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Interrelationships between dissatisfaction with teaching work and depressive symptoms: Structural equation modelling

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Abstract *The objective of this article is to evaluate the interrelationships of factors associated with depressive symptoms (DS) in teachers, considering dissatisfaction with the teaching job as a possible mediator. This was a cross-sectional study using data from 700 teachers from the public school system of a Brazilian municipality. The outcome of interest was DS, as assessed using the Beck Depression Inventory (BDI). Direct and indirect interrelationships between the outcome and dissatisfaction with work, age, income, lifestyle and adiposity were tested. These variables composed the operational model tested by structural equation modelling. Older age (β=0.12) and greater dissatisfaction with work (β=0.12) were directly associated with DS. A more favourable lifestyle (β=-0.60) and adiposity (β=-0.10) were associated with a lower occurrence of DS. The variables lifestyle (β=-0.06) and adiposity (β=-0.02) also had negative indirect effects on DS, mediated by job dissatisfaction. The structural equation model tested identified interrelationships that influenced DS. Dissatisfaction with teaching work was associated with DS and mediated the relationship of other factors with such symptoms.*
Key words *Professors, Depressive symptoms, Epidemiology, Occupational health*

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Introduction

Among teachers, depression is the most prevalent mental disorder and has been identified as the cause of more than half of absences from work among teachers of basic education[1]. National studies have found prevalence rates of depressive symptoms (DSs) among public school teachers varying between 21.6%[2] and 50%[3], values considerably higher than those observed in other groups[4-6]. The international literature on this subject also indicates a high prevalence of DSs among professors[7,8]. In basic education, especially in public education, there are significant challenges due to the high demands[9], such as precarious working and infrastructure conditions, a lack of interest/engagement of students and their families, pressure to meet deadlines and tasks, an excessive workload, and open positions due to low wages, among other factors[10].

Depression is a multifactorial mental disorder caused by complex interrelationships among genetic, biological, environmental and psychological factors and negatively affects the health, well-being and behaviour of individuals[11-13]. Factors such as age[14,15], income[14,16,17], lifestyle[15,18] and adiposity[19,20] influence the occurrence of DSs. Such illness has also been associated with the possible relationship an individual has with his or her work[11-13].

Satisfaction with work, i.e., the perception that workers have regarding their work or the realization of their value through work[21,22], is an individual and subjective feeling that reflects how much a worker enjoys his or her work[22-24]. It is a complex concept that is influenced by various aspects related to work that interact with living and health conditions[25,26]. Satisfaction with work can be positive for health, just as dissatisfaction can harm the health of workers and the organization/institution where they work[22]. Task overload, without proper management, can cause workers to perceive work as a burden, leading to loss of achievement, burnout and dissatisfaction[11].

Thus, job satisfaction and mental health complement and influence each other to the extent that if an individual is not satisfied with his or her work conditions, his or her mental health will be affected, and vice versa[25]. The mediation of job satisfaction in the occurrence of DSs has already been evaluated among health professionals[11] and seems plausible among professors[3,13]. Although the identified relationships have been recognized, no models have been employed to investigate the subject among professors and elucidate the complex possible interrelationships that influence DSs, with job dissatisfaction as a mediator, thus requiring further clarification[3,13]. In this context, understanding the interrelationships that influence the occurrence of DSs among teaches may shed light on the mental illness that results from these relationships and contribute to the generation of public strategies that value teachers and their health. Thus, the aim of the present study was to evaluate the interrelationships of factors associated with depressive symptoms in teachers, considering dissatisfaction with teaching as a possible mediator.

Method

In this present study, data from the ProfSMoc project "Chronic health conditions and associated factors among teachers at the public state school of Montes Claros: A population-based study" were used. This was an epidemiological, cross-sectional study conducted in the municipality of Montes Claros, which is an urban centre in north Minas Gerais that had an estimated population of 404,804 inhabitants in 2018[27]. Data collection occurred from March to December 2016.

