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Associations between effort–reward imbalance and health indicators among school teachers in Chuquisaca, Bolivia: a cross-sectional study

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ABSTRACT

Objective To assess the association between effort–reward imbalance (ERI) and health indicators among Bolivian school teachers.

Design School-based cross-sectional study.

Setting Sixty randomly selected schools from rural (33) and urban (27) schools in Chuquisaca, Bolivia.

Participants A total of 1062 school teachers were invited to participate, of which 597 answered the questionnaire (response 56.2%).

Exposure measure Psychosocial factors at work were explored through the short version of the Effort–Reward Questionnaire.

Primary and secondary outcome measures Health outcomes included self-rated overall health, mental distress (12-item General Health Questionnaire ≥5) and the 7-day prevalence of low back pain (LBP) as well as neck or shoulder pain (Nordic Questionnaire). Crude and adjusted ORs and their 95% CIs for each health outcome were calculated using logistic regression models.

Results The median value for the effort–reward ratio was 0.91 (range: 0.3–2.3) with higher values for teachers from rural versus urban schools. Overall, about 43% of the teachers reported their overall health as fair or poor; 45% suffered mental distress, 17% reported LBP and 29% neck or shoulder pain. Prevalences were higher for teachers employed at rural schools compared with those at urban schools. After adjusting for potential confounders and school location, ERI was statistically significantly associated with fair/poor self-rated health (adjusted OR 1.7, 95% CI 1.0 to 2.9); mental distress (1.9; 95% CI 1.2 to 3.1) and LBP (2.3; 95% CI 1.3 to 4.1).

Conclusion Our results indicate the urgent need to improve psychosocial working conditions among Bolivian school teachers, in order to promote their health and well-being.

BACKGROUND

School teachers are exposed to high and multiple emotional and physical demands inside and outside the classroom.[1] This includes a variety of tasks: high workload, large class sizes, bad behaviour of students, negative organisational climate, problems with school authorities, lack of autonomy,

Strengths and limitations of this study

► The study explores the role of psychosocial working conditions on the health of teachers, an aspect rarely studied in low-income countries.
► We used validated questionnaires to measure exposure and outcome.
► Due to limited resources, no diagnostic evaluations for any of the health outcomes included could be done.
► Limited external validity by exclusion of schools (in remote and dispersed rural areas).

lack of motivation, low social status and scarce social support.[2] For that reason, teaching is considered a stressful profession.[3–5] As a consequence, high rates of absenteeism and early retirement were reported among teachers.[6] Among the negative consequences of teaching on health and well-being, fatigue, headaches, tension, listlessness, sleep and concentration disorders, inner restlessness and increased irritability were reported.[5]

From teachers and other professions, it is well known that psychosocial factors at work play an important role in the development of work stress.[7 8] Among the explanatory models for this association, Siegrist proposed the effort–reward imbalance at work (ERI) model. This approach is based on the conception of 'social reciprocity'.[9] It means that every employee expects fair rewards for his/her efforts. Rewards could be reflected in perceived esteem, career opportunities and job security. Considering this, the ERI model assumes that an absent or inadequate reciprocity could result in emotional distress, and therefore, adverse health effects. Previous studies and systematic reviews reported that ERI is related to increased risk of poor work ability,[10] poor self-rated health,[11 12] mental disorders,[3 13] cardiovascular diseases[14 15] and musculoskeletal diseases especially affecting

low back and neck or shoulders.[16 17] Additionally, this model proposes that personal characteristics like an excessive work-related commitment (overcommitment [OC]) or the interaction between OC and ERI could affect workers' health.[18]

Very little information is available about teachers' working conditions and health in Latin America. A multi-centre study among teachers from Argentina, Chile, Ecuador, Mexico, Peru and Uruguay reported that their work in these countries is characterised by work overload, little time to rest and high extracurricular work.[19] Additionally, the authors found a high percentage of health problems related to a strained voice, uncomfortable postures, high mental work demands, social problems related to the students (eg, parental neglect, domestic violence and poverty), deficient infrastructure and lack of teaching material. Most of the teachers perceived low appreciation of their work by society.[19] This latter finding was also reported for Bolivian teachers.[20] Other studies in Latin America and Africa likewise found unsuitable working conditions among teachers,[21–25] with marked differences between work in rural and urban areas, described in terms of living conditions and in terms of teachers' work.

