	Similar to human development scholars' assertion that aging adults are survivors of conditions and events related to an increased risk of mortality, individuals in long-term marriages may be considered survivors of relationship problems and other challenges that could have contributed to marital dissolution

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Author	Title	Year	Sample	Main findings	Main limitations	Conclusion
Ruseski JE, Humphreys BR, Hallman K, Wicker P, Breuer C	Sport participation and subjective well-being: instrumental variable results from German survey data	2014	The sample used in the empirical analysis contains 1238 adults between the ages of 18–70 who responded to the question about happiness	Individuals who participate in sport have higher life happiness. The results suggest a U-shaped relationship between age and self-reported happiness. Higher income is associated with greater self-reported happiness, males are less happy than females, and single individuals are less happy than nonsingles	Cross-sectional study Telephone interview	This broader impact of sport participation on general happiness lends support to the policy priority of many governments to increase sport participation at all levels of the general population
Sahraian A, Gholami A, Javadpour A, Omivadir B	Association between religiosity and happiness among a group of Muslim undergraduate students	2013	271 undergraduates medical students attending Shiraz University of Medical Sciences in Iran	It was found that higher score on religious belief was significantly linked to the level of happiness	Cross-sectional study	The result confirms that individuals with a more religious attitude experience more happiness. The result of this study should be considered in programs designed to improve overall well-being of university students
Tay L, Kuykendall L	Promoting happiness: the malleability of individual and societal subjective wellbeing	2013	Literature review on subjective wellbeing	Research now shows that although subjective wellbeing is heritable and stable, it can change substantially over time. Long-term changes can be affected by positive or negative life events; subjective wellbeing interventions have also proved to be effective for boosting wellbeing for as long as six months. At the societal level, economic factors matter for the subjective wellbeing of citizens. Economic wealth is shown to be a predictor of societal wellbeing across countries and over time. Also, high unemployment severely lowers the wellbeing of individuals and has spillover effects on other societal members, such as the employed	Is not a systematic review article	For practitioners, policy makers, and economists interested in the wellbeing of individuals, this article propose that these findings have implications for mental health practice and economic policies
Van Campen C, de Boer AH, ledema J	Are informal caregivers less happy than noncaregivers? Happiness and the intensity of caregiving in combination with paid and voluntary work	2013	The sample consisted of 336 informal caregivers and 1765 noncaregivers in the Dutch population	Caregivers are happier than noncaregivers when they provide care for < 6 hours a week; and in line with the burden assumption, the results show that providing care for more than 11 hours a week is associated with lower levels of happiness. Other results contradicted the burden assumption that combining caregiving with paid or voluntary work is associated with more time burden and less happiness. The result that combining caregiving with paid employment or volunteering is related to higher rates of happiness confirms the subjective well-being assumption	The variables of burden and happiness were measured with single items. Cross-sectional study	It is concluded that these cross-sectional results open ways to longitudinal research that can inform governments in the development of policies to support informal caregivers

Based on the results from these searches, it was possible to identify six core aspects related to the keywords “happiness” and “health”, namely:

1. Aspects of happiness;
2. Biology of happiness;
3. Psychology of happiness;
4. Sociodemography of happiness;
5. Health, mental health and happiness;
6. Positive implications for psychiatry.

Each of these aspects is described further in the following section.

Results

Aspects of happiness

The scientific literature often refers to two types of happiness: psychological well-being and hedonic well-being. The term psychological well-being, or eudaimonia, has been used to refer to a combination of character strengths involving self-direction (*e.g.*, autonomy, purpose of life, environmental and self-acceptance), cooperatives (*i.e.*, positive relationships with others) and self-transcendence (*i.e.*, personal growth and self-realization)^{8,12}. Hedonic well-being, or hedonia, is associated with: (i) a pleasurable life; (ii) life satisfaction; (iii) presence of positive feelings and (iv) absence of negative feelings²⁰. It can be said, therefore, that psychological well-being is connected to the personal fulfillment of one’s own potential, while hedonic well-being is linked to the experience of satisfaction.

