Validation of the Teacher Stress Inventory (TSI) in a South African context: The SABPA Study

Susanna Maria Boshoff

Hons. B.Sc. (Psychology)

20101333

Mini-dissertation (article format) submitted in partial fulfilment of the requirements for the degree Magister Scientiae (Clinical Psychology) at the North-West University, Potchefstroom Campus, South Africa

Supervisor: Prof. J.C. Potgieter

Co-supervisor: Prof. L. Malan

May 2011

Acknowledgements

I wish to extend a sincere word of gratitude to the following individuals who, in some way or another, assisted me in completing this project:

- The SABPA research team for their hard work and assistance. To every research participants, thank you, without you this would not have been possible.

- Elma de Kock and Lesley Greyvenstein, for the professional and kind manner in which you "checked my every word".

- Special thanks to my supervisor, Prof. J.C. Potgieter, for his assistance, patience and guidance.

- My co-supervisor, Prof. L. Malan, for her time, insight and sound mind.

- My aunt, Dr. Suria Ellis, for her skilled statistical analysis and guidance. Thank you for your constant encouragement and for not once losing heart or growing weary of acting noble and doing right.

- Special thanks to my parents, Pieter and Maretha Boshoff, my brothers and sister, and every single member of my family. Thank you for every prayer, your steady support, warm hospitality, encouragement, and unconditional love throughout this journey. You add the feathers to my wings.

- To my loving and loyal friends. Thank you for being there when I needed an ear or a shoulder, and for always sharing in my delight.

- The love of my life, Francois. Thank you for your unconditional acceptance, gentle support and bold spirit. This would not have been possible without your sound wisdom, unshakable faith and unfailing love. I love sharing my dreams with you.

Lastly, I give all the honour and glory to My Lord and Saviour. It is by Your grace that I have been blessed with overflowing guidance and strength. Thank you for Your goodness and love, that follows me wherever I go. You truly complete me.

Table of Contents

1. Summary

Validation of the Teacher Stress Inventory (TSI) in a South African context: The SABPA study

Keywords:

Teacher Stress Inventory (TSI), validation, reliability, validity, South African context, stress, psychological well-being.

This research was aimed at determining the psychometric properties of the Teacher Stress Inventory (TSI; Boyle, Borg, Falzon & Baglioni, 1995) and in doing so enabling the possible development of a much needed, more culture sensitive inventory for the measurement of teacher stress as it manifests in the South African context. A review of international literature revealed that the stress associated with the teaching profession is a well-known phenomenon, and has received increasing recognition and research attention in recent years (e.g., Brown, Howcroft & Jacobs, 2010; Chaplain, 2008; Ngidi & Sibaya, 2002; Olivier & Venter, 2003; Schwarzen & Hallum, 2008; Sharplin, O'Neill & Chapman, 2011; Vandeyar, 2005). However, only a few studies on teacher stress in the South African context could be found. The studies that were done within the South African teaching context (Ferreira, 2008; Lund & Fisher, 2006; Møller, 2007) did report various and specific challenges that add to the stressors South African teachers need to overcome in order to maintain psychological well-being. Furthermore, these studies mostly implemented scales that were developed within a Eurocentric context, and thus did not incorporate cultural and contextual factors that are known to impact directly on both the construction and experience of psychological well-being (Temane & Wissing, 2008; Wissing & Temane, 2008; Wissing, Wissing, Du Toit, &

Temane, 2006) and stress. The need for a teacher stress scale which will be valid in the South African context became apparent. Therefore, the aim of this study is to validate the TSI for use in a South African context.

A cross-sectional design for data collection was used as part of the Sympathetic Activity and Ambulatory Blood pressure in Africans (SAPBA) study. The research sample consisted of urban Caucasian (n=209) and African (n=200) teachers subsiding in the North-West Province of South Africa. The TSI, the General Health Questionnaire (GHQ) and the Mental Health Continuum-Short Form (MHC-SF) were administered to all participants, together with physiological measures of stress that were taken under controlled circumstances. Based on the results from the exploratory factor analysis and item analysis that was conducted separately on the different ethnic groups, it was decided to omit items 1, 3 and 6 due to evidenced problematic psychometric properties in this study population. A further factor analysis that was conducted on the total study group showed sufficient communalities and yielded a two-factor model, with a robust factor structure and satisfactory reliability indices for both extracted factors, namely (1) *General circumstance related stress* and (2) *Learner related stress*. Satisfactory criterion-related validity was determined by correlating the TSI with other measures of psychological health, the GHQ and the MHC-SF, as well as physiological measures of health.