In Bolivia, one of the largest public workforces (179 689 workers) is composed of teachers and administrative staff working in the educational sector; of these, 58.2% are women, and 79% work in urban areas.[26] Teachers with formal contracts have to teach between 72 and 160 hours per month. In addition, it is very common for teachers to work in more than one school, for example, in different shifts (morning, afternoon or evening) or at public and private schools.[27] The number of students per teacher is high, especially at secondary level (about 41 students per teacher) and in the urban areas (about 37 students per teacher). This imbalanced ratio has only grown in recent years as a result of policies which incentivise students to stay in school longer.[27]

In a previous publication, we reported a high percentage of musculoskeletal disorders (MSDs) among Bolivian teachers. The prevalence of musculoskeletal pain in any part of the body was 86% during the last 12 months, 63% during the last 7 days and 15% for work-limiting pain.[28] Besides this study, we are not aware of any other study among Bolivian teachers assessing psychosocial work environment and health. In this context, the objective of this study was to assess the association between ERI and health indicators among Bolivian school teachers working in rural and urban areas. Further, we want to assess the association between the ERI and health indicators regardless of gender, age or place of work. In this way, the results of this study will support the still lacking establishment of public health prevention policies and surveillance programmes among Bolivian teachers.

METHODS
From August to November 2015, a cross-sectional study was conducted among school teachers working in regular education in Chuquisaca, Bolivia. Chuquisaca is one of the nine main regions in Bolivia, located in the Southern central part of the country, with a surface area of approximately $51\,524\,km^2$, $576\,153$ inhabitants,[29] and a Regional Human Development Index of 0.674.[30]

From the register of the regional education department, 60 schools from the regular education system were selected randomly, and all teachers were invited to participate in the study (1062 teachers), independent of their type of contract or their number of working hours. Of these schools, 27 schools were located in urban areas and 33 in rural areas. Small schools (less than five teachers) were excluded a priori because of difficult geographical access. Approximately 14% of all teachers in Chuquisaca work in such small schools.

The study team visited the selected schools and asked the director to distribute an envelope containing the questionnaire, information sheet and informed consent form to all teachers working in the school. In each of the schools, two boxes were installed—one to collect the completed anonymous questionnaires, the other to collect the informed consent form. Teachers were asked to place the completed questionnaire and the signed informed consent form into the different boxes, which 1 week later were picked up from the school by the research team.

In order to find statistically significant differences between rural and urban school, we aimed for a minimum sample size of 480 teachers (240 per geographical area) in order to reach a statistical power of 80% at an alpha of 0.05 for an outcome prevalence of 50%.

Instruments and variable definitions
The paper–pencil questionnaire consisted of 65 closed questions (16 pages) and took approximately 30 min to complete. Teachers completed the questionnaire during their free time at the schools or at home. Teachers did not receive any type of direct incentive for their participation in the study.

Sociodemographic variables and working conditions were explored through the VI. National Survey of Working Conditions and Health (Spain)[31] and the Unesco study on working conditions and health in teachers.[19] They included: age (assessed in four categories: ≤29, 30–39, 40–49 and ≥50 years, but subsequently recategorised into two groups: <40 years, ≥40 years, based on the distribution of the variable), gender (male and female) and school location (rural and urban). Teaching level was grouped into exclusive primary, primary and secondary, and exclusive secondary. Hours per week spent in extracurricular activities (carried out outside the school) included: preparing school lessons, preparing teaching material, preparing extraprogramme activities, meeting with parents or pupils, planning and team working, administrative duties, participating in courses and correcting class tests. Teachers were asked to report the number of

hours per week they regularly spend for each of these activities. Later, this variable was dichotomised at the median value (<10 and ≥10 hours/week). Finally, monthly income was explored taking as reference the minimum wage for Bolivia. It was grouped in: low (<US$238: less than the minimum wage), medium (US$239–US$476: between 100% and 200% of the minimum wages) and high (>US$476: more than double the minimum wage).