Although these are two different ways to experience happiness, they are strongly related^{8,12,20}. However, from a historical point of view, they have different origins. Aristotle postulated that every human being had unique capabilities, called *daimon*, that should be recognized and developed³. Similar to this idea are the concepts/theories of: (i) self-actualization, described by Maslow; (ii) the individualization theory developed by Jung; and (iii) Antonovsky’s theory of existential coherence; all are related to the concept of eudaimonia^{20,21}. It is relevant to note that Epicurus provided the basis for the later development of hedonism²⁰. The biological differences between each type are discussed further below.

Besides these two types of happiness, it is important to distinguish two types of emotions or affects that are connected to the understanding of happiness: positive affect and negative affect. These are independent variables and may or may not be in opposition¹⁸; it is possible to feel positive and negative emotions at the same time, as well as being in a neutral state. These emotions/affects might seem to have different determinants, consequences and correlations¹⁴, and it is relevant to note that happiness itself is related to the frequency of positive emotions and not to their intensity^{14,18}. Negative emotions, such as fear and anger, are recognizably beneficial as they help people to ensure their survival and safety. Nevertheless, these are short-term benefits; the Broaden and Build Theory states that positive emotions amplify cognition and behavior, providing intellectual, social and physical resources for optimum performance. Thus, the long term benefits of positive emotions contribute to the individual’s ability to continue his/her development¹⁴.

Biology of happiness

Trying to understand the complex link between psychological factors and biological change, scientists have studied the effects on health of negative emotions. For example, it is known that stress, depression and anxiety generate changes in the hypothalamic-pituitary-adrenal axis, with a consequent increase of cortisol, sympathetic stimulation and elevation of proinflammatory markers. If these negative stimuli persist, the risk increases of developing cardiovascular disease, cancer and/or infections^{22,23}. However, only recently has scientific interest focused on verifying that positive emotions could also induce biological changes. Some studies have demonstrated that the two types of happiness (eudaimonia and hedonia) can cause biological changes

that promote positive emotions²⁴; however, most of this research has shown that only eudaimonia is statistically related to biological changes^{12,20,22}. In general, the changes found in the neuroendocrine, immune and cardiovascular systems secondary to positive emotions are beneficial and protective effect^{12,23}.

First, positive emotions can quickly cancel the adverse effects of body stress reaction, and thus return the body to a steady state¹⁴. It may be interesting to see how this biological characteristic of positive emotions corresponds to the observation that many people say they feel good, even through times of suffering, if adverse events are interpreted as having a purpose or meaning⁸. Perhaps this search for meaning is a psychic attempt to maintain an emotional balance.

Second, higher levels of eudaimonia are related to lower levels of salivary cortisol and proinflammatory cytokines, a lower cardiovascular disease risk, longer duration of REM sleep^{20,23}, higher levels of immunoglobulin A, and higher HDL cholesterol levels¹² compared to those with low levels of eudaimonia. There are, however, differences between men and women in this regard; for example, inflammatory markers such as C-reactive protein and fibrinogen are lower in happy women than in happy men²⁴.

These alterations have been found regardless of the presence of negative emotions, suggesting that happiness has a direct effect on the body, regardless of the absence of negative affect²³. On the other hand, in the same manner as tobacco and some physical leisure activities are found in stressed individuals, depression and anxiety and their associated behaviors contribute to increased rates of diseases and adverse biological changes; part of the positive biological findings in happy individuals is also due to their tendency towards healthier habits and more prudent lifestyles²³.

Another important point is that studies of monozygotic twins, separated and raised in different environments, have shown that happiness has a genetic component of 35%-50% in humans^{6,14,25}. In this regard, it is suggested that the long allele of the promoter region of the 5-HTT gene (5-HTTLPR long) could be associated with optimism. The 5-HTT gene encodes serotonin transporters; this type of polymorphism in the promoter region is called a functional polymorphism²⁶. De Neve found that individuals satisfied or very satisfied with life have a statistically significant higher percentage of this genotype (long 5-HTTLPR homozygous), compared to people dissatisfied with life. Recently, it was discovered that, in women, a low MAO gene expression is significantly associated with increased levels of happiness. This finding, however, was not present in men²⁶.

