

Stressors and stress symptoms of Life Science educators in schools in Tshwane North

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Increased workloads and curriculum changes have become an integral part of the teaching profession. Knowledge of the major stressors and stress symptoms of teachers is required for proper stress management. We therefore aimed to determine the major stressors and stress symptoms experienced by Grade 10–12 Life Science (previously known as Biology) educators in government schools in Tshwane North (Gauteng, South Africa), as well as to assess their time distribution and their needs with regard to academic support. Questionnaires were sent to the Grade 10–12 Life Science educators in 94 government schools in Tshwane North. Participation was voluntary and anonymous. Only teachers from 36 schools responded. A total of 53.9% of these educators indicated that they spend more than 50 hours each week on school-related activities, 17.3% of whom spend between 60 hours and 64 hours and 9.6% spend more than 74 hours. When asked if they had felt stressed during the 3 months preceding the study, 81.1% of respondents replied in the affirmative; 70.5% of whom felt that school-related factors contributed the most to their stress. Factors identified as major contributors to this stress were: learners' poor behaviour and attitude and lack of discipline, lack of time, large class sizes, and teaching a learning area in which they were not trained. Educators indicated that they prefer assistance in the form of a book containing portfolio tasks with accompanying assessment tools and suggested memoranda, as well as workshops at their schools. Stress management programmes should be needs directed. Stressors can largely be alleviated by proper consultation and planning on the side of the higher authorities, additional academic support and the availability of appropriate funding.

Introduction

In the mid-1990s, research carried out for the International Labour Organization (ILO) indicated that between 25% and 33% of educators in Organisation for Economic Cooperation and Development countries experienced high levels of work-related stress.¹ Local studies have confirmed that stress is a serious problem in the South African teaching profession.^{2–6} The severity of the problem was highlighted by a nationwide local study that showed that 55% of educators in South Africa are considering leaving the education profession – two-thirds of whom reported job stress as the primary reason.^{7,8}

According to the ILO, the consequences of high levels of work-related stress amongst educators are reflected in high anxiety and depression rates, increased physical ailments and drug and alcohol use.⁹ This report corresponds with the findings of local studies.^{3,4} Goodman⁹ includes burnout and nervous breakdowns as ways in which educators respond to stress. Burnout commonly results in educators feeling overwhelmed, withdrawing from students and work, caring less, and often working to the point of exhaustion.¹⁰ High levels of educator stress may thus exert destructive effects on the educators themselves, and in so doing impede classroom teaching and learning.⁵ Proper school education in Life Science (previously known as Biology) is essential for many careers. Yet teaching in this field is not optimal in South Africa and little is known about the stress status of educators of this subject. We thus undertook this study to address some of these uncertainties.

The British Columbia Teacher Federation Survey on teacher workload and stress identified three key areas of stress: (1) increasing difficulty and complexity of teaching and relating to students, (2) volume of work and expectations and (3) lack of time, resources, support and respect.¹¹ Other international studies have suggested excessive work requirements and hours, undisciplined pupils, inadequate administrative support, high accountability, constant changes and reforms¹, school location, racial composition, student socio-economic status⁹, undesirable student attitudes, non-teaching duties, lack of recognition, excessive administrative loads¹², multiple obligations¹³ and pressure from management¹⁰, as major stressors. These findings generally correspond to results from South African studies.^{2–6}

Stress stemming from the implementation of new curricula is internationally well studied.^{14–17} Part of the problem is the manner in which new curricula or reforms are introduced. Ideally, curriculum changes should be accompanied by extensive staff development, mentoring and peer training, but this is seldom carried out satisfactorily. Other problems with regard to curriculum implementation include: the pressure of assessment, increased workloads, changing of programmes with emphasis on portfolios, lack of time to listen to student problems¹⁴, more administrative work, increased planning¹⁶ and uncertainty about the future¹⁵. Educators often feel that their strengths, skills and relationship with children are eroded by the educational changes demanded by new curricula.¹⁶ The results of local studies largely correlate with international findings.³

Outcome-based education (OBE) was introduced in South Africa in the late 1990s. According to the *National Curriculum Statement*, OBE aims to enable all learners to reach their maximum learning potential by setting learning outcomes and by encouraging a learner-centred and activity-based approach to education. OBE has further increased the demands on educators by making assessment part of every lesson, and by making mandatory the planning of assessment tasks, the development of formal year-long assessment programmes and the introduction of learner portfolios that have to be moderated on school, cluster/district/region and provincial/national levels.¹⁸

Problem statement and aim

Educators are exposed to constant pressures from learners, school management and the Department of Education. They are flooded with administrative, teaching and extracurricular responsibilities and often have to cope with unmotivated and disruptive learners. Changes in the curriculum since OBE was introduced have further increased the demands on educators. Knowledge about the major stressors and stress symptoms of teachers will therefore be valuable in order to manage factors causing stress. As changing curricula and increasing workloads have previously been described as major stressors it would be of interest to know whether teachers feel that additional academic support could lessen their burden and, by implication, decrease their stress levels. Should a need for additional support indeed exist, it is important to ascertain the type of academic support that would best address their needs. Based on the rationale given above, our aim was to assess Grade 10–12 Life Science educators' time distribution, explore their perception of stressors and stress symptoms, and determine their needs for additional academic support.