Effort–reward imbalance and overcommitment

ERI and OC were assessed using the Spanish short version of the ERI questionnaire,[32] which has been widely used in Latin American countries.[33] It included three effort items, seven reward items and six items to evaluate OC. Efforts are related to the demands of the work environment (quantitative and qualitative load, and increase in workload over time) while rewards refer to aspects related to esteem, promotion and job security.[9] Each item was measured on a 4-point Likert scale (1=strongly disagree, 2=disagree, 3=agree and 4=strongly agree). Following the recommendations for the construction of the score,[32] the ERI ratio was computed dividing effort score (enumerator) with reward score (denominator) and multiplying by 7/3 to adjust for the unequal number of effort and rewards items. As recommended by Siegrist *et al*,[32] the study populations' distribution was used to dichotomise ERI considering teachers with values in the highest tertile as a risk group. In our study, this corresponds to a ratio greater than 1 (greater effort than perceived reward).

The OC scale was computed by summing up all items. It was dichotomised considering people with values in the highest tertile (OC >17) as a high OC group.

Outcomes

Self-rated overall health was assessed on a 5-point Likert scale from excellent to poor through the 36-item Short Form Survey (SF-36) item 'How do you rate your health?'.[34] Poor or fair overall health was considered if participants reported their self-reported health to be poor or fair.[35]

The Spanish version of the 12-item General Health Questionnaire (GHQ-12) was used to explore psychological distress during the previous 4 weeks.[36] Each question was rated on a 4-point Likert scale (from 'much more than usual' to 'not at all'). Following the 0-0-1-1 scaling method, the resulting score ranged from 0 to 12 points with higher scores meaning a higher level of mental distress. Due to lack of a validated cut-off for Bolivia, we used the Chilean and Argentinian cut-off of ≥5 to define teachers with mental distress.[36 37]

MSDs were explored using the Spanish version of the Standardised Nordic questionnaire. The questionnaire includes an anatomical depiction of different parts of the body.[38] With the help of this depiction, respondents identify pain areas where they experienced pain during the last 12 months, and if so, they are asked about pain during the last 7 days and work-limiting pain during the 12 months prior to the study. For this study, we considered 7-day prevalence to define pain in the neck or shoulder (neck/shoulder pain) and low back pain as a proxy for chronic or recurring pain.

Data analysis

Questionnaires were double entered into EpiInfo V.7 for Windows. After a congruence check, data were exported to IBM SPSS Statistics V.24 for further analysis. All the numerical variables included in the study (Effort–Reward Scales, extracurricular activities and GHQ-12 score), did not follow a normal distribution, so the median and range were reported. For categorical variables, absolute and relative frequencies were calculated for the total population. Working conditions and health indicators for teachers who worked in urban and rural areas were compared using a χ^2 test (categorical variables).

After an analysis of the pattern of incomplete data, missing at random mechanism was assumed, and missing values were replaced via multiple imputation by fully conditional specifications.[39] In total, 10 imputation data sets were created using logistic regression equations as the imputation method (categorical variables). Combining those, logistic regression models were used to calculate crude and adjusted ORs, as well as their corresponding 95% CIs for the four health outcomes. Based on previous studies[3 7 17] and the bivariate analyses, models were adjusted for age, gender, school location, teaching level, type of school, hours per week spent in extracurricular activities and income. Interactions between ERI and OC were tested. As a sensitivity analysis, we performed complete cases analysis.

Ethics approval and consent to participate

In order to protect the rights and well-being of participants, international ethical recommendations for research with human beings[40] were followed. An information letter, as well as a written informed consent form, was provided to each participant. The questionnaire was completely anonymous and voluntary participation was respected at all times.

Patient and public involvement

No patients/public were involved in the development of the research question, design or implementation of the study. Dissemination of the results of the study was made available to the health and education authorities and a summary of the study was sent to each participating school.

RESULTS

A total of 620 teachers returned the questionnaire (response 56.2%), 356 by teachers working in rural areas and 264 in urban areas. For the analyses presented in this paper, 23 questionnaires were excluded because participants were administrative staff (n=19), or only completed the first page of the questionnaire (4).