It is important to consider that many of these studies have some limitations such as small sample sizes, cross-sectional designs or bivariate analyses. Still, the studies are promising and already point us in several directions.

Psychology of happiness

If 35%-50% of happiness depends on a genetic influence, at least 30%-40% are represented other variables, suggesting that the environment and life events also have a large influence on subjective well-being. However, this influence varies from event to event; personal interpretations may be the key to understanding the link between life events and subjective well-being⁶. In this sense, character has a strong impact on the perception of all aspects of health, including physical, social and emotional well-being. For example, self-direction is measured by levels of responsibility, ingenuity and ability to find meaning, and has a strong connection with all aspects of health. Changes in self-direction explain about 32% of the variations in the risk of disease and about 45% of the variations in subjective well-being.

The way in which an individual sees life can predict his/her health outcomes. For example, pessimists need to visit four times as many doctors in one year than optimists¹⁷. Similarly, the link between success and happiness exists not only because success makes people happy, but because positive attitudes engender success²⁷. A concept that may explain these relationships is emotional competence (EC),

also known as emotional intelligence. This concept relates to how the individual deals with emotional information, intrapersonally and interpersonally. High EC is associated with greater happiness, and higher mental and physical health, greater professional success and greater satisfaction in social relationships and marriage²⁸.

Christakis and Fowler used the Framingham study to try to answer the following question: can the happiness of others influence personal happiness? The study was based on the theory that emotional states can be transferred interpersonally through mimicry, by copying emotionally relevant bodily actions, especially facial expressions, and it concluded positively. The authors suggested that happiness may be seen as a network phenomenon; happiness clusters resulted from the spread of happiness and not only by the tendency of people to associate with similar individuals²⁹. Although this theory of social contagion has also been replicated in disorders such as depression, a study involving roommates in college resulted in different findings, arguing that happiness and mental disorders have low social contagion³⁰. Perhaps the last word on the subject has not yet been given, but there is no doubt that this is an exciting area.

Sociodemography of happiness

Several factors associated with happiness have been studied. Below we describe some that appear in more recent studies and have not been reported in other review articles on happiness.

Economic factors

The first modern economist to study happiness found a paradox (i.e., the Easterlin paradox) in which groups of richer countries are happier than groups of poorer countries, but this difference is not so clear between rich and Latin American countries where there are larger social differences. Even in poor countries, the relationship between money and happiness is not linear. Deprivation and poverty are less associated with happiness³¹ however, after reaching a level of care that meets basic needs, other factors, such as people's increased aspirations and concerns about their own heritage come into play^{10,32}. Indeed, despite the economic changes, happiness levels have remained relatively stable in countries such as Ireland and the United States^{17,33}; a study linking retirement and welfare showed that monetary gain increased financial well-being, but the benefits of retirement on health and subjective and social welfare were transient³⁴. Another binding factor between economic issues and happiness seems to be social inequality, since individuals living in areas of great social inequality tend to describe themselves as unhappy and unhealthy³⁵. From the individual point of view, however, people who are paid by the hour appear to be happier³⁶. In addition, informal workers tend to report higher levels of happiness related to their professional activity³⁷. Another factor that may explain this lack of linearity between economic issues and subjective well-being levels is that happy people tend to focus more on social ideals and moral goals than just monetary achievement⁷.

Age

With increasing age, happiness tends to decrease in the population as a whole^{38,39}. However, from the individual point of view, centenarians who have high levels of satisfaction with their lives in the past tend in their old age to make the best personal assessments of their own health, economic security and happiness⁴⁰. Therefore, there is a protective relationship between happiness and physical decline that occurs in old age^{41,42}. In this age group, contentment related to the children and the health of the family is associated with a higher level of happiness⁴³. Moreover, happiness is related to longevity, independent of family genetic and environmental issues⁴⁴. Finally, a rather curious result was obtained from a longitudinal study that found a positive association between chocolate consumption, optimism, better health and greater psychological well-being⁴⁵.