Subjects and methods

Research design and sample

A quantitative methodology was applied to obtain numerical data. All Grade 10–12 Life Science educators from 94 government secondary schools in Tshwane North (a district in the Gauteng Province, South Africa) were invited to participate in the survey which took place in December 2005. This area was chosen for the investigation because of the experience of one of the researchers as a former Life Science teacher at a school in this district. It was decided to include all the schools in this area (township as well as city schools) to specifically ascertain the responses of the Life Science educators who might have specific needs.

The fact that there are historically two types of schools in Tshwane North, as in all other municipalities in South Africa, is a product of the apartheid regime which ended in 1994. During this regime, racially separate education systems were created in urban areas with well provisioned White schools (termed here the 'city schools') located in central White residential areas of towns and cities, and neglected and under-provisioned Black schools (termed the 'township schools') located in the townships, which were separate residential areas on the periphery of towns and cities for Black people. The neglect of the latter schools and the inequality in education still remains today as a legacy of the apartheid period.

Consent to conduct the study was obtained from the Faculty of Health Sciences Research Ethics Committee, University of Pretoria and the Gauteng Department of Education. A letter, in which permission was requested to distribute questionnaires to Grade 10–12 Life Science educators, was despatched to the principals of 94 government secondary schools in Tshwane North. No exclusion criteria were used. Educators were informed about the study by means of a participant information leaflet and an informed consent form. Each educator voluntarily decided whether he/she wanted to participate in the study. Those agreeing to participate in the study were asked to complete the given questionnaires anonymously and to submit the completed document to their principal sealed in the envelope provided. The sealed envelopes were then returned to the Gauteng Department of Education District offices, from where we collected them.

Data collection

We compiled a questionnaire consisting of sections pertaining to biographical information (Section A), time distribution (Section B), the need for the development of additional educator support programmes (Section C), the format in which such support is preferred (Section D), stressors in the workplace (Section E) and stress symptoms and signs (Section F).

Section A consisted of a set of questions relating to the biographical variables of gender, age, home language, highest qualification and teaching experience, as well as a question asking if educators had felt stressed during the preceding 3 months. If they indicated that they had felt stressed they were asked to indicate if school-related or other factors contributed the most to the stress they had experienced (Table 1a–h).

In Section B, educators were asked to indicate how many hours they spend on school-related activities in an average school week and to indicate what percentage of this time they spend on their various duties (Table 1i,j).

Educators were asked in Section C to indicate if they felt that they needed extra academic assistance with the implementation of the new curriculum and what kind of assistance was required (Table 1k). The areas which educators indicated they needed assistance with were: (1) collecting and evaluating information to be used for teaching purposes, (2) setting portfolio tasks, (3) setting tests and exams, (4) creating assessment tools such as rubrics, (5) linking learning outcomes and assessment standards with content, (6) using learning outcomes and assessment standards in teaching and assessment, (7) setting homework exercises and (8) formulating practical ideas for teaching Life Science.

Table 1: Percentage of educators according to their biographical details and individual responses regarding time distribution, stress experienced and support required

Variable		City school educators	Township school educators	Comparison between city and township school educators	Total
a. Gender	Female	n=34 85.3	n=20 55.0	p=0.014	n=54 74.1
	Male	14.7	45.0		
b. Age (years)	20–29	n=34 8.8	n=21 0.0	p=0.033	n=55 5.5
	30–39	8.8	42.9		
	40–49	58.8	38.1		
	50–59	20.6	19.1		
	60–69	2.9	0.0		
c. Home language	Afrikaans	n=34 82.4	n=21 9.5	p=0.001	n=55 54.5
	English	14.7	4.8		
	Ndebele	0.0	9.5		
	Sepedi	0.0	33.3		
	Venda	0.0	4.8		
	Tsonga	0.0	28.6		
	Other	2.9	9.5		
d. Teaching experience (years)	0–5	n=34 11.8	n=21 4.8	p=0.106	n=55 9.1
	6–10	8.8	23.8		
	11–15	11.8	33.3		
	16–20	26.5	14.3		
	21–25	20.6	4.8		
	26–30	17.7	9.5		
	31–35	2.9	9.5		
e. Highest tertiary qualification	Diploma	n=34 17.7	n=21 57.1	p=0.006	n=55 32.7
	Bachelors	38.2	9.5		
	Honours	23.5	28.6		
	Masters	20.6	4.8		
f. Tertiary education in the field of Life Science?	Yes	n=34 97.1	n=20 80.0	p=0.037	n=54 90.7
	No	2.9	20.0		
g. Stressed over last 3 months?	Yes	n=34 91.2	n=19 63.2	–	n=53 81.1
	No	8.8	36.8		
h. Major contributors to stress experienced	School-related factors	n=31 74.2	n=13 61.5	p=0.013	n=44 70.5
	Other factors	6.5	38.5		
	Both	19.4	0.0		
i. Time spent on school-related activities in an average week (hours/week)	30–34	n=34 2.9	n=18 0.0	p=0.072	n=52 1.9
	35–39	0.0	27.8		
	40–44	8.8	27.8		
	45–49	23.5	11.1		
	50–54	8.8	5.6		
	55–59	11.8	11.1		
	60–64	20.6	11.1		
	65–69	8.8	0.0		
	70–74	2.9	0.0		
>74	11.8	5.6			
j. Time spent on different activities	Teaching	38.5	32.8	–	–
	Administrative tasks	16.6	14.4		
	Portfolios	19.4	28.5		
	Extracurricular	15.9	9.1		
	Other	9.7	15.2		
k. Do you need extra support with the implementation of the new curriculum?	Yes	n=34 76.5	n=21 85.7	p=0.405	n=55 80.0
	No	23.5	14.3		