Table 1 Sociodemographic and work-related characteristics of study population in teachers working in rural and urban areas (n=597)

		n missing	Total n=597 n (%)	Urban n=250 n (%)	Rural n=347 n (%)	P value*
Age	≤29 years	5	109 (18.5)	29 (11.8)	80 (23.2)	<0.01*
	30–39 years		196 (33.2)	57 (23.3)	139 (40.3)	
	40–49 years		139 (23.6)	66 (26.9)	73 (21.2)	
	≥50 years		146 (24.7)	93 (38.0)	53 (15.4)	
Gender	Female	4	430 (72.9)	192 (78.4)	238 (69.0)	0.03*
Teaching level	Secondary	6	225 (37.7)	70 (28.0)	155 (44.7)	<0.01*
	Primary and secondary		82 (13.7)	41 (16.4)	41 (11.8)	
	Primary		290 (48.6)	139 (55.6)	151 (43.5)	
Extracurricular activities†	Hours/week (Md; range)‡	33	10.00; 1–96	10.00; 1–72	10.00; 1–96	0.34§
Monthly income	High (>US$476)	10	167 (28.0)	84 (33.6)	82 (23.6)	<0.01*
	Medium (US$239–US$476)		306 (51.2)	110 (44.0)	196 (56.5)	
	Low (<US$238)		124 (20.8)	56 (22.4)	69 (19.9)	
Work posture	Standing or walking (always)	19	423 (70.9)	192 (76.8)	231 (66.6)	0.01*
ERI-effort	Md; range‡		7.00; 3–12	7.00; 3–11	8.00; 3–12	<0.01§
ERI-reward	Md; range‡		19.00; 10–27	20.00; 12–27	18.00; 10–26	0.02§
Job promotion	Md; range‡		7.50; 3–12	7.00; 3.0–11.0	8.00; 3.0–12.0	0.80§
Esteem	Md; range‡		5.00; 2–8	5.00; 2.0–8.0	5.00; 2.0–8.0	<0.01§
Job security	Md; range‡		6.00; 2–8	7.00; 3–8	6.0; 2.0–8.0	0.11§
ERI-ratio	Md; range‡	62	0.91; 0.3–2.3	0.82; 0.3–1.8	0.96; 0.3–2.3	<0.01§
ERI-risk group	ERI >1.0		176 (29.5)	55 (22.0)	122 (35.2)	<0.01*
Overcommitment (OC)	Md; range‡	37	16.50; 7.0–24.0	16.00; 7.0–24.0	17.00;7.0–24.0	0.01§
	OC >higher value		208 (34.8)	84 (33.6)	124 (35.7)	0.96*

*P value χ^2 test.
†Extracurricular activities: the sum of time in extracurricular activities including preparing school lessons, preparing teaching material, preparation of extraprogramme activities, interviews with parents or pupils, planning and teamwork, administrative duties, participation in courses and correcting class tests.
‡Md, median; range, minimum and maximum value.
§P value Mann-Whitney U test.
ERI, effort–reward imbalance.

Sociodemographic and work-related characteristics of urban and rural teachers

Teachers working in urban areas were statistically significantly older, were more likely to be female, work at the primary level, have high income and always walk or stand while working compared with teachers working in rural areas. There were no statistically significant differences between teachers working in rural and urban areas for extracurricular activities (table 1).

Median values for effort–reward Ratio showed higher reward in comparison to the effort (median 0.91; range: 0.3–2.3) in both groups, even though the median value for teachers working in rural areas was less favourable than those in urban areas (0.96 vs 0.82; p<0.01) (table 1). Likewise, the prevalence of teachers reporting ERI >1 was higher in teachers working in rural areas (35%) compared with those employed in urban areas (22%; p<0.01).

Health indicators

In general, a high percentage of teachers perceived their health as being fair or poor with higher prevalences among teachers working in rural areas (50%) compared with urban areas (28%; p<0.001). Likewise, the median value of the sum of the GHQ-12 score was significantly higher in teachers working in rural areas compared with their counterparts (4.0 vs 5.0; p<0.01). Applying a GHQ-12 score of 5 or above as a cut-off point to consider mental distress, more than half of the teachers in rural areas (51%) and 38% of those in urban areas were affected. Musculoskeletal pain during the last 7 days was reported by 29% of the teachers for neck or shoulder pain and by 17% for low back pain, without statistically significant differences between teachers employed at rural or urban schools (table 2).