The study participants were basic education teachers (elementary and high school) of the state public network. Probability sampling was performed using cluster sampling in a single stage, with the school as the primary sampling unit (PSU). Of the 49 state schools in the urban area of the municipality, 35 were randomly selected (PSU) by probability proportional to size (PPS), and the number of teachers in the schools was the reference parameter for the draw. A formula for a finite population was used (N=1,851) considering a prevalence of 50% of the event of interest, a confidence level of 95%, a tolerable error of 5%, an additional 10% to compensate for possible losses, and deff=2.0. The estimated sample size was 700 teachers. All teachers working in the classroom for at least one year at the schools included were invited to participate. Individuals who deviated from their teaching roles or were on leave from work were excluded because the intention of the study was to observe the influence of classroom performance; additionally, the exclusion of these individuals led to a more homogeneous sample.

A pilot study was conducted to adjust the instrument and data collection strategy. Data collection took place between March and December 2016 and consisted of three stages in each school.

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The first stage involved the school administrators. The project was presented, consent was requested from the administrators to conduct the study on site, and the second stage was scheduled (meeting with teachers to raise awareness and invite them to participate). During the second stage, at Module II meetings (meetings that are part of each teacher's workload), self-administered questionnaires were delivered to the teachers who agreed to participate in the study, consent forms were collected, and the third stage was scheduled. The third stage consisted of the teachers returning the completed questionnaires, with verification by the field team to avoid loss of/inconsistencies in information, and physical assessments were also carried out (weight, height, bioimpedance, waist circumference (WC), hip circumference (HC) and blood pressure (BP). These evaluations were conducted in accordance with World Health Organization (WHO) guidelines using standardized procedures[28] and respect for biosafety standards. The measurements were performed in duplicate, and the mean was recorded. The evaluators received prior training and calibration, resulting in satisfactory intra- and inter-examiner agreement (weighted kappa greater than 81% and intraclass correlation coefficient (ICC) greater than 0.85). The collected data were also input in duplicate, followed by an analysis to check for/correct inconsistencies.

The outcome of interest in this study was DSs. DSs were evaluated using the Beck Depression Inventory (BDI)[29]. The Brazilian version was validated among university students, was cross-culturally adapted and was shown to be valid and reliable. The internal consistency of the BDI was high (0.81), and the general pattern of results confirmed construct validity[30]. The instrument has 21 questions, covering feelings and attitudes. Each question is scored from 0 to 3, with a maximum score of 63 points[31]. Higher scores reflect greater involvement of DSs.

Given the absence of a specific theoretical model, an operational model was proposed to identify interrelationships that influence DSs among teachers (Figure 1). This model included variables already indicated in the literature as exerting some influence on DSs, for example, age[14,15], income[14,16,17], lifestyle[15,18] and adiposity[19,20]. The influence of satisfaction with teaching on DSs has been investigated[12,13]. However, the interrelationships that affect DSs mediated by job satisfaction was investigated this study; and the study design was based on a study conducted among health professionals[15,18].

Figure 1 presents the hypothesized multivariate operating model for testing. The direct and indirect interrelationships between DSs (outcome of interest) and the other variables, mediated by job dissatisfaction, were evaluated. The observed variables are in the rectangles, and the latent variable is in the ellipse. The interrelationships are illustrated using arrows directed from the independent to dependent variable.

The study variables were job dissatisfaction, age, income, lifestyle and adiposity (Figure 1). Job dissatisfaction was assessed using a separate question ("Overall, how do you feel about your job as a teacher?") scored with a five-category Likert scale (very satisfied, moderately satisfied, neither satisfied nor dissatisfied, dissatisfied and very dissatisfied), with scores ranging from 1 to 5 and higher values indicating greater dissatisfaction. This variable mediates the relationships between DS and the other study variables. Locke[21] defines job satisfaction as the result of an evaluation by a worker about his or her work or feeling of value through work, being a positive emotion of well-being. For Martinez[32], satisfaction and dissatisfaction are on a continuum, in which satisfaction is at one extreme and dissatisfaction at the other. This concept of job satisfaction allows for an evaluation using a Likert scale, an approach that has been used in other studies[33,34].