Educators were asked in Section D to indicate, in order of priority, three of the seven listed formats of possible support they would prefer. The formats to choose from were: (1) a booklet containing the names of websites and other sources where portfolio tasks and their assessment tools could be found, (2) workshops held at the University of Pretoria, (3) workshops held at schools, (4) a book containing portfolio tasks with their accompanying assessment tools and suggested memoranda, (5) a CD-ROM for teachers containing content sorted according to learning outcomes, grades and the four different knowledge areas for Life Sciences, as well as a variety of portfolio tasks with accompanying assessment tools and suggested memoranda linked to the different learning outcomes and knowledge areas, (6) a CD-ROM for learners containing content sorted according to the four different knowledge areas for Life Sciences, in the form of text, diagrams and animations, as well as a section containing 'test your knowledge' and (7) a multilingual explanatory Life Science dictionary, containing translations in different African languages.

Section E consisted of 50 possible school-related stressors (Table 2). The list of stressors was compiled in consultation with current Life Science educators and Heads of Departments at schools.

Section F consisted of 68 possible signs and symptoms of stress grouped under the headings (1) physical, (2) emotional and (3) behavioural (Figures 1, 2 and 3). Participants were requested to indicate which symptoms they had experienced over the preceding 6 months. The Stress Symptom checklist from the Cornell University Employee Assistance Program (document number 255-1531) was employed to assess the stress perceived by the educators.

A pilot study was undertaken to identify possible problems with the questionnaire. Valuable feedback was received about the appropriateness of the questionnaire and adaptations were subsequently incorporated.

Statistical analysis

Descriptive statistics for frequency distribution, the Pearson correlation coefficient and the Fisher's exact test were used to analyse the data. Results from the city school educators were compared with those of the township school educators. These results are presented in Table 1. The data were also analysed to determine if there were any correlations between stress levels and gender, age, home language, years of teaching experience, highest tertiary qualification or amount of time spent on school-related activities.

Results

A total of 56 educators completed the questionnaire, of whom 35 were from city schools and 21 were from township schools. The biographical details, time distribution and independent responses of the respondents are summarised in Table 1.

The Fisher exact test showed significant differences between groups with regard to the percentage of educators who reported the presence of stress. Differences were found between males (57.1%) and females (89.5%) ($p=0.016$), age range ($p=0.002$) and home language ($p=0.006$).

The Fisher exact test showed no significant differences for perceived stress between differences in years of teaching experience ($p=0.840$) or differences in the number of hours spent on school-related activities per week ($p=0.548$).

Stressors in the workplace

Educators were presented with 50 potential stressors which they had to rate on a scale from 1 to 5 (with 1 being no influence and 5 being a serious contributor to stress). The percentage of educators who rated a potential stressor as 4 or 5 is shown in Table 2.

Significant differences were found between city and township schools for various stressors (Table 3). The main differences were the lack of essential resources and transport problems of learners pertaining to the township schools.

Table 2: Percentage of educators who rated each stressor as a serious or major contributor to stress