Interpersonal relationships

People living in minority groups tend to report less happiness than those who belong to majority groups⁷. For example, after the tragic events of September 11, 2001 in the United States, Arab Americans reported a greater perception of abuse and discrimination; this perception was related to higher levels of psychological stress, worse health outcomes and a lower sense of happiness⁴⁶.

Married people tend to experience better health and happiness than unmarried people. This relationship has been found in various countries, within various health parameters and in both men and women⁴⁷. This association, however, extends beyond marital status, because the quality of marriage also has a great influence on it⁴⁷⁻⁴⁹. There is also a positive relationship between happiness and sexual satisfaction in women and men, although that relationship is stronger in women⁵⁰.

Religiosity and volunteering

It is well established that people who identify themselves as religious tend to report better health and more happiness, regardless of their religious affiliation, performance of the religious activities, work, family, social support or financial situation⁵¹. The studies that have reached these conclusions were mostly carried out in the western population. However, research on Islamic and Egyptian students also found a positive relationship between religious affiliation and happiness⁵²⁻⁵⁴. Seen as human dimensions by many researchers, these aspects tend to be increasingly taken into consideration in the treatment and development of people^{15,55}, especially considering that the humans are religious beings, since they spend more time praying than having sex¹⁵.

Another related aspect is the issue of volunteering and altruism. People who engage in volunteer work and altruistic behaviors tend to be healthier, live longer, and to be happier⁵⁶⁻⁵⁸. However, when this type of activity becomes too arduous, occupying more than 11 hours per week, the happiness levels tend to decrease^{56,58}.

Educational level, sports and leisure

The positive relationship has long been recognized between education levels, intelligence quotient (IQ) and health levels. More recently, a positive relationship has also been found between educational levels, IQ and the happiness index^{10,59,60}.

Other factors studied in recent years include physical leisure activities that have been shown to increase subjective well being, both in the short and long term⁶¹. Involvement in sport also appears to have a causal relationship with higher levels of happiness⁶².

Finally, it is worth remembering the psychological theory of the set point of happiness, according to which people have a basal level of happiness that they tend to return to over time, even after major events such as winning the lottery or divorce. However, unemployment is one of the events that has a negative impact on happiness that people tend not to adapt to¹⁰.

Health, mental health and happiness

Happiness and health are closely related, both on an individual and population basis; happier people and communities tend to be healthier, and the inverse relationship is also true⁶³. This relationship was also found in adolescents⁶⁴, the young^{65,66} and the elderly⁶⁷. However, in the elderly, a study found that health predicted subjective well-being, but the reverse was not true⁶⁸, perhaps because, in this population, other factors previously listed in the sociodemography of happiness subsection^{3,4} came into play. As examples, the happiest nations tend to have lower levels of blood pressure⁶⁹; a study of coronary artery disease (CAD) found that optimistic men had a lower risk of developing CAD¹⁷; and happier people recovered better from sickness⁷⁰.

It is well known that chronic diseases are associated with negative impacts on various aspects of the quality of life, including happiness, and increase the risk of depression⁷¹. However, different chronic diseases seem to impact differently on subjective well-being⁷¹. In the elderly, for example, the physical diseases that impose decreased happiness were disabling pain and urinary incontinence; these disturb the activities of daily living and are associated with social stigmas⁶⁷.

Furthermore, mental disorders in general, and specifically depression, alcohol and drug abuse⁷² and anxiety^{72,73} more negatively affect happiness than does physical illness. Similarly, there is an inverse relationship between suicide and the subjective well-being index, and also between the presence of mental disorders and happiness⁷⁴. For this reason, it has been proposed that happiness indices could be used as population markers for mental disorders⁷⁴. In this sense, the ability to exercise control over adaptive negative emotions is associated with beneficial results in mental health⁷⁵. However, excessively large or small variations in positive emotions are associated with poorer mental health, particularly depression and anxiety disorders, lower life satisfaction and more unhappiness⁷⁶. Perhaps this issue of emotional control can also explain the association between mental disorders and unhappiness, and the large presence of negative emotions that mental disorders cause.