Age and income were analysed in their original numerical form. Lifestyle was assessed using the "Fantastic Lifestyle" tool, which includes the main aspects of a healthy lifestyle. This instrument was developed in Canada and later translated into Portuguese and validated among young adult students at the Federal University of Santa Catarina; the translated version met internal and external consistency criteria and construct validity, with psychometric properties appropriate for the assessment of lifestyle in epidemiological studies[35]. Fantastic is an acronym that represents 9 domains: F = family and friends; A = physical activity; N = nutrition; T = tobacco/cigarettes and drugs; A = alcohol; S = sleep, seat belt, stress and safer sex; T = type/pattern of behaviour; I = introspection; and C = career/job. The instrument has 25 questions divided into 9 domains, whose response options are in the form of a Likert scale. The total maximum score is 100 points[35]; the lower the score, the greater the need for change in the respondents' lifestyle, and the higher the score, the better the lifestyle adopted by the respondent. This scoring system was consistent that used most studies that have employed this instrument; the measurement model adjusted, using CFA, for the

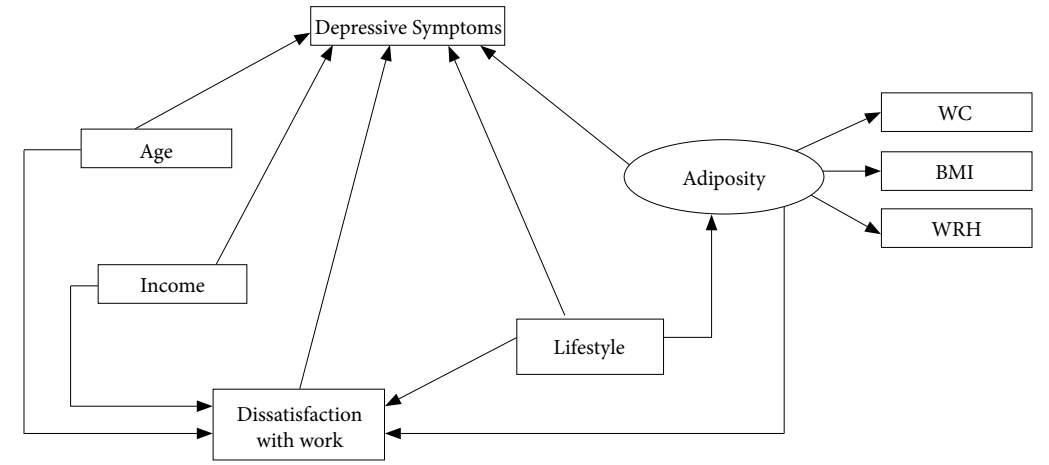


Figure 1. Structural equation model tested to assess the interrelationships between factors that influence depressive symptoms in basic education teachers mediated by job dissatisfaction. Montes Claros-MG, 2016 (n=700).

Source: Authors.

lifestyle construct did not show adequate fit: χ^2/df=5.68; GFI=0.843; CFI=0.615; TLI=0.578 and RMSEA=0.08 (p=0.000). Adiposity was treated as a latent variable, defined by three observed variables: waist circumference (WC), body mass index (BMI) and waist-to-height ratio (WHR); the numerical values were used for these variables (Figure 2).

BMI is an indicator of nutritional status and is used to assess the distribution of fat throughout the body; WC and WHR assess the accumulation of fat in the abdominal region. For this reason, we chose to study adiposity, a manifestation of abdominal fat accumulation and body fat distribution, as a latent variable. Furthermore, this model for measuring adiposity has already been adopted in previous studies[36,37].

In the descriptive analyses, the ordinal categorical variable (job satisfaction) is presented as simple and relative frequencies. The other variables, all numeric, are presented as the mean, standard deviation, median, minimum and maximum values, coefficients of skewness (sk) and kurtosis (ku). For inclusion in the model, numerical variables must have met the assumption of normality (sk<3 or ku<10)[38]. Only the variable income violated this assumption, and therefore, values were logarithmically transformed before being introduced into the model, correcting the problem.