	Stressor	%		Stressor	%
1	Lack of time to get through all your work	67.9	26	Pressure from school management	34.6
2	Learner behaviour, discipline and attitude	67.3	27	Performance appraisals	34.5
3	Class size: too many learners to handle at once	63.6	28	Training for new curriculum for Grade 10s	34.0
4	Constant changes and reforms	57.1	29	Language problems of learners	33.9
5	Teaching a learning area that you are not trained in	55.8	30	Preparation and execution of practicals	33.9
6	Learner absenteeism	53.6	31	Correcting other educators' work	32.7
7	Lack of respect from learners	53.6	32	Lack of teaching aids e.g. equipment	32.7
8	Marking portfolio tasks, tests and examinations	53.6	33	Having to do other educators' work e.g. marking	30.9
9	Uncertainty about future Grade-12 examinations	52.7	34	Incorporation of outcomes-based education	30.9
10	Preparation of Grade 9s for common task assessments	50.0	35	Processing of learner marks for reports	29.1
11	Completing forms for the Gauteng Department of Education	50.0	36	School and cluster moderation	28.6
12	Lack of learner and staff work ethic	50.0	37	Having to do the work of a higher post level	28.3
13	Excessive working requirements and hours	49.1	38	Violence at school	26.8
14	Changes in the Grade-12 portfolio requirements	49.1	39	Organisation by school management	25.0
15	Under- or over-parent involvement	48.2	40	Parent evenings	25.0
16	Setting portfolio tasks, tests and examinations	48.2	41	Subject content (unfamiliar or too difficult)	23.6
17	Administrative tasks e.g. paperwork	47.3	42	Moderating other educators' work	21.8
18	Lack of academic resources for learners	44.6	43	Cluster meetings	20.0
19	Lack of support from management	41.5	44	Language problems of educators	18.2
20	Lack of financial resources at the school	41.1	45	Attending meetings	17.0
21	Problems with the new curriculum for Grade 10s	38.9	46	Transport problems of learners	16.1
22	Educator absenteeism	38.2	47	Lack of essential resources e.g. chairs	12.7
23	Preparing Grade 12s for examinations	38.2	48	Racial issues	12.5
24	Extracurricular or non-teaching duties	35.7	49	Transport problems of educators	7.3
25	Intervention with non-coping learners	35.2	50	Assisting new educators	7.2

Symptom checklist

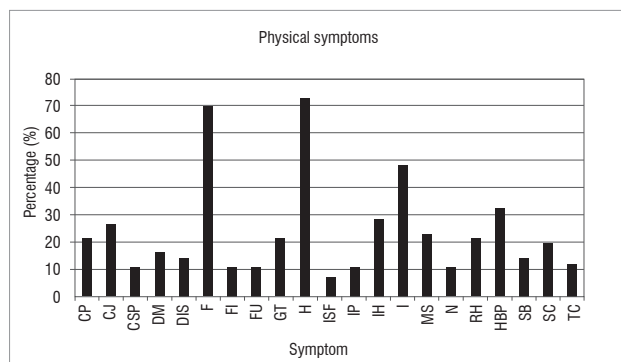
Educators ($n=56$) were asked to indicate which of 68 stress symptoms they had experienced over the 6-month period preceding the study (Figures 1, 2 and 3).

Significant differences in the reporting of stress symptoms were found between city and township school educators (Table 4). Township school educators were less fatigued ($p=0.001$) and less irritable ($p=0.002$) than city school educators.

Table 3: Differences between the ratings of stressors by township and city school educators ranked in order of significance (indicated as a percentage)