Table 2 Health indicators study population in teachers working in rural and urban areas (n=597)

	n missing	Total n=597 n (%)	Urban n=250 n (%)	Rural n=347 n (%)	P value
Self-rated health*					
Excellent	5	16 (2.7)	10 (4.1)	6 (1.8)	<0.001†
Very good		67 (11.2)	36 (14.7)	30 (8.7)	
Good		254 (42.5)	130 (53.1)	121 (34.9)	
Fair		244 (40.9)	68 (27.8)	174 (50.4)	
Poor		16 (2.7)	1 (0.4)	15 (4.2)	
Mental health‡					
GHQ-12 score (Md; range)§	70	4.00; 0.0–12.0	4.00; 0.0–11.0	5.00; 0.0–12.0	<0.01¶
Mental distress (GHQ-12 values ≥5)		271 (45.4)	94 (37.6)	177 (51.0)	0.02†
Musculoskeletal pain**					
Low back pain	Last 7 days 0	104 (17.4)	40 (16.0)	64 (18.4)	0.44†
Neck or shoulders pain	Last 7 days 0	174 (29.1)	65 (26.0)	109 (31.4)	0.15†

*Question of the SF-36 questionnaire: 'How do you rate your health?'
†P value χ^2 test.
‡Spanish version of the 12-item General Health Questionnaire (GHQ-12).
§Md, median; range, minimum and maximum value.
¶P value Mann-Whitney U test.
**Explored with the Spanish version of the Standardised Nordic questionnaire.

Logistic regression models for health indicators

In the univariate model, teachers with ERI scores >1 compared with those with lower scores were statistically significantly more likely to self-rate their overall health as fair or poor (crude OR 1.9; 95% CI 1.2 to 2.9), to suffer from mental distress (2.0; 95% CI 1.3 to 3.0), to report low back pain (2.4; 95% CI 1.4 to 4.0) and neck or shoulder pain (1.7; 95% CI 1.1 to 2.7). After adjustment, the results remained consistent. However, they were no longer statistically significant for neck or shoulder pain. Independently of the other variables, women (as opposed to men) and those working in rural areas (as opposed to urban areas) were more likely to report worse health indicators (tables 3 and 4). The results were consistent with the case complete analysis (see online supplementary additional tables). The ERI and OC interaction did not show association with any health indicator, therefore, the interaction term was not included in the final models.

DISCUSSION

This paper aimed to compare working conditions and health indicators in teachers working in rural and urban areas, and to assess the association between psychosocial work environment and health outcomes in school teachers from Chuquisaca—Bolivia. Our results showed a high prevalence of teachers who perceived their overall and mental health as low. Likewise, a considerable proportion of teachers reported neck/shoulder pain or low back pain. Psychosocial working conditions measured by ERI were an important predictor of all outcomes

except neck/shoulder pain. The intrinsic factor OC did not explain this association, nor was an effect modification by OC indicated.

Health outcomes

While there is little information available on the prevalence of self-rated overall health in teachers, data for the general adult population in Latin America indicate a high variability between and within countries. For example, one study carried out in multiple Latin American countries found a prevalence of self-reported health rated as poor among 22% of people in Uruguay and 49% in Brazil.[41] In comparison, the prevalence among our study population could be considered relatively high (43%).

With respect to mental distress, the prevalence in our study (45.4%) was higher than the one reported previously in German teachers (26.2%),[3 42] and quite similar to the one reported in Japanese teachers (47.3%). However, the latter study applied a lower GHQ-12 cut-off point (≥4).[43] Applying this cut-off point to our study population, the prevalence of distress would have been 58% and thus higher than among Japanese teachers.