In conclusion, the TSI proved to be a useful, brief self-report questionnaire for the assessment of occupational stress within this cohort of South African teachers. If replicated within a sample more representative of the South African context, the findings of this study will allow the impact of different sources of teacher stress to be determined and compared within the South African context. It further holds promising possibilities for influencing public policy with regard to the education system in South Africa and to contribute to the exploration of teacher stress in this context, with the aim of contributing to the psychological

well-being of South African teachers. Further psychometric evaluation is however necessary before the TSI can be considered to be a valid instrument in the broad South African context.

2. Opsomming

Validering van die *Teacher Stress Inventory* (TSI) in ’n Suid-Afrikaanse konteks: Die SABPA-Studie.

Sleutelterme:

Teacher Stress Inventory (TSI), validering, betroubaarheid, geldigheid, Suid-Afrikaanse konteks, stres, psigologiese welstand.

Die doel van hierdie studie was om die psigometriese eienskappe van die *Teacher Stress Inventory* (TSI; Boyle, Borg, Falzon & Baglioni, 1995) te bepaal, en daardeur die noodsaaklike ontwikkeling van ’n meer kultureel-sensitiewe skaal vir die bepaling van onderwyserstres, soos dit voorkom in die Suid-Afrikaanse konteks, moontlik te maak. ’n Oorsig van internasionale literatuur het aan die lig gebring dat stres geassosieer met die onderwysprofessie ’n alombekende verskynsel is, en dat dit in die afgelope jare toenemende erkenning en navorsingsaandag ontvang het (e.g., Brown, Howcroft & Jacobs, 2010; Chaplain, 2008; Ngidi & Sibaya, 2002; Olivier & Venter, 2003; Schwarzen & Hallum, 2008; Sharplin, O’Neill & Chapman, 2011; Vandeyar, 2005). Daar kon egter slegs enkele studies oor onderwyserstres in die Suid-Afrikaanse konteks gevind word. Die studies wat in die Suid-Afrikaanse konteks onderneem is (Ferreira, 2008; Lund & Fisher, 2006; Møller, 2007), het verskeie en spesifieke uitdagings rapporteer wat bydra tot die stres wat Suid-Afrikaanse onderwysers suksesvol moet hanteer om sodoende psigologiese welstand te handhaaf. Verder is bevind dat hierdie studies meestal skale wat vanuit ’n Eurosentriese konteks ontwikkel is implementeer, en dat dit dus nie kulturele en kontekstuele faktore wat die konstruksie en ervaring van psigologiese welstand (Temane & Wissing, 2008; Wissing & Temane, 2008;

Wissing, Wissing, Du Toit, & Temane, 2006) en stres beïnvloed, inkorporeer nie. Die behoefte aan ’n onderwyserstres-skaal wat geldig is in die Suid-Afrikaanse konteks, het aan die lig gekom. Gevolglik was die doel van hierdie studie om die TSI te valideer vir die gebruik daarvan in ’n Suid-Afrikaanse konteks.

’n Deursnit-ontwerp vir data-opname is gebruik in hierdie studie, wat deel vorm van die *Sympathetic Activity and Ambulatory Blood pressure in Africans* (SAPBA) -studie. Die deelnemers het bestaan uit stedelike Kaukasiese (n=209) en Afrika- (n=200) onderwysers, woonagtig in die Noordwes-provinsie van Suid-Afrika. Die TSI, die *General Health Questionnaire* (GHQ) en die *Mental Health Continuum - Short Form* (MHC-SF), tesame met fisiologiese metings van stres, is op al die deelnemers onder gekontroleerde omstandighede afgeneem. Na aanleiding van die resultate van die eksploratiewe faktorontleding en itemanalises, wat afsonderlik op die verskillende etniese groepe uitgevoer is, is daar besluit om items 1, 3 en 6 uit te laat as gevolg van die problematiese psigometriese eienskappe van die items in hierdie populasie. Verdere faktorontleding wat op die totale studiegroep uitgevoer is, het voldoende kommunaliteite getoon en twee faktore met ’n sterk faktorstruktuur en bevredigende betroubaarheidskoëffisiente vir beide faktore opgelewer, naamlik (1) *Algemene omstandigheidsverwante stres* en (2) *Leerderverwante stres*. Bevredigende kriterium-verwante geldigheid is bepaal deur die TSI met ander meetinstumente van psigologiese welstand, die *GHQ* en die *MHC-SF,* sowel as fisiologiese maatstawwe van gesondheid, te korreleer.

Die gevolgtrekking is dat die TSI ’n bruikbare, kort self-rapporteringsvraelys vir die assessering van onderwyserstres binne hierdie kohort van Suid-Afrikaanse onderwysers is. Sou hierdie bevindinge binne ’n steekproef meer verteenwoordigend van die Suid-Afrikaanse konteks gerepliseer kan word, sal dit moontlik wees om die impak van verskillende bronne van onderwyserstres te bepaal en te vergelyk binne die Suid-Afrikaanse konteks. Dit skep

voorts belowende moontlikhede om die staatsbeleid met betrekking tot die Suid-Afrikaanse onderwyssisteem te beïnvloed, en sodoende by te dra tot die verkenning van onderwyserstres in hierdie konteks, met die uiteindelike doel om by te dra tot die psigologiese welstand van Suid-Afrikaanse onderwysers. Verdere psigometriese evaluasie is egter nodig voor die TSI as geldig in die breër Suid-Afrikaanse konteks beskou kan word.