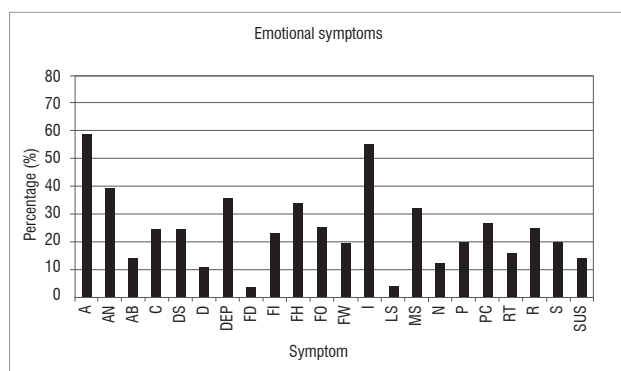
Stressor		City	Township	City	Township	City	Township	City	Township	City	Township	p-value
		Rating 1	Rating 2	Rating 3	Rating 4	Rating 5						
1	Transport problems of learners	62.9	14.3	11.4	33.3	20.0	19.1	2.9	0.0	2.9	33.3	0.001
2	Lack of essential resources e.g. chairs	73.5	19.1	14.7	28.6	8.8	23.8	2.9	4.8	0.0	23.8	0.001
3	Violence at school	45.7	0.0	20.0	23.8	20.0	28.6	5.7	19.1	8.6	28.6	0.004
4	Parent under- or over-involvement	14.3	9.5	25.7	9.5	25.7	9.5	28.6	23.8	5.7	47.6	0.006
5	School and cluster moderation	2.9	38.1	34.3	9.5	31.4	28.6	22.9	14.3	8.6	9.5	0.008
6	Lack of academic resources for learners	37.1	9.5	8.6	9.5	22.9	14.3	22.9	19.1	8.6	47.6	0.012
7	Lack of financial resources at the school	31.4	4.8	11.4	9.5	31.4	19.1	17.1	28.6	8.6	38.1	0.019
8	Lack of teaching aids e.g. equipment	28.6	5.0	25.7	20.0	28.6	15.0	8.6	30.0	8.6	30.0	0.019
9	Constant changes and reforms	0.0	23.8	5.7	9.5	25.7	28.6	34.3	19.1	34.3	19.1	0.029
10	Extracurricular or non-teaching duties	11.4	38.1	17.1	19.1	22.9	28.6	31.4	4.8	17.1	9.5	0.051
11	Administrative tasks e.g. paper work	5.7	0.0	22.9	10.0	31.4	30.0	28.6	15.0	11.4	45.0	0.053
12	Excessive working requirements and hours	0.0	14.3	8.8	23.8	32.4	28.6	23.5	19.1	35.3	14.3	0.058
13	Organisation by school management	20.0	23.8	37.1	14.3	28.6	19.1	11.4	19.1	2.9	23.8	0.064
14	Language problems of learners	25.7	4.8	31.4	14.3	20.0	28.6	17.1	33.3	5.7	19.1	0.065
15	Lack of support from management	28.1	4.8	21.9	19.1	21.9	14.3	18.8	28.6	9.4	33.3	0.075
35	Completing forms for the Gauteng Department of Education	2.9	9.5	8.6	19.1	31.4	33.3	28.6	19.1	28.6	19.1	0.524
36	Uncertainty about future Grade-12 examinations	5.7	20.0	17.1	10.0	22.9	20.0	25.7	20.0	28.6	30.0	0.548
37	Cluster meetings	14.3	10.0	28.6	40.0	31.4	40.0	20.0	5.0	5.7	5.0	0.567
38	Teaching a learning area that you are not trained in	31.3	20.0	12.5	5.0	6.3	10.0	21.9	20.0	28.1	45.0	0.635
39	Language problems of educators	40.0	40.0	34.3	20.0	8.6	20.0	14.3	15.0	2.9	5.0	0.669
40	Lack of time to get through all your work	5.7	4.8	8.6	4.8	17.2	23.8	25.7	38.1	42.9	28.6	0.743
41	Intervention with non-coping learners	11.7	5.0	20.6	20.0	35.3	35.0	23.5	20.0	8.8	20.0	0.753
42	Learner behaviour, discipline and attitude	2.9	9.5	5.9	9.5	23.5	14.3	26.5	28.6	41.2	38.1	0.759
43	Problems with the new curriculum for Grade 10s	6.1	0.0	24.2	19.1	33.3	38.1	21.2	28.6	15.2	14.3	0.771
44	Having to do the work of a higher post level	42.4	35.0	12.1	20.0	18.2	15.0	12.1	20.0	15.2	10.0	0.823
45	Racial issues	40.0	52.4	25.7	19.1	22.9	14.3	2.9	4.8	8.6	9.5	0.855
46	Preparation and execution of practicals	17.1	23.8	20.0	14.3	25.7	33.3	25.7	19.1	11.4	9.5	0.894
47	Processing of marks for reports	11.4	10.0	22.9	20.0	34.3	45.0	20.0	20.0	11.4	5.0	0.905
48	Educator absenteeism	11.4	10.0	31.4	25.0	22.9	20.0	17.1	20.0	17.1	25.0	0.951
49	Lack of respect from learners	8.6	4.8	17.1	14.3	22.9	23.8	25.7	33.3	25.7	23.8	0.960
50	Marking portfolio tasks, tests and examinations	2.9	4.8	11.4	14.3	28.6	33.3	31.4	28.6	25.7	19.1	0.963

Stressors ranked 16 to 34 were omitted for presentation purposes.



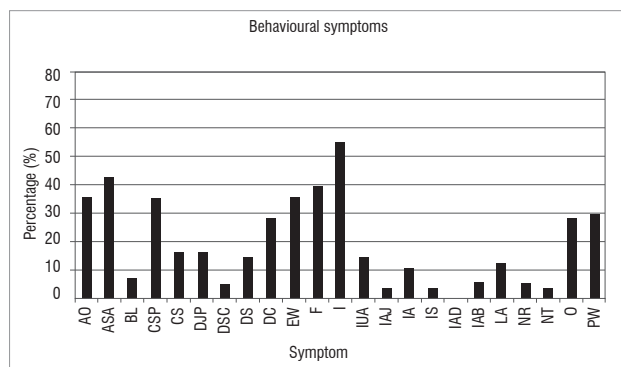
CP, chest pain; CJ, clenched jaw; CSP, cold and sweaty palms; DM, dry mouth; DIS, dry and itchy skin; F, fatigue; FI, frequent illness; FU, frequent urination; GT, grinding of teeth; H, headache; ISF, impaired sexual function; IP, increased perspiration; IH, indigestion or heartburn; I, insomnia; MS, muscle spasms; N, nausea; RH, racing or pounding heart; HBP, high blood pressure; SB, shortness of breath; SC, stomach cramps or pains; TC, tightness of chest or throat

Figure 1: Percentage of educators that indicated the presence of specific physical symptoms of stress over the 6 months preceding the study.