The model fit was performed in two stages. First, the latent variable (adiposity) was established through confirmatory factor analysis (Figure 2). A good fit of this variable was considered based on significant factorial weights ($p<0.05$) and standardized factorial weights greater than or equal to 0.50 ($\lambda \geq 0.50$)[38].

Next, the multivariate model was adjusted using structural equation modelling, with estimation of direct and indirect effects that influence the presence of DSs as well as potential interrelationships between the variables considered in the analysis and job dissatisfaction (Figure 3).

Standardized coefficients were estimated, and the critical ratio (CR), at the 5% level, was used to assess significance[12]. For interpretation, the possibility of a small effect (values close to 0.10), medium effect (close to 0.30) or large effect (greater than 0.50) was considered. Bentler's comparative fit index (CFI), goodness of fit index (GFI) and Tucker-Lewis index (TLI) were used to assess the quality of the fit, with values >0.90 indicating a good fit. In addition, the root mean square error of approximation (RMSEA) was used, with values <0.10 indicating an acceptable fit, and the absolute index (X^2/df), with values <5 indicating an acceptable fit[39].

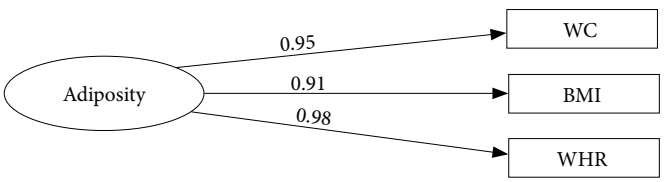
The descriptive data were analysed using the Statistical Package for Social Sciences (SPSS) software, version 18.0. For the analysis (latent

variable analysis and structural equation modelling) of the models, IBM SPSS AMOS (version 23.0) was used.

This study was approved by the Research Ethics Committee (CEP) of the State University of Montes Claros – Unimontes (Opinion 1,293,458 of 10/23/2015) and was conducted in accordance with the ethical precepts of the National Health Council (CNS)/Resolution No. 466/2012 and the Declaration of Helsinki of the World Medical Association.

Results

In this study, data from 700 basic education teachers were analysed. There was a predominance of females (n=582; 83%). Regarding, 18% of the participants were 30 years or younger, 66% were between 31 and 50 years, 14.4% were between 51 and 60 years, and only 1.7% were 61 years or older. Regarding race, 58.2% self-declared as mixed race, 29.6% self-declared as white, 9.3% self-declared as black, and 3% self-declared as in-



X^2	0.00
gl	0.00
CFI	1.00
GFI	1.00
TLI	1.00

Figure 2. Adjusted measurement model, with its adjustment index, for the adiposity construct forin basic education teachers. Montes Claros-MG, 2016 (n=700).

WC: waist circumference; BMI: body mass index; WHR: waist-to-height ratio.

Source: Authors.