3. Preface

3.1. Article format

For purposes of this mini-dissertation, which is part of the requirements for a professional Master's degree, the article format as described by General Regulation A.13.7 of the North-West University was chosen.

3.2. Selected journal

The target journal for publication is the Journal of Psychology in Africa. The manuscript as well as the reference list has been styled according to the specifications of the APA (American Psychological Association) publication guidelines for the purpose of examination. Where journal specifications differ from the APA publication guidelines, appropriate amendments will be made before submission for publication.

3.3. Letter of Consent

We, the co-author(s), hereby give consent that Susanna Maria Boshoff may submit the manuscript for the purposes of a mini-dissertation. It may also be submitted to the Journal of Psychology in Africa for publication.

Prof. J.C. Potgieter	Prof. L. Malan	Dr S.M. Ellis
Co-author and Supervisor	Co-author	Co-author

4. Manuscript

Validation of the Teacher Stress Inventory (TSI) in a South African context: The SABPA Study

S.M. Boshoff, J.C. Potgieter, S.M. Ellis and L. Malan.

School for Psychosocial Behavioural Sciences, North-West University (Potchefstroom campus), South Africa.

4.1. Instructions to Authors

Journal of Psychology in Africa

The Journal of Psychology in Africa includes original articles (possibly published with written comments of several readers), review articles, book reviews, commentaries, special issues, case analyses, reports, special announcements, etc. Contributions should attempt a synthesis of emic and etic methodologies and applications.

Specifically, manuscripts should: 1) Combine quantitative and qualitative data, 2) Take a systematic qualitative or ethnographic approach, 3) Use an original and creative methodological approach, 4) Address an important but overlooked topic, and 5) Present new theoretical or conceptual ideas.

Also, all papers must show an awareness of the cultural context of the research questions asked, the measures used, and the results obtained. Finally the papers should be practical, based on local experience, and applicable to crucial development efforts in key areas of psychology.

Editorial policy

Submission of a manuscript implies that the material has not previously been published, nor is it being considered for publication elsewhere. Submission of a manuscript will be taken to imply transfer of copyright of the material to the publishers; NISC Pty Ltd. Contributions are accepted on the understanding that the authors have the authority for publication. Material accepted for publication in this journal may not be reprinted or published in translation without the express permission of the publishers, NISC Pty Ltd. The Journal has a policy of anonymous peer review. Papers will be scrutinised and commented on by at least two independent expert referees or consulting editors as well as by an editor. The Editor reserves the right to revise the final draft of the manuscript to conform to editorial requirements.

Manuscripts

Manuscripts should be submitted in English, French, Portuguese or Spanish. They should be typewritten and double-spaced, with wide margins, using one side of the page only. Manuscripts should be submitted to the Editor-in-Chief Journal of Psychology in Africa, Professor Elias Mpofu, Department of Counsellor Education, Counselling Psychology and Rehabilitation Services, Pennsylvania State University, 327 CEDAR Building, University Park, PA 16802-3110, USA, e-mail: exm31@psu.edu. We encourage authors to submit manuscripts via e-mail, in MS Word, but we also require two hard copies of any e-mail submission.

Before submitting a manuscript, authors should peruse and consult a recent issue of the Journal of Psychology in Africa for general layout and style.

Manuscript format

All pages must be numbered consecutively, including those containing the references, tables and figures. The typescript of manuscripts should be arranged as follows: Title: This should be brief, sufficiently informative for retrieval by automatic searching techniques and should contain important keywords (preferably <10 words). Author(s) and Address(es) of author(s): The corresponding author must be indicated. The authors' respective addresses where the work was done must be indicated. An e-mail address, telephone number and fax number for the corresponding author must be provided. Abstract: English abstracts must be supplied with all submissions accompanied by a French, Portuguese and/or Spanish translation. For data-based contributions, the abstract should be structured as follows: Objective — the primary purpose of the paper, Method — data source, subjects, design, measurements, data analysis, Results — key findings, and Conclusions — implications, future directions. For all other contributions (except editorials, letters and book reviews) the abstract must be a concise statement of the content of the paper. Abstracts must