A, anger; AN, anxiety; AB, apathy or boredom; C, cynicism (pessimism); DS, decreased self confidence; D, defensiveness; DEP, depression; FD, feeling of danger or doom; FI, feeling of insecurity; FH, feeling helpless or hopeless; FO, feeling overwhelmed; FW, feeling of worthlessness; I, irritability; LS, loss of sense of purpose; MS, mood swings; N, nightmares; P, panic; PC, poor concentration; RT, racing thoughts; R, restlessness; S, sadness; SUS, suspiciousness

Figure 2: Percentage of educators that indicated the presence of specific emotional symptoms of stress over the 6 months preceding the study.



AO, angry outbursts; ASA, avoidance of social activities; BL, being late or missing appointments; CSP, change in sleep pattern; CS, crying spells; DJP, decreased job performance; DSC, decreased self care; DS, decreased interest in sex; DC, difficulty concentrating; EW, excessive worry; F, forgetfulness; I, impatience; IUA, inability to enjoy usual activities; IAJ, increase in accidents or injuries; IA, increased arguing; IS, increased smoking; IAD, increased use of alcohol or drugs; IAB, increased absenteeism; LA, loss of appetite; NR, neglecting responsibility; NT, nervous twitch or habit; O, overeating; PW, postpone work

Figure 3: Percentage of educators that indicated the presence of specific behavioural symptoms of stress over the 6 months preceding the study.

Table 4: Differences between educators at city and township schools in the occurrence of stress symptoms, ranked in order of significance

Rank	Stress symptom	City %	Township %	Total %	p-value
1	Fatigue	85.7	42.9	69.6	0.001
2	Irritability	71.4	28.6	55.3	0.002
3	Feeling overwhelmed	37.1	4.8	25.0	0.007
4	Overeating	40.0	9.5	28.6	0.015
5	Clenched jaw	37.1	9.5	26.8	0.024
6	Nausea	17.1	0.0	10.7	0.045

City school educators: n=35; township school educators: n=21

Need for development of an educator support programme

Most (80%) educators – 76.5% of city and 85.7% of township school educators – expressed a need for extra academic support during the implementation of the new curriculum. These respondents indicated that they especially needed help with setting of portfolio tasks, linking learning outcomes and assessment standards to preferred content, collecting and evaluating information for teaching purposes and formulating practical ideas for teaching Life Science.

When educators were presented with a list of seven available educator support resources and asked to indicate which they used, 89.2% reported that they used textbooks, 83.9% used the *National Curriculum Statement* for Grades 10–12, 76.8% used the *Study and Master Series*, 69.6% used old examination questions, 26.8% used the *Future Entrepreneurs' Series* – OBE material for Grade 10, 8.9% used *Gauteng Online* (an e-learning project) and 8.9% used the webpage www.thutong.org.za (a government education portal).

Development of an educator support programme

Educators were given the choice of seven formats in which additional support could potentially be offered. Their primary preference (with 55.4% of respondents selecting this option) was assistance or support in the form of a book containing portfolio tasks with accompanying assessment tools such as rubrics and suggested memoranda, while 42.9% of respondents indicated that they primarily require workshops held at their schools once every term.

Discussion

Our main aim was to assess the time distribution, perception of stressors, and presence of stress symptoms in Grade 10–12 Life Science educators at schools in Tshwane North. In addition, we assessed the need of educators for additional academic support and the preferred format of such support.

Despite care being taken to minimise the effort required by educators to return the questionnaires, the response was disappointing. Of the 94 schools which received questionnaires, only 36 schools responded. Although workload may have been a factor, misgivings about the confidentiality of their responses might also have contributed to the low response rate. Completed questionnaires were received from only 56 Grade 10–12 Life Science educators from government secondary schools. Females comprised 74.1% of respondents and males 25.9%; 62.5% of respondents were from city schools and 37.5% were from township schools. Afrikaans was the home language of 54.5% of respondents, Sepedi 12.7%, English 10.9%, Tsonga 10.9%, Ndebele 3.6% and Venda 1.8%, with 5.5% of respondents indicating other languages (Table 1).

Time distribution

Analyses of the working hours showed that 53.9% of Life Science educators spent more than 50 hours per week on school-related activities (Table 1). This finding corresponds with an international study in which it was demonstrated that educators work about 22 extra hours a week without overtime remuneration¹⁹ and supports the results of a previous South African study in which 85% of participants indicated that they worked until late in the evenings.²⁰

Stressors in the workplace

Most (81.1%) educators described themselves as stressed, with 70.5% identifying school-related factors as the major cause of the stress (Table 1). This finding differed from that of an international study in which only 25–33% of educators reported high levels of work-related stress.¹ The practical implications of the high stress levels of South African educators are illustrated by the results of a local study wherein 50% of participants indicated their enthusiasm for the teaching profession to be dwindling as a result of stress.²⁰