Comparison between teachers working in urban and rural areas

In our study, teachers working in rural areas were more likely to perceive their health as fair or poor, to report a higher percentage of mental distress and to suffer from musculoskeletal pain than teachers from urban areas. These differences could be partially explained

Table 3 Crude and adjusted logistic regression analyses for self-rated overall health and mental distress among 597 Bolivian teachers using multiple imputation

	Self-rated health (fair or poor)*			Mental distress†		
	n (%)	OR (95% CI)	aOR (95% CI)‡	n (%)	OR (95% CI)	aOR (95% CI)‡
Age						
<40 years	146 (47.4)	1	1	153 (49.7)	1	1
≥40 years	114 (39.4)	0.72 (0.5 to 1.0)	0.88 (0.6 to 1.3)	118 (40.8)	0.11 (0.5 to 1.1)	0.85 (0.5 to 1.4)
Gender						
Male	56 (33.5)	1	1	69 (41.3)	1	1
Female	204 (47.4)	1.80 (1.2 to 2.6)	2.06 (1.3 to 3.2)	202 (47.0)	1.25 (0.8 to 1.9)	1.24 (0.8 to 2.0)
Place of work						
Urban	71 (28.4)	1	1	94 (37.6)	1	1
Rural	189 (54.5)	3.01 (2.1 to 4.3)	3.62 (2.4 to 5.5)	177 (51.0)	1.71 (1.1 to 2.6)	1.58 (1.0 to 2.4)
Teaching level						
Secondary	88 (39.1)	1	1	97 (43.1)	1	1
Primary and secondary	28 (34.1)	0.80 (0.5 to 1.4)	1.05 (0.6 to 2.0)	34 (41.5)	0.94 (0.5 to 1.6)	1.16 (0.6 to 2.2)
Primary	144 (49.7)	1.53 (1.1 to 2.2)	1.80 (1.2 to 2.7)	140 (48.3)	1.22 (0.8 to 1.9)	1.46 (0.9 to 2.3)
Extracurricular activities§						
≤10 hours per week	146 (45.5)	1	1	145 (44.6)	1	1
>10 hours per week	114 (41.9)	0.88 (0.6 to 1.3)	0.76 (0.5 to 1.1)	126 (46.3)	1.08 (0.7 to 1.6)	1.00 (0.7 to 1.5)
Monthly income						
High (>US$476)	69 (41.6)	1	1	69 (41.6)	1	1
Medium (US$239–US$476)	52 (41.6)	1.01 (0.6 to 1.6)	0.81 (0.5 to 1.3)	53 (42.4)	1.03 (0.5 to 2.0)	0.93 (0.4 to 2.2)
Low (<US$238)	139 (45.4)	1.17 (0.8 to 1.7)	0.80 (0.4 to 1.3)	149 (48.7)	1.34 (0.8 to 2.3)	1.12 (0.6 to 2.1)
Work posture (standing or walking)						
Never-most of the time	69 (39.7)	1	1	86 (49.4)	1	1
Always	191 (45.2)	1.26 (0.9 to 1.8)	1.48 (1.0 to 2.2)	187 (44.2)	0.81 (0.5 to 1.3)	0.81 (0.5 to 1.4)
ERI						
≤1	164 (39.0)	1	1	171 (40.6)	1	1
>1	96 (54.5)	1.85 (1.2 to 2.9)	1.74 (1.0 to 2.9)	101 (57.4)	1.96 (1.3 to 3.0)	1.91 (1.2 to 3.1)
Overcommitment						
≤Low/medium value	145 (37.2)	1	1	161 (41.3)	1	1
>Higher value	114 (54.8)	2.10 (1.3 to 3.5)	1.84 (1.1 to 3.2)	110 (52.9)	1.61 (1.0 to 2.5)	1.40 (0.8 to 2.3)

*Question of the SF-36 questionnaire: 'How do you rate your health?'.
†Spanish version of the 12-item General Health Questionnaire.
‡aOR 95% CI: adjusted OR and 95% CI.
§Extracurricular activities: the sum of time in extra-curricular activities including preparing school lessons, preparing teaching material, preparation of extra-programme activities, interviews with parents or pupils, planning and teamwork, administrative duties, participation in courses and correcting class tests.
ERI, effort-reward imbalance.

by demographic variables, socioeconomic status and availability of healthcare resources across countries and cultures.[44 45]

In Bolivia, a teaching career in public schools frequently starts in rural areas. With a job promotion, teachers may then change to an urban school after their first years on duty. This explains the younger age and lower income of the teachers working at rural schools observed in our study.