not exceed 200 words. It should summarise the information presented in the paper but should not include references. Referencing: References in text: References in running text should be quoted as follows: Louw and Mkize (2004), or (Louw 2004), or Louw (2000, 2004a, 2004b), or (Louw and Mkize 2004), or (Mkize 2003, Louw and Naidoo 2004). All surnames should be cited the first time the reference occurs, e.g. Louw, Mkize and Naidoo (2004) or (Louw, Mkize and Naidoo 2004). Subsequent citations should use et al., e.g. Louw et al. (2004) or (Louw et al. 2004). 'Unpublished observations' and 'personal communications' may be cited in the text, but not in the reference list. Manuscripts accepted but not yet published can be included as references followed by 'in press'. Reference list: Full references should be given at the end of the article in alphabetical order, using double spacing. References to journals should include the authors' surnames and initials, the full title of the paper, the full name of the journal, the year of publication, the volume number, and inclusive page numbers. Titles of journals must not be abbreviated. References to books should include the authors' surnames and initials, the year of publication, the full title of the book, the place of publication, and the publisher's name. References should be cited as per the examples below (please note the absence of punctuation):

Appoh, L. (1995). The effects of parental attitudes, beliefs and values on the nutritional status of their children in two communities in Ghana. Unpublished masters dissertation, University of Trondheim, Norway

Peltzer, K. (2001). Factors at follow-up associated with adherence with directly observed therapy (DOT) for tuberculosis patients in South Africa. Journal of Psychology in Africa, 11, 165–185.

Sternberg, R. J. (2001, June). Cultural approaches to intellectual and social competencies. Paper presented at the Annual Convention of the American Psychological Society, Toronto, Canada.

Cook, D. A., & Wiley, C. Y. (2000). Psychotherapy with members of the African American churches and spiritual traditions. In P. S. Richards & A. E. Bergin (Ed.), Handbook of psychotherapy and religiosity diversity (pp. 369–396). Washington DC: American Psychological Association.

Tables: Each table, numbered with Arabic numerals in the order in which they are to appear, must be on a separate sheet of paper with the table number and an appropriate stand-alone caption. Tables may include up to five horizontal lines but no vertical lines. Figures: High quality originals must be provided. They must be prepared separately on white A4 paper. Figures must not repeat data presented in the text or tables. Figures should be planned to appear with a maximum final width of either 80mm or 175mm. Lettering must be in Arial. Complicated symbols or patterns must be avoided. Graphs and histograms should preferably be two-dimensional and scale marks (turning inwards) provided. All lines (including boxes) should be black, but not too thick and heavy. Line artwork (including drawings and maps) must be high-quality laser output (not photocopies). Photographs should be excellent quality on glossy paper, with clear details and sufficient contrast. In addition to the print versions, illustrations, including all graphs and chemical formulae, must be submitted in electronic format, e.g. tif or eps, with each figure saved as a separate file (at least 1 200dpi).

The reprints will be available in PDF format and may be downloaded from the NISC website for a period of three months after the date of notification. Corresponding authors will receive notification via email when reprints are available for download. The Journal does not place restriction on manuscript length but attention is drawn to the fact that page charges, of R150 for South African contributors and US$30 for non-African contributors, are currently levied. There is an extra charge for colour plates.

Instructions to authors are available at: http://www.elliottfitzpatrick.com

4.2. Manuscript title, authors and addresses

Validation of the Teacher Stress Inventory (TSI) in a South African context: The SABPA Study

Authors and addresses

Susanna M. Boshoff, Johan C. Potgieter, Susanna M. Ellis* and Leoné Malan**

School for Psychosocial Behavioural Sciences, North-West University (Potchefstroom Campus), South Africa.

** Statistical Consultation Services, North-West University (Potchefstroom Campus), South Africa.*

*** Hypertension in Africa Research Team (HART), School for Physiology, Nutrition and Consumer Science, Faculty of Health Sciences, North-West University (Potchefstroom Campus), South Africa.*

Johan C. Potgieter *

Department of Psychology

School for Psychosocial and Behavioural Sciences

North-West University, Potchefstroom Campus

Private Bag X6001

Potchefstroom

2520

South Africa

E-mail: johan.potgieter@nwu.ac.za

* To whom correspondence should be addressed.

Abstract

Validation of the Teacher Stress Inventory (TSI) in a South African context: The SABPA study

Keywords:

Teacher Stress Inventory (TSI), validation, reliability, validity, South African context, stress, psychological well-being

The aim of this study was to validate the Teacher Stress Inventory (TSI) for use in a South African context. A cross-sectional survey design which formed part of the Sympathetic Activity and Ambulatory Blood pressure in Africans (SAPBA) study included urban Caucasian (n=209) and African (n=200) educators subsiding in the North-West Province of South Africa. The TSI, the General Health Questionnaire (GHQ) and the Mental Health Continuum-Short Form (MHC-SF) were administered to all participants as well as physiological measurements of stress which were taken under controlled circumstances. Statistical analysis yielded a two-factor model, with satisfactory reliability indices for both extracted factors, namely (1) *General circumstance related stress* and (2) *Learner related stress*. These factors proved to be reliable sub-constructs and compared satisfactory with the five factors initially identified in US samples. Criterion-related validity was found to be satisfactory when correlating the TSI with other measures of psychological and physiological health. It was concluded that the TSI can be considered a useful, brief self-report questionnaire for the assessment of teacher stress in this cohort of South African teachers.