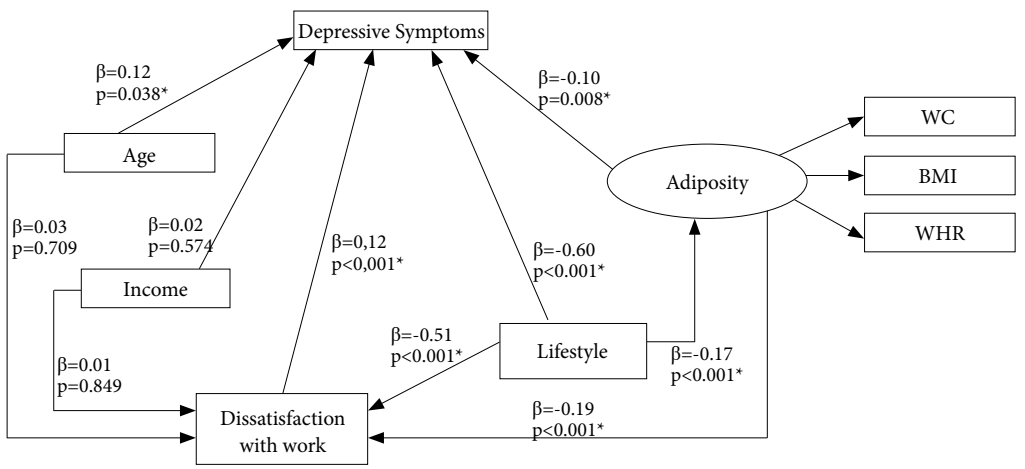


Figure 3. Structural equation model adjusted to evaluate the interrelationships between factors that influence depressive symptoms in basic education teachers mediated by job dissatisfaction. Montes Claros-MG, 2016 (n=700).

*Significance at the 0.05 level. WC: waist circumference; BMI: body mass index; WHR: waist-to-height ratio. Fit indices: X^2/df=2.65; CFI=0.996; GFI=0.992; TLI=0.982; RMSEA=0.049 (90%CI 0.025-0.073).

Source: Authors.

digenous or yellow. Regarding education, 44.7% reported having only undergraduate degrees, and 55% reported having latu sensu graduate degrees. There was a predominance of teachers with a stable union (61.6%). The descriptive measures of the variables of the proposed model are presented in Table 1; the majority of teachers were dissatisfied with their work (34.9%), followed by those who were dissatisfied often (28.7%), sometimes (28.6%), rarely (6.1%) and almost never (1.7%).

Figure 2 displays the results of the confirmatory factor analysis of the latent variable adiposity; all the observed variables that composed this variable had adequate factor weights (≥0.5) and were statistically significant ($p<0.001$). The fitted model was saturated (determined); that is, the number of estimated parameters was equal to the number of nonredundant elements of the covariance matrix, and df=0. Thus, this model had a single solution and, therefore, a perfect fit.

Figure 3 presents the results of the multivariate analysis using structural equation modelling. The fit indices were considered satisfactory: X^2/df=2.65; CFI=0.996; GFI=0.992; TLI=0.982; and RMSEA=0.049 (90%CI 0.025-0.073). A significant positive direct effect was observed between age and DSs (β=0.12) and between job dissatisfaction and DSs (β=0.12). A significant negative direct effect was observed between lifestyle and job dissatisfaction (β=-0.51), between lifestyle and DSs (β=-0.60), between lifestyle and adiposity (β=-0.17), between adiposity and job dissatisfaction (β=-0.19), and between adiposity and DSs (β=-0.10). Thus, older age and greater dissatisfaction with teaching were directly associated with DSs, and a more favourable lifestyle and adiposity were associated with a lower occurrence of DSs.

In the mediation analysis (Table 2), a significant indirect effect (mediated by job dissatisfaction) was observed for the variables lifestyle (β=-0.612) and adiposity (β=-0.0228), both with negative effects. In other words, a healthier lifestyle and adiposity were associated with a lower occurrence of DSs, even when mediated by dissatisfaction with teaching.

Discussion

The operational model tested identified interrelationships that influence DSs, directly and indirectly, mediated by job dissatisfaction. This model proved to be adequate because it has a single solution, and all degrees of freedom of its covariance matrix were consumed to estimate the relationships of the proposed model. These measures indicate a very good fit and adequacy of the model. The model revealed that DSs were influenced by direct and indirect effects, mediated by job dissatisfaction, confirming the hypothesis investigated. Regarding the direct effects, age, job dissatisfaction, lifestyle and adiposity were associated with the occurrence of DSs.

The direct effect of age on DSs was positive (β=0.12), revealing that an increase in the age of teachers is associated with the presence of more DSs. Previous studies have identified that increasing age is related to a higher occurrence of common mental disorders among professors,

Table 1. Descriptive measures of the variables of the proposed operating model. Montes Claros-MG, 2016 (n=700).