Positive implications for psychiatry

Given all of the above, a question must be raised: is possible and is it desirable to promote happiness? The evidence appears to say yes. Happiness does not cure the disease but makes people less sick and the size of this effect appears to be comparable to smoking or not⁷⁷. In mental health, in particular, the study of factors that lead to happiness can be particularly beneficial in those at higher risk of developing mental disorders¹⁸. In fact, positive psychological interventions have already been successfully tested in patients with depressive disorders⁷⁸. Furthermore, investment in approaches that increase subjective well-being may be cheaper for the public purse. For example, a study comparing psychotherapy versus paying monetary damages in legal compensation cases showed that psychological approaches may be up to 32 times cheaper than financial compensation, as well as being more effective in promoting health and happiness in patients potentially involved in litigation⁷⁹. The understanding of what promotes happiness in people can also be useful for mental health professionals themselves since they are at risk of decreased life satisfaction and burnout syndrome; this can have negative consequences for psychiatric patients, since high levels of stress in these professionals predict therapeutic problems in general⁸⁰.

Positive psychology contains the concept of *flourish*. This concept suggests five features found in happy people (*PERMA*) that should be promoted to increase levels of subjective well-being in people in general:

1. Positive emotions (P)
2. Engagement (E; being in the flow)
3. Relationships (R; having healthy relationships)
4. Meaning (M; purpose in life)
5. Accomplishment (A)

Investment in any of these areas promotes the others and helps develop happiness^{81,82}.

In addition to increasing happiness, feeding positive emotions such as gratitude, kindness, perseverance, optimism and creativity, contributes to increased resilience, buffers psychological stress and promotes mental health. Programs such as the Penn Resiliency Program (PRP), developed for this purpose, have been successfully implemented in the United States, the United Kingdom, Australia, Portugal and China. In this program, participants learn to adopt more optimistic explanatory styles, detecting inaccurate thoughts, challenging negative beliefs and considering alternative interpretations. In addition, a task force made up of several positive psychology professionals developed an inventory to help people identify their character strengths; this is called the Values in Action Inventory of

Strengths (VIA-IS). Despite its limitation of being based on self-report, the simple application of this instrument has been shown to be therapeutic in itself and has brought positive results. The VIA-IS and the PRP are intended for use by adults and children. There is also a tool named Appreciative Inquiry, used in institutions, that aligns with positive psychology. By means of this instrument, groups are helped to refocus problems towards the identification of existing strengths in group members, thus providing a starting point for positive change¹⁴.

Discussion

We have critically reviewed the literature on the relationship between happiness and health in order to identify the most relevant information for psychiatry. We especially considered data that were also being studied in the latest research, and not only the findings of classical studies. Studies are numerous; nevertheless, we realize that many studies on the topic of happiness are transversal; this, despite the use of large samples, diminishes the robustness of some conclusions. In addition, the measurement scales are often limited by being of the self-report variety. In a sense, we already find this difficulty in psychiatry itself in its use of subjective medical measurements, such as pain. However, analysis of the concept of happiness and its associated emotions may be more complex than describing the symptoms of psychiatric disorders, which can expose us to some difficult biases that are difficult to bypass. Another limitation of some studies seems to lie in their contained psychotherapeutic interventions. Although there are well-established interventions within positive psychology (some have been reported in this article) as well an interesting proposal for psychoeducation made by Clonniger (2006), progress in the expansion of clinical approaches seems to be necessary. In addition, most therapeutic interventions proposed have comprised a more psychoeducative approach. Certainly, some of these limitations exist because the interest of the health sciences in this topic is relatively recent. Moreover, is an area that is more linked to the formulation of psychotherapeutic approaches and this tends to discourage investment in the development of new psychoactive drugs.