Validation of the Teacher Stress Inventory (TSI) in a South African context: The SABPA Study

The stress associated with the teaching profession is a well-known phenomenon, and has received increasing recognition and research attention in recent years (e.g., Brown, Howcroft & Jacobs, 2010; Chaplain, 2008; Ngidi & Sibaya, 2002; Olivier & Venter, 2003; Schwarzen & Hallum, 2008; Sharplin, O'Neill & Chapman, 2011; Vandeyar, 2005). In fact, teaching has been identified as one of the most stressful professions in both national (Eloff, Engelbrecht, Oswald & Swart, 2003; Ngidi & Sibaya, 2002; Olivier & Venter, 2003; Williams, 2003) and international research (Beck & Garguilo, 2001; Billingsley, 2004; Naring, Briet & Brouwers, 2006; Mearns & Cain, 2003; Vandeyar, 2005).

Existing literature offers several definitions for the concept of stress. Generally these definitions refer to the complex and multidimensional perceptions and responses of humans trying to adapt to the challenges of everyday life. Stress is often defined as a condition or feeling experienced when a person perceives that emotional and physical demands of the environment exceed the personal and social resources the individual is able to mobilise (Sarafino, 2008). According to Cox (1978), stress is typically defined in terms of (i) the external environmental stimulus characteristics; (ii) the individuals' emotional states; or (iii) an interaction variable emphasizing the relationship between individuals and their environments. Researchers acknowledge that stress may be experienced either positively, defined as 'eustress', or negatively, defined as 'distress' (Mashele, van Rooyen, Malan & Potgieter, 2010; Selye, 1975). 'Eustress' refers to an adaptive response that promotes the activation of internal resources to meet environmental and emotional demands and optimize goal achievement (Selye, 1975). 'Distress', however, is evident when the environmental and emotional demands of a situation exceed the individual's adaptive resources and the person

can, therefore, not cope or adapt to persistent stress (Selye, 1975). In this study, the term ‘psychological distress’ will be used to refer to persistent stress that is not resolved through coping or adaptation (cf. Selye, 1975), and will be explored further in the specific context of teacher stress.

Within the context of teaching, Eloff et al. (2003) described the stress that teachers experience as a complex process involving an interaction between the teacher and the environment. More specifically, Kyriacou (1987) defined teacher stress as a condition of negative affect, such as frustration and anxiety, that results from aspects of the job, typically referred to as ‘stressors’, that are perceived by teachers as a threat to their psychological or physical well-being. Kyriacou and Sutcliffe (1978) made an explicit distinction between stressors that are mainly physical, such as many pupils in the classroom, and those which are essentially psychological, such as poor relationships with colleagues.

Sources of stress identified in the literature include among others, unsatisfactory working conditions, workload, pupil behaviour and attitudes, lack of promotional prospects and poor colleague relationships (Travers & Cooper, 1996). Recent studies done within the South African teaching context (Ferreira, 2008; Lund & Fisher, 2006; Møller, 2007) reported various challenges that add to the stressors South Africans need to overcome in order to maintain psychological well-being. These factors included historical and socio-economic disparities (Møller, 2007), the challenges of coping with HIV/AIDS, the downsizing of the number of teachers in schools (Olivier & Venter, 2003) and the fact that in many instances South African teachers have to cope with multi-racial classrooms, teach in their second language and work with individuals from other cultures whose backgrounds they do not fully understand (Vandeyar, 2005). Borg, Riding and Falzon (1991) further emphasised that, if not managed properly, stress can become a disabling problem that can affect teachers’ job satisfaction and have a negative impact on teacher’s overall effectiveness with learners.

Mental and physical illness is another common result of stress, which could further impair the working relationship between teachers and students as well as the general quality of teaching (Blase, 1982; Kyriacou, 1987).

It is thus evident that the level of teacher stress is an important co-determinant of teachers' psychological well-being and physical health. Symptoms of mental illness, like depression, correlate negatively with psychological well-being (Ryff & Keyes, 1995). Adults with complete mental health and high levels of psychological well-being are described as *flourishing* in life (Keyes, 2002). They generally have positive emotions and functions both psychologically and socially (Keyes, 2002). The effects of stress may negatively affect teacher well-being, causing teachers to feel frustrated, angry and depressed, and with incomplete mental health. Keyes (2002) would describe these teachers as *languishing* in life with low psychological well-being. Persistent psychosocial stress has further been associated with symptoms of physical illness. This may include increases in blood pressure (Malan et al., 2006), over activity of the sympathetic nervous system (SNS), exhibiting excessive cardiovascular risk factors, including hypertension (Malan et al., 2006) and metabolic syndrome (MS) risks (Rosmond, 2005).