Variable	Mean (SD)	Median	Minimum	Maximum	Skewness	Kurtosis
BDI	7.5 (6.7)	6.0	0.0	35.0	1.235	1.407
Age	40.4 (9.6)	40.0	21	67	0.260	-0.704
Income	4527.8 (3095.1)	4000.0	600.0	35000.0	4.046	27.645
Lifestyle	71.3 (10.4)	72.0	22.0	96.0	-0.475	0.660
Waist circumference (cm)	79.9 (10.9)	79.0	56.2	123.0	0.701	0.748
BMI	25.7 (4.5)	25.2	16.1	47.7	0.786	1.349
Waist to height ratio	0.4 (0.0)	0.4	0.3	0.8	0.674	1.006
Variable	**n**	**%**				
Dissatisfaction with work						
Almost always	244	34,9				
Relatively often	201	28,7				
Sometimes	200	28,6				
Rarely	43	6,1				
Almost never	12	1,7				

Source: Authors.

Table 2. Direct and indirect effects of the variables investigated on depressive symptoms (DS). Montes Claros-MG, 2016 (n=700).

Variables	Effects	Standardized coefficient (β)	p value *
Age			
	Direct	0.12	S
	Indirect	-0.0036	NS
Income			
	Direct	0.02	NS
	Indirect	0.0012	NS
Lifestyle			
	Direct	-0.60	S
	Indirect	-0.0612	S
Adiposity			
	Direct	-0.10	S
	Indirect	-0.0228	S
Dissatisfaction with work			
	Direct	0.12	S

*S=significant e NS=not significant. Indirect=through dissatisfaction with work. Fit indices: X^2/df=2.65; CFI=0.996; GFI=0.992; TLI=0.982; RMSEA=0.049 (90%CI 0.025-0.073).

Source: Authors.

for example, depression and anxiety, especially among women[3,40]. A study by Souza and Costa[41] suggested that younger age is linked to better physical quality of life and functional capacity of professors. Notably, the universe of teachers is predominantly female, and in the sample investigated, the mean age of females was 41±9.5 years (data not shown). For women, this age group is rightly considered borderline because the person, by ceasing to perceive themselves as young, may judge themselves incapable of performing certain actions and attaining certain dreams, leading to increased anxiety and/or depression, which affects professional practice[3].

The direct effect of job dissatisfaction on DSs was also positive (β=0.12), indicating that greater job dissatisfaction is associated with the occurrence of DSs and confirming the main hypothesis of this study. Exposure to stressors at work can cause dissatisfaction with work and thus impact mental health[42]. Previous studies have identified a relationship between worse perception of work and the impact on the mental health of professors[3,43-45]. Among university professors, a direct relationship was also observed between DSs and the Vulnerability to Work Stress Scale, which scores items related to work nuisance that measure dissatisfaction with work[46]. Among Italian teachers, in 2016[47], a lower occurrence of mental health problems was observed regarding the perception of satisfaction with work relationships (OR=0.27). The study also observed that the superposition of negative questions related to teaching increased the possibility of mental health problems (OR=17.44)[47].

Lifestyle had a direct negative effect on DSs (β=-0.60), revealing that a healthier lifestyle was associated with a lower occurrence of DSs. The relationship between mental health problems, including DSs, and lifestyle is also recognized in the scientific literature[48-50]. Among university professors, lifestyle, as measured using the same scale used in our study, was also associated with stress levels[51]. Among the elderly in Santa Catarina in 2016, factors such as not having a healthy diet, a compromised sleep pattern and lower volumes of physical activity had impacts on the occurrence of DSs[52]. Physical exercise, specifically, has been strongly indicated as a protective factor against the occurrence of DSs[53,54], and among teachers from Barretos, a high prevalence of physical inactivity was observed, with a sedentary lifestyle associated with worse quality of life[55].