The study of happiness from a scientific perspective, together with a realization of its implications for health is promising and fascinating, especially if we believe our medical indices of good health are not always in agreement with the perceptions of the patient or society. For example, consider the population of Matsigenka in the Peruvian Amazon; over the past 30 years health indicators have improved greatly, but during the same time period this population reported itself as sicker and unhappier⁸³. Perhaps for similar reasons psychiatry has failed to increase subjective well-being in the general population, despite extensive pharmacological advances and new psychotherapeutic techniques. Probably, the focus has been almost exclusively pathological¹⁵.

The immediate goal of all medicine is to alleviate suffering. To achieve this in psychiatry, accurate diagnostic, psychopharmacological advances and psychotherapeutic techniques are fundamental. However, identify what makes life happy can be useful in various types of health prevention (primary, secondary and tertiary)⁸⁴. This particularly applies to promoting mental health as specified in the WHO parameters: a state of well-being in which people can understand and use their own skills, deal with the stresses of life, work and love, and may contribute to their communities⁸⁵. Furthermore, the promotion of mental health may contribute to reducing the stigma towards psychiatry and psychiatric patients¹⁵.

Conclusion

Positive emotions related to happiness generate beneficial alterations in the neuroendocrine, immune and cardiovascular systems. Aspects of character, such as self-direction, are strongly linked to higher levels of happiness. According to the Easterlin paradox, the relationship between money and happiness is not linear. Levels of

happiness tend to fall with increasing age; however, the previous level of subjective well-being is a major predictor of happiness in this age group. Religious people who practice physical leisure activities, who have high educational levels or higher IQs, who are married, who are involved in sports, or do up to 11 hours of volunteer work per week tend to report higher levels of happiness. In addition, higher levels of happiness are related to lower physical and mental illness, as well better coping abilities in adversity. For this reason, the study of happiness brings several positive implications for psychiatry that should be considered in clinical practice and in future research.

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Conflicts of interest

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Transcultural adaptation of the Amyotrophic Lateral Sclerosis Depression Inventory to Brazilian Portuguese

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Dear Editor

Depression symptoms in patients with Amyotrophic Lateral Sclerosis (ALS) has been investigated using instruments not specific and may interfere in results¹⁻³.

Given the evolution and physical impairment caused by ALS, the ALS Depression Inventory (ADI) was created in 2005 to assess depression symptoms in these individuals. Results have shown a reduction in 12 items also providing accurate measures of depression symptoms in severely paralyzed patients^{4,5}. In light of the instrument's accuracy in detecting depression symptoms at any stage of ALS, and since it has yet to be used in Brazil, it was necessary to translate and transculturally adapt the ADI-12 to Brazilian Portuguese.

There are formal stages for translating and adapting instruments. Attention to linguistics must be given during translation, due to the different semantics between languages. The method proposed by Beaton *et al.*⁶ was used as a model. The pre-final version was applied to 15 patients diagnosed with ALS in accordance with El Escorial-R

at the Neuromuscular Disease Outpatient Clinic of Oswaldo Cruz University Hospital (HUOC) of University of Pernambuco (UPE). Participants were questioned to determine whether the responses actually corresponded to what the individuals understood and if changes needed to be made to the document. All subjects were aged 18 years and older, of both sexes and gave their informed consent.

The study was conducted between December 2013 and November 2014, after approval was obtained from the Research Ethics Committee of University of Pernambuco/PROPEGE (CAAE: 25749413.2.0000.5207).

Table 1 shows the results of the versions of the ADI-12 according to the stages of transcultural adaptation. A number of subtle changes were made to conform with Brazilian Portuguese. For example the term "consists of" is translated as "*consta de*", but we preferred to translate it as "*consiste em*", more commonly used in our language and therefore easier for the subjects to understand.