In an attempt to measure the level of teacher stress, Boyle, Borg, Falzon and Baglioni (1995) formulated the 20 item Teacher Stress Inventory (TSI) measuring occupational stress in teachers. The TSI was derived from the 51 sources of teacher stress identified and discussed by Kyriacou and Suthcliff (1978). It consists of five factors as sources of teacher stress, namely workload, student misbehaviour, poor colleague relations, professional recognition, and time/resource difficulties (Boyle et al., 1995).

It is, however, a fact that the TSI, together with the majority of research on teacher stress, emanates from a Western context, which is often characterized as adhering to an individualistic worldview. Recent research has emphasized the direct impact of cultural and

contextual factors on both the construction and experience of psychological well-being (Temane & Wissing, 2008; Wissing & Temane, 2008; Wissing, Wissing, Du Toit & Temane, 2006) and thus possibly also the construction and experience of stress. The South African context, which can be characterized as being both collectivistic and individualistic (Wissing & Temane, 2008; Malan, Malan, Wissing & Seedat, 2008), adds various unique challenges to the maintenance of psychological well-being and the understanding of teacher stress. It can thus not be assumed that the same five factors of the TSI, as initially identified by Boyle et al. (1995), will be identified as sources of teacher stress in a South African context, or that the TSI in its entirety would be valid in a South African context. This paper aims at investigating the psychometric properties (i.e. factor structure, internal consistency reliability and construct validity) of the TSI as a measure of teacher stress in a multicultural sample of South African adults.

Clark and Watson (1995) and Paunonen and Ashton (1998) agreed that there are specific psychometric properties that need to be considered when determining the cross cultural applicability of scales. These properties included scale means (Paunonen & Ashton, 1998), variances (Paunonen & Ashton, 1998), reliability (Clark & Watson, 1995; Paunonen & Ashton, 1998), criterion related validity (Clark & Watson, 1995; Paunonen & Ashton, 1998) and factor structure (Clark & Watson, 1995; Paunonen & Ashton, 1998). If these psychometric properties compare satisfactorily to the five factors initially identified by Boyle et al. (1995) in the original culture in which the test was developed, the scale would likely be applicable and valid in the South African context. However, when these properties are different, caution should be used when interpreting the results, and various ways in which such differences may have come about, should be considered (Paunonen & Ashton, 1998).

The question thus arises whether the TSI would be reliable and valid in a South African context, where the term “South African context” refers to a population that includes

both Caucasian South Africans, who typically exhibit a more individualistic orientation, as well as African South Africans, who exhibit a more collectivistic cultural orientation.

This paper will provide results regarding the psychometric properties of the TSI and in doing so, enable the possible development of a much needed, more culture sensitive inventory for the measurement of teacher stress as it manifests in the South African context. These results will further allow the impact of different sources of teacher stress to be determined and compared within both culture groups, which will aim at influencing public policy with regard to the education system in South Africa and contributing to the psychological well-being of South African teachers. The specific aim of this study is thus to validate the TSI for use in a South African context.

Method

Design

This sub-study forms part of the Sympathetic Activity and Ambulatory Blood pressure in Africans (SAPBA) study in which data were collected through the use of a target population comparative design. For the purposes of this paper, quantitative data were collected through a cross-sectional design with a purposively selected study population.

Procedure

Data-collection was completed within a period of 50 days for each group, to avoid the possible effects of seasonal change on certain physiological measures. During this period data were gathered from a maximum of four participants per day. On the first day of data gathering each participant was fitted with a Cardiotens® apparatus (Meditech CE0120, Budapest, Hungary) at the schools where they are employed, which measured 24 hour ambulatory blood pressure with 30 minute intervals during the day and 60 minute intervals during the night. Participants were transported to the Metabolic Unit research facility of the

North-West University after work, where they were welcomed and familiarized with the experimental setup before they completed the physiological and psychosocial leg of the research. During their stay at the unit, data gathering took place in well-ventilated rooms at a comfortable temperature and relaxing environment.

The battery of psychosocial tests was administered shortly after the participants' arrival at the metabolic unit. One part of the battery was completed before dinner and the last part after dinner in order to avoid the effects of participant fatigue. The sequence of completing the questionnaires was also organised to lessen the effect of fatigue and drowsiness. Psychological data were gathered by fieldworkers with post-graduate training in psychology, and under the supervision of registered psychologists.

After completion of the total test battery, which took approximately 90 minutes, participants relaxed and went to bed at approximately 22:00. They fasted overnight for the collection of physiological measurements the following day. After completion of the measurements the following morning, participants received breakfast, and were transported back to their schools. Feedback on psychological data was given at a later date in the form of an information session followed by a workshop that focused on stress management.