From a list of 50 factors (Table 2), the following ten school-related factors were found to be major contributors to the stress of Grade 10–12 Life Science educators: (1) lack of time, (2) learners' poor behaviour and attitudes and lack of discipline, (3) large class sizes, (4) constant changes and reforms, (5) teaching a learning discipline for which one has not been trained, (6) absenteeism of learners, (7) lack of respect from learners, (8) marking portfolio tasks, tests and examinations, (9) uncertainty about future Grade-12 examinations and (10) preparation of Grade 9s for common task assessments. Although the rankings were different, several factors considered to be major stressors in the present study corresponded with those reported by other local and international studies.^{2,4,5,8,10-13,20} The most prominent of these were constant changes and reforms, lack of time, learner misbehaviour, lack of discipline and lack of resources. A number of stressors, such as absenteeism of both learners and educators, and uncertainty about future Grade-12 examinations, did not emerge in previous studies, but came to the fore in this study as major stressors in the South African context. In contrast, a lack of leadership and management problems, factors generally seen to rank high as stressors in other studies,^{3,4,20} were not found to be among the top ranking stressors in the present study.

The implementation of new curricula, as shown by previous studies^{3,12,13,16,21}, proved to be a major stressor for educators, with 57.1% of respondents ranking constant changes and reforms 4th out of 50 possible stressors, 53.6% ranking the marking of portfolio tasks 8th and 48.2% ranking the setting of portfolio tasks 16th (Table 2).

Although racial issues and language problems (instruction in a language other than the home language) have previously been identified as specific challenges in the South African education system,²² these did not appear to be major stressors for the educators participating in the present study (Table 2). Racial issues, identified as a stressor by 12.5% of respondents, ranked 48th and language issues, identified by 33.9%, ranked 29th out of 50. Surprisingly, violence at schools, identified as a stressor by 26.8% of respondents, ranked only 38th out of 50 possible stressors – in contrast with the findings of the Human Sciences Research Council which reported violence as a major stressor.^{7,8}

When educators were given the opportunity to list school-related factors that constitute major stressors but were not included in the questionnaire, the following were frequently listed: fewer learners taking Life Science as a subject, lack of time for family responsibilities, use of dagga/drugs by learners on school premises, learners bullying their peers, learners playing truant, and financial problems owing to poor compensation. Learner absenteeism and financial problems have been cited as additional school-related stressors previously.^{2,4} Inadequate salaries may, as shown by Olivier and Venter⁴, be a major reason why some educators embark on second jobs, or even change occupation.

Stress symptoms

The fact that educators are experiencing stress is reiterated by their reports of the presence of stress symptoms. This scenario is of concern

because of the potential influence of long-term stress on the health of educators which, in turn, could contribute to increased rates of educator absenteeism. The percentage of respondents reporting headaches (73.2%), fatigue (69.6%), irritability (55.4%), impatience (55.4%), insomnia (48.2%), avoidance of social activities (42.9%), forgetfulness (40%), anxiety (39.3%), depression (35.7%), angry outbursts (35.7%) and excessive worry (35.7%) in the preceding 6 months (Figures 1, 2 and 3) are largely in agreement with the occurrence of stress symptoms reported in other studies.^{2,4,9,10,20,23} The above-mentioned symptoms can negatively influence educator performance and the quality of teaching.²⁰

Another phenomenon reported to various degrees in other studies is the increase in drug and alcohol use/abuse.^{7,9,20} In the present study, none of the participants reported this symptom. It is possible that stress-induced substance abuse is region dependent. Or it is possible that educators refrained from reporting such use because of the potential consequences (the fear that their principals may look at the questionnaires).

Differences between city and township schools

Tertiary qualification

Significant differences were found between city and township school educators with regard to their highest tertiary qualification. City school Grade 10–12 Life Science educators were better qualified than township school educators ($p=0.006$). As much as 82.4% of city school educators had at least a bachelor's degree, in contrast to the 42.9% of township school educators (Table 1). The implication of this finding is that underqualified educators display poor conceptual foundations.²¹

Major stressors

Upon comparing city and township school educators (Table 1) with regard to the major contributors to their stress, it was evident that non-school related factors contributed significantly more ($p=0.013$) to stress in township school educators (38.5%) than to stress in city school educators (6.5%). This difference may be related to the prevailing conditions in previously disadvantaged communities, such as a lack of resources.

Stressors

A lack of time, learners' poor behaviour, disciplinary problems, learners' poor attitudes, problems with the new curriculum, processing of marks for reports, lack of respect from learners and marking of portfolio tasks were stressful to both township and city school educators (Table 3). However, for a number of stressors, there were significant differences between the perceptions of township school educators and city school educators. For instance, township school educators rated transport problems ($p=0.001$), lack of essential resources ($p=0.001$), violence at school ($p=0.004$), lack of parent involvement ($p=0.006$), lack of academic resources for learners ($p=0.012$), lack of financial resources at schools ($p=0.019$) and a lack of teaching aids ($p=0.019$) more stressful than did city school educators. This result differed from those of a US study by Abel and Sewell²⁴, in which it was shown that urban school educators experienced significantly more stress stemming from poor working conditions than rural school educators. Lack of essential resources and lack of adequate finances thus appear to remain major problems, largely contributing to high stress levels in educators from previously disadvantaged schools. In contrast, school and cluster moderation ($p=0.008$), constant changes and reforms ($p=0.029$) and extracurricular responsibilities ($p=0.05$) contributed to significantly more stress in city school educators than in township school educators. The results of the present study thus emphasise the differences in the needs between city and township schools. These differences should be taken into consideration during the development of stress management programmes to assist educators.