Table 1. Original version (English), synthesis of the translation and final version of the ADI-12 in Portuguese

Question	Original version (English)	Synthesis of the translation	Final version (Portuguese)
Enunciation	This questionnaire consists of 12 statements with 4 possible answers: "I fully agree", "I agree", "I don't agree" and "I do not agree at all". Please read every statement precisely and think about to what extent the statement is applicable to you in the last two weeks including today. Please mark (tick) the right answer for you. Please cross only one answer at a time and do not leave any statements open	Este questionário consiste em 12 afirmações com 4 respostas possíveis: "Eu concordo plenamente", "Eu concordo", "Eu não concordo" e "Eu não concordo de forma alguma". Por favor, leia cada afirmativa com atenção e pense em até que ponto a afirmação se aplica a você nas duas últimas semanas, incluindo hoje. Por favor, marque (faça um X) a resposta correta para você. Por favor, marque apenas uma resposta por vez e não deixe nenhuma afirmativa em aberto	Este questionário consiste em 12 declarações com 4 respostas possíveis: "Eu concordo totalmente", "Eu concordo", "Eu não concordo" e "Eu não concordo de forma alguma". Por favor, leia cada declaração com atenção e pense em até que ponto a declaração se aplica a você nas últimas duas semanas, incluindo hoje. Por favor, marque um X na resposta correta para você. Por favor, marque apenas uma resposta por vez e não deixe nenhuma declaração em aberto
1	I am happy and I smile often	Eu estou feliz e sorrio frequentemente	Eu estou feliz e sorrio frequentemente
2	I can appreciate life despite my circumstances	Eu consigo apreciar a vida apesar das minhas circunstâncias	Eu consigo apreciar a vida apesar das minhas limitações
3	I can get away from it all and I am often relaxed	Eu consigo me desligar de tudo e me sinto frequentemente relaxado(a)	Eu consigo me desligar de tudo e me sinto frequentemente relaxado(a)
4	I feel alive and vital	Eu me sinto vivo(a) e com muita energia	Eu me sinto vivo(a) e com muita energia
5	More often than not I am sad	Geralmente, eu me sinto triste	Com muita frequência, eu me sinto triste
6	I have lost all interest in family and friends	Eu perdi todo o interesse na família e nos amigos	Eu perdi todo o interesse na família e nos amigos
7	Most often I feel empty	Na maioria das vezes eu me sinto vazio(a)	Frequentemente eu me sinto vazio(a)
8	There is nothing that I look forward to or that I can enjoy	Não existe nada pelo que eu anseie ou que eu possa apreciar	Não existe nada que eu me interesse ou que eu possa apreciar
9	I often feel lost and abandoned and don't know how to carry on	Eu costumo me sentir perdido(a) e abandonado(a) e não sei como seguir em frente	Eu geralmente me sinto perdido(a) e abandonado(a) e não sei como seguir em frente
10	I look forward to every new day	Eu fico ansioso(a) por cada novo dia	Eu fico ansioso(a) por cada novo dia
11	I often wish I were dead	Eu desejo estar morto(a) com frequência	Eu frequentemente desejo estar morto(a)
12	I feel like I have lost all of my energy	Eu me sinto como se tivesse perdido toda minha energia	Sinto como se tivesse perdido toda a minha energia

In the clause “I can appreciate life”, the verb “can” means ability and not permission; therefore the clause was translated as “*eu consigo apreciar a vida*” instead of “*eu posso apreciar a vida*”. The term “get away from it” is best translated as “*se desligar*”; thus the clause “I can get away from it all” was translated as “*eu consigo me desligar de tudo*” instead of “*eu consigo me livrar de tudo*” or “*eu consigo lidar com tudo*”. The remaining questions required less adaptation since their literal translation expressed their real intention and did not compromise the intended meaning.

In this cultural adaptation process the patients encountered no difficulty during the application of any of the questions. Therefore, the ADI-12 was considered equivalent to the original English version in terms of semantics and expression of concepts, without requiring subsequent adjustments.

Translation of the ADI-12 to Brazilian Portuguese and its adaptation to the socioeconomic and cultural conditions of our people makes this instrument a useful additional parameter to help identify depression symptoms in patients with ALS, thereby improving the care provided to these individuals. A study with a larger sample size is needed to validate the instrument.

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