Adiposity also had a direct negative effect on DSs (β=-0.10); that is, higher adiposity had a protective effect against the occurrence of DS. The relationship between weight and DSs is evidenced in the literature; however, its intensity is related to the stage in which these symptoms are found[56-58]. Lack of appetite is listed as an important complaint in individuals with depression[55,56]. A study investigated the eating behaviour of severely depressed patients before and after treatment with antidepressants. Before treatment, the patients had lower caloric intake than did individuals in the control group; however, with treatment, there was an increase in the energy intake of the patients, who began to ingest the same amount of energy as the control group. At the end of treatment, there was an average gain of 2.5 kg, and at the end of the maintenance period, there was a gain of 5.2 kg compared to pretreatment weight. The recovery of weight lost before treatment due to inappetence was a positive response to antidepressant treatment[57]. In contrast, overweight and obesity have been associated with the occurrence of DSs[58].

Notably, although the literature has reported greater trends in DS occurrence with decreasing levels of education and income[16,59], in our study, income had a direct effect on DSs. However, this relationship was not statistically significant.

DSs were also influenced by indirect effects (mediated by job dissatisfaction). In this case, lifestyle (β=-0.0612) and adiposity (β=-0.0228) both had a negative indirect effects on DSs. Dissatisfaction with work potentiated the effect that a less healthy lifestyle had on a higher occurrence of DSs. Likewise, higher adiposity, mediated by job dissatisfaction, had a protective effect against the occurrence of DSs. These findings reinforce the hypothesis tested that such dissatisfaction, in addition to having a direct effect on DSs, may also potentiate the effect of other existing factors that also predispose individuals to this condition. Thus, our findings corroborate the notion that dissatisfaction with work goes beyond the limits of the school environment, being influenced by and exerting an influence on life outside of work[26]. No other studies addressing this issue among teachers were found, making comparisons of the results difficult. However, this relationship has already been observed among health professionals[11].

The prevalence of dissatisfaction with teaching observed in this study (35%) is worrying and deserves more attention. Among teachers in public schools in Passo Fundo, 37.3% were dissatisfied[60], a percentage similar to that found in this study and higher than that found among teachers of higher education (18.2%)[61].

This study has limitations: it is cross-sectional and limited to causal inference. In addition, the nonparticipation of teachers who were not working in the classroom (teachers on sick leave or who performing tasks other than teaching) may have led to an underestimation of DSs. Notably, the diagnosis of depression exceeds the power of the instrument used in the study, given that it is a screening scale for epidemiological studies to identify possible cases of DS; therefore, it is necessary to perform clinical diagnoses to rule out possible symptoms that may interfere with teaching activity. It was also difficult to establish comparisons with other studies on DSs due to the different approaches and different instruments and cut-off points found in the literature, in addition to populations of nonteachers.

The positive aspects of the study were the representative size of the sample, the rigor in conducting the study, the training and calibration of the team, the adoption of validated instruments, and the entry of data into the database in duplicate and an audit of the database, which confirmed internal validity to the study. In addition, the operational model tested was coherent, with satisfactory fit indices, and structural equation modelling allowed the evaluation of the set of possible relationships between the study variables, estimating the interrelationships.

Notably, it is necessary to implement motivational factors at work that psychologically empower teachers to provide them with tools to better deal with work issues. It is also necessary to ensure decent working conditions for teachers. The absence of these factors can generate feelings of frustration, discouragement, and lack of competence, in addition to lower commitment to work, more absenteeism and lower satisfaction[62], which can negatively affect the educational system and cause personal losses. Thus, it is necessary to create strategies that act as protective factors.

Conclusion

The structural equation model tested identified interrelationships that influence DSs. The increase in DSs was directly associated with increasing age, dissatisfaction with work, a less healthy lifestyle and lower adiposity. DSs also increased from indirect effects, mediated by dissatisfaction with work, from a less healthy lifestyle and lower adiposity. This evidence, considering DSs, teaching and job dissatisfaction, unveils mental illness derived from these relationships and situations, showing that attitudes that value teachers and their health are necessary, as are the needs for society to recognize this situation and attempt to provide subsidies to avoid the precariousness of teaching work.

Collaborations

All authors made a substantial contribution to the design of the research project, analysis and interpretation of data, writing and critical review, certifying that they participated sufficiently in the study to make public their responsibility for the content.

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