For many young teachers, this means living away from their families and friends at the beginning of their career in a cultural setting where family and friends are more important than in many high-income countries. Given the infrastructure in Bolivian rural areas, the travel time from school to home town might be long, only permitting rare visits home during the school year. In addition, the low salary of school teachers in Bolivia (every fifth teacher

Table 4 Crude and adjusted logistic regression analysis for 7-day prevalence of low back pain and neck/shoulder pain among 597 Bolivian teachers using multiple imputation

	7-day prevalence of low back pain*			7-day prevalence of neck or shoulder pain*		
	n (%)	OR (95% CI)	aOR (95% CI)†	n (%)	OR (95% CI)	aOR (95% CI)†
Age						
<40 years	66 (21.4)	1	1	104 (33.8)	1	1
≥40 years	38 (13.1)	0.56 (0.4 to 0.9)	0.62 (0.4 to 1.0)	70 (24.2)	0.62 (0.4 to 0.9)	0.77 (0.5 to 1.2)
Gender						
Male	24 (14.4)	1	1	35 (21.0)	1	1
Female	80 (18.6)	1.36 (0.8 to 2.3)	1.37 (0.8 to 2.4)	139 (32.3)	1.77 (1.2 to 2.7)	1.80 (1.1 to 2.9)
Place of work						
Urban	40 (16.0)	1	1	65 (26.0)	1	1
Rural	64 (18.4)	1.19 (0.8 to 1.8)	0.88 (0.5 to 1.4)	109 (31.4)	1.30 (0.9 to 1.9)	1.12 (0.7 to 1.7)
Teaching level						
Secondary	47 (20.9)	1	1	77 (34.2)	1	1
Primary and secondary	8 (9.8)	0.42 (1.2 to 0.9)	0.46 (0.2 to 1.1)	18 (22.0)	0.55 (0.3 to 1.0)	0.59 (0.3 to 1.1)
Primary	49 (16.9)	0.79 (0.5 to 1.1)	0.87 (0.5 to 1.4)	79 (27.2)	0.71 (0.5 to 1.0)	0.74 (0.5 to 1.1)
Extracurricular activities‡						
≤10 hours per week	57 (15.5)	1	1	87 (26.8)	1	1
>10 hours per week	48 (17.6)	1.01 (0.7 to 1.6)	0.86 (0.5 to 1.4)	87 (32.0)	1.29 (0.9 to 1.9)	1.15 (0.8 to 1.7)
Monthly income						
High (>US$476)	24 (14.5)	1	1	39 (23.5)	1	1
Medium (US$239–US$476)	20 (16.0)	1.09 (0.6 to 2.1)	0.85 (0.4 to 1.8)	36 (28.8)	1.29 (0.8 to 2.2)	1.02 (0.6 to 1.8)
Low (<US$238 USD)	61 (19.9)	1.46 (0.9 to 2.5)	1.11 (0.6 to 2.0)	99 (32.4)	1.54 (1.0 to 2.4)	1.18 (0.7 to 1.9)
Work posture (standing or walking)						
Never-most of the time	31 (17.8)	1	1	50 (28.7)	1	1
Always	73 (17.3)	0.96 (0.6 to 1.6)	1.01 (0.6 to 1.7)	124 (29.3)	1.05 (0.7 to 1.6)	1.14 (0.7 to 1.8)
ERI						
≤1	56 (13.3)	1	1	109 (25.9)	1	1
>1	48 (27.3)	2.41 (1.4 to 4.0)	2.27 (1.3 to 4.1)	65 (36.9)	1.70 (1.1 to 2.7)	1.54 (0.9 to 2.5)
Overcommitment						
≤Low/medium value	60 (15.4)	1	1	103 (26.4)	1	1
>Higher value	44 (21.2)	1.52 (0.8 to 3.1)	1.34 (0.7 to 2.5)	71 (34.1)	1.46 (0.8 to 2.6)	1.29 (0.7 to 2.3)

*Spanish version of the Standardised Nordic questionnaire.
†aOR 95% CI: adjusted OR and 95% CI.
‡Extracurricular activities: the sum of time in extracurricular activities including preparing school lessons, preparing teaching material, preparation of extraprogramme activities, interviews with parents or pupils, planning and teamwork, administrative duties, participation in courses and correcting class tests.
ERI, effort–reward imbalance.

in our study only received the minimum wage) was even lower for rural teachers. Therefore, it is not surprising that rural teachers in our study perceived the relationship between effort and reward of their work as worse than their urban counterparts.