Participants

The research sample consisted of 409 participants, subdivided into Caucasian and African subgroups of urbanized educators residing in the North-West Province. Participants were aged between 25 and 62 years. The African group consisted of 200 participants, of which 101 were male and 99 female. The Caucasian group consisted of 209 participants, of which 101 were male and 108 female. Exclusion criteria regarding the SABPA project consisted of the following: pregnancy, lactating, usage of alpha and beta-blockers or psychotropic substances, not been vaccinated in the previous 3 months and temperatures above 37° Celsius (Mashele et al., 2010).

Measures

The following measuring instruments were used for the purposes of this study.

The Teacher Stress Inventory (TSI; Boyle et al., 1995)

The TSI is a 20 item self-report scale that uses a five point Likert-type response format, ranging from no stress (0) to extreme stress (4), measuring the occupational stress in teachers (Boyle et al., 1995).

Boyle et al. (1995) derived the TSI from the 51 sources of stress identified by Kyriacou and Suthcliff (1978). Participants are requested to answer the question: "As a teacher, how great a source of stress are these factors to you?" Participants are then presented with a list of potential work-related stressors, and the response options are *No stress, Mild stress, Moderate stress, Much stress,* and *Extreme stress*. Factor analysis conducted by Boyle et al. (1995) produced five subscales that included workload, student misbehaviour, poor colleague relations, professional recognition, and time/resource difficulties. This scale will be validated in a South African context.

The General Health Questionnaire (GHQ; Goldberg & Hillier, 1979)

The GHQ is a 28 item self-report scale aimed at detecting common symptoms which are encountered in the various syndromes of mental disorders and will thus differentiate individuals with psychopathology as a general class from those who are considered to be normal (Goldberg & Hillier, 1979). In this study, the 'GHQ method' (Goldberg & Hillier, 1979) of scoring was implemented, i.e., responses were scored 0-0-1-1, producing a potential minimum scale score of 0 and a maximum of 28. In addition to the total score, sub-scale scores are obtained for Somatic Symptoms (SS), Anxiety and Insomnia (AS), Social Dysfunction (SD) and Severe Depression (DS). Goldberg and Hillier (1979) report internal consistency coefficients for subscales ranging from 0.69 to 0.90. Good reliability and validity indices for the GHQ across various cultures were reported by Goldberg et al. (1997). Wissing

and van Eeden (2002) further indicate similar reliabilities in a South African sample. Wissing et al. (1999) reported acceptable reliability and validity indices for use in Setswana-speaking adults in the North-West Province of South Africa. Cronbach alpha reliability indices in the current study were 0.74 (SS), 0.74 (AS), 0.55 (SD), 0.75 (DS) and 0.89 (total scale). The GHQ will be correlated with the TSI to determine criterion-related validity.

The Mental Health Continuum - Short Form (MHC-SF; Keyes, 2005)

The MHC-SF is a 14 item self-report questionnaire that employs a six point Likert-type response format, ranging from never (0) to every day (6), measuring positive mental health (Keyes, 2005). The MHC-SF specifically measures the degree of (1) emotional well-being (EWB) as defined in terms of positive affect and satisfaction with life; (2) social well-being (SWB) as described by Keyes's (1998) model of SWB, derived from one item on each of the facets of social acceptance, social actualization, social contribution, social coherence and social integration; and (3) psychological well-being (PWB) as described by Ryff's (1989) model of PWB which includes one item on each of the dimensions of autonomy, environmental mastery, personal growth, positive relations with others, purpose in life and self-acceptance. Factor analysis revealed that the MHC-SF replicated the three-factor structure found in the US samples. Furthermore, the internal reliability of the overall MHC-SF Scale in a random sample of Setswana-speaking adults in the North-West Province of South Africa was 0.74 (Keyes et al., 2008). The MHC-SF will be correlated with the TSI to determine criterion-related validity.

Physiological measures of stress

All anthropometric measurements were standardised and taken in triplicate to the nearest 0.1 cm by registered biokineticists. Height was measured by making use of a stadiometer and weight was measured to the nearest 0.1 kg using a Krups scale with the participants wearing minimal clothing. These measurements were used for the calculation of

body mass index (body mass/height^2). Physical activity was measured using an ActicalR accelerometer (Montreal, Quebec).