Stress symptoms

Stress symptoms were experienced by more city than township school educators (Table 4). Significant differences were found between city

and township school educators with regard to the presence of fatigue ($p=0.001$), irritability ($p=0.002$), feeling overwhelmed ($p=0.007$), overeating ($p=0.015$), clenched jaw ($p=0.024$) and nausea ($p=0.045$).

Perceived stress and other factors

In addition to the assessment of individual stress factors, educators were also asked whether they had felt stressed during the preceding 3 months. It appears that significantly more ($p=0.016$) female educators (89.5%) than male educators (57.1%) are stressed. Possible reasons for this difference may be that male educators, in general, employ more effective coping skills or do not have the same commitment as female educators, or that female educators are more conscientious, or that stress levels of female educators are higher because of their multidimensional role as educator, parent and housekeeper, or that male and female school-related responsibilities differ. The true reason probably lies in a combination of these factors. In addition to gender differences in perceived stress, we also found that more educators from city schools (91.2%) than from township schools (63.2%) were stressed.

A significant difference ($p=0.002$) in perceived stress was evident among different age groups. Educators in the age ranges 20–29 years and 50–59 years, irrespective of gender or school locality, all indicated that they were stressed while only 45% of the educators in the age range 40–49 reported being stressed. These findings do not correspond with those of Schulze and Steyn⁵ who found that educators between 36 years old and 45 years old were particularly vulnerable. However, it does concur with reports that older educators may find it harder to adapt to OBE.⁵ Although the possibility does exist that the young educators (20–29) may feel overwhelmed by the high expectations and the novelty of the situation and that the older educators may feel stressed by all the changes, it is far too simplistic to arrive at such conclusions without examining other factors inherent to the situation and outcome of the process. This is a possible future area of study.

A significant difference ($p=0.006$) was found with regard to home language and educators' perceived stress. All the Ndebele educators, 93% of Afrikaans-speaking and 83% of English-speaking educators indicated that they had experienced stress. In contrast, only 50% of Sepedi and Tsonga educators answered in the affirmative. It would be interesting to further investigate the reason for this.

Surprisingly, it appears that neither the number of years teaching experience ($p=0.840$) nor the number of hours spent on school-related activities ($p=0.548$) had a significant influence on the educators' perception of stress. In contrast, Van der Linde and Van der Westhuizen⁶ found that a much larger percentage of educators with 3–5 years or 16–20 years of experience reported a high degree of stress.

Development of an educator support programme

Most (80%) educators indicated that they need extra academic support during the implementation of the new curriculum. They specified that they especially need assistance with setting of portfolio tasks, linking of learning outcomes and assessment standards to preferred content and collecting and evaluating information to be used for teaching purposes. Because these needs are all time consuming, it is felt that assisting the educators in these three areas could potentially save them time, which can then be used for other purposes such as relaxation or other academic endeavours. When questioned on the preferred format of support, educators indicated that they would prefer assistance in the form of a book containing portfolio tasks with accompanying assessment tools and suggested memoranda. A few educators' first choice was workshops held at their schools once every term. The best option may very well constitute a booklet along the suggested lines, accompanied by accredited workshops at regular intervals.

Conclusions

Most Grade 10–12 Life Science educators located in Tshwane North are stressed and overworked. A lack of time, learners' poor behaviour, large class sizes and the constant changes and reforms associated with the implementation of new curricula, in this instance OBE, are the main

stressors. The absenteeism of learners and educators, and the uncertainty about future Grade-12 examinations, were identified as stressors unique to this study. High stress levels can lead to stress symptoms such as headaches, fatigue, irritability and impatience. This effect is of major concern owing to the possible impact of chronic stress on educator well-being, as well as on the educational process as a whole. It is of importance to note that educators from better resourced city schools had stressors different from educators from under-resourced township schools as a result of the historical context in which these schools were founded. It is thus suggested that stress management programmes be customised to suit these different types of schools which have different historical backgrounds. The nature of many of the major stressors which teachers experience is such that several stressors can be alleviated by proper consultation and planning on the side of the higher authorities, by additional academic support and by the availability of appropriate funding. Since completion of the study, further curricula changes have been introduced. We therefore suggest that follow-up studies investigate the impact of the current curriculum changes on educator stress levels.

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Authors' contributions

M.J.A.C. was responsible for data collection. Both authors contributed to the study design and manuscript preparation.

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