Association between ERI and health indicators
Our results confirm previous studies indicating that ERI might be a risk factor for health outcomes including self-rated overall health,[46] low back pain[47]

and mental distress[3] in different working populations. Self-rated health was described to be a good indicator of health status and mortality risk[48] especially for women.[49] Work-stress could lead to changes in the nervous system that condition the perception of one's own health or the start of a health problem. Falconer and Quesnel-Vallée[50] demonstrated with a nationally representative longitudinal study in Canada that health information and acknowledgement of their

disease diagnoses influence subjective health in an important way.

Similarly, our results indicate an association between ERI and mental distress,[7 42] independent of socioeconomic and working characteristics. Although it was proposed that an interaction between ERI and OC could affect the association between ERI and physical and mental health,[18] our results are consistent with other studies which do not confirm such effect modification by OC.[51] This means that the association between psychosocial work environment and health in our population of rural and urban teachers is not modified by the intrinsic factor of OC to work.

Several studies have previously reported a relationship between a poor psychosocial work environment and MSDs in school teachers.[52] This relationship could potentially be explained by the variety of job functions they perform inside and outside the classroom apart from the demands of family life. According to Bugajska *et al*[53] 'adverse psychosocial work factors increase physical load'. In this sense, high job demands could be related to long working hours, few breaks at work and infrequent changes in posture. As reported in other studies, our results showed a weak association between psychosocial factors at work and neck or shoulder pain during the last 7 days,[47 54] probably due to the effect of other variables not considered in the study.

Strengths and limitations of the study

This is the first study in Bolivia in which employment and working conditions were studied as potential risk factors for physical and mental health conditions in school teachers working in rural and urban areas. For this, we used validated and standardised questionnaires to measure our main variables in order to compare our findings to other studies around the world. The ERI questionnaire was recognised as a good tool to assess psychosocial risk at work[51] and to predict burn-out as the consequence of incompatibilities between professionals and their job contexts.[55] Self-rated health is reported as a validated indicator of a 'wide spectrum' of health conditions.[56] In the same way, the GHQ-12 showed a good performance as a screening instrument for common mental disorders and was not influenced by gender, age or educational level.[36] Finally, the Nordic Questionnaire is recommended as a screening tool in occupational settings with a high sensitivity and specificity, especially for chronic or recurring low back pain.[57] However, as a limitation, there were no diagnostic evaluations for any of the health outcomes included.

As in other cross-sectional studies, causal inference is not allowed, because we cannot assume that exposure occurred prior to the outcome. Additionally, the presence of the 'healthy worker' bias is common in many occupational studies and it may be present in our study as well. It is possible that teachers over 40 with more health complaints were retired or on sick leave.

Response in our study was moderate. One reason for this was that in some schools, even after several reminders and personal visits to the schools, the head teacher forgot to distribute the questionnaires to the teachers. One may speculate that these were schools had worse conditions compared with the participating schools. Therefore, the selection of teachers from schools with better conditions might have resulted in an underestimation of the true exposure and outcome prevalence. On the other hand, it is also possible that teachers with dissatisfaction about working or health conditions may have been more likely to answer the questionnaire, thereby overestimating the prevalences.

Due to difficulties in geographical access, our study excluded a priori schools with less than five teachers, most of which were located in remote and dispersed rural areas. Therefore, the generalisability of our study is limited to teachers working at schools with at least five teachers.

CONCLUSIONS

Our study describes the poor working conditions and high prevalence of mental and physical health outcomes in Bolivian school teachers, especially for those working in rural areas. The results support the influence of psychosocial factors on health conditions in teachers, calling attention to consider these aspects for educational and health policies. In Latin America, and in particular in Bolivia, it is necessary to have more precise information about working and health conditions through prospective studies or surveillance systems, in order to propose coordinated public strategies in the education and health sector that improve and support the sustainable development of the country.

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