Cardiovascular measurements made use of the Cardiotens apparatus (Meditech CE0120®) for the 24-hour ambulatory blood pressure measurement, for both systolic blood pressure (SBP) and diastolic blood pressure (DBP) and a 12-lead electrocardiogram (ECG; NOVRAV PC 1200) was applied to obtain six resting cardiac cycles. Non-invasive rested continuous arterial blood pressure recordings were obtained using the Finometer device (Finapres Medical Systems, Amsterdam, Netherlands). The Fast Modelflo computer program was used to analyze the results to provide mean arterial pressure (MAP), total peripheral resistance (TPR), and heart rate (HR), systolic (SBP) and diastolic blood pressure (DBP). A finger prick for fasting blood glucose was done. These physiological stress related measures (i.e. blood pressure and blood glucose levels) will also be correlated with the TSI to determine criterion-related validity.

Ethical Consideration

Ethical approval was obtained from the Ethics Committee of the North-West University, Potchefstroom Campus (NWU-00036-07-S6). Approval date: 12 November 2007. Participants were given participant numbers as to conceal their identity and to ensure confidentiality. After being informed of all aspects of the research and given the opportunity to ask questions, consent forms were signed by all participants for participation in both the physiological and psychological parts of the research. All physiological data were gathered through adequately trained practitioners. All psychological data were gathered by fieldworkers with post-graduate training in psychology, and under the supervision of registered psychologists. Participants received feedback on psychological results in the form of an information session followed by a workshop focused on stress management.

Data analysis

The SPSS (SPSS Inc., 2009) was used to conduct both descriptive and inferential statistics. According to Clark and Watson (1995) and Paunonen and Ashton (1998), there are specific psychometric properties that need to be considered when determining the cross cultural applicability of scales. These properties include scale means (Paunonen & Ashton, 1998), variances (Paunonen & Ashton, 1998), reliability (Clark & Watson, 1995; Paunonen & Ashton, 1998), criterion related validity (Clark & Watson, 1995; Paunonen & Ashton, 1998) and factor structure (Clark & Watson, 1995; Paunonen & Ashton, 1998). To this extent, means, standard deviations and reliability coefficients such as Cronbach's coefficient alphas, mean inter-item and item-total correlations were computed as indicators of internal consistency and homogeneity of the instrument under discussion. Secondly, the factor structure of the TSI was examined by conducting both confirmatory and exploratory factor analyses of the data and relevant indices of fit, such as Chi-square statistic, Root Mean Square Error of Approximation (RMSEA) and Comparative Fit Index (CFI). Thirdly, criterion-related validity was determined by correlating the TSI with the GHQ, the MHC-SF and physiological determinants of stress.

Results

Descriptive Statistics

Descriptive statistics and the t-test p-values for the difference between African and Caucasian groups are reported in Table 1. According to Ellis and Steyn (2003), statistical significance does not necessarily imply that result will be of significance in practice. They ascribe this to the fact that tests have a tendency to yield small *p*-values, which indicate significance, as the sizes of the data sets increase. Ellis and Steyn (2003) stated that practical significance can be understood as a large enough difference to have an effect in practice. A natural way to comment on practical significance is to use the standardised difference

between the means of two populations, i.e. the difference between the two means divided by the estimate for standard deviation, referred to as Cohen's *d*-value (Ellis & Steyn, 2003). Interpretation of effect sizes can be done according to the following guidelines (a) small effect: d=0.2, (b) medium effect: d=0.5 and (c) large effect: d=0.8 (Ellis & Steyn, 2003). For the purpose of this study, data with *d*-values of approximately 0.5 and larger will be considered as practically significant as this is an expected size of an effect in human sciences (Steyn & Ellis, 2009).

As indicated by Table 1, significant differences between the African and Caucasian groups on indices of psychological health were evident. The groups differed practically significantly with regard to the TSI total scale, measuring occupational stress in teachers, the GHQ total scale and all its subscales, measuring syndromes of mental disorders, as well as the MHC-Emotional well-being subscale, where the MHC-SF is a measure of positive mental health. With regard to the GHQ and its subscales and the TSI total scale, values seem to be higher for the African group than for the Caucasian group. This is in line with the observation that significantly lower levels of emotional well-being are present in the African group.

Practically significant differences between the scores of the African and Caucasian groups on indices of physiological health were also evident. The African group showed significantly higher body mass indexes, Gamma-glutamyl transferase (GGT) levels, which is a liver enzyme indicating hepatic dysfunction which might be associated with alcohol use when elevated, and generally higher levels of blood pressure when compared to the Caucasian group. The Caucasian group showed higher levels of physical activity than the African group. The African group were thus more obese, less active, consumed more alcohol and had higher blood pressure than the Caucasian group.

<Insert Table 1 approximately here>

Table 2 summarizes the descriptive statistics of the TSI. The mean scores for the African group were higher than for Caucasian group on all items. The highest item means for the African group yielded values of above 4.00 (items 7,8,9,10,15 and 16), while the highest item mean for the Caucasian group was 3.75 (item 8). The lowest item means for the African group was for items 6 and 13, which yielded values of 3.22 and 3.18, while the lowest item means for the Caucasian group was for items 6 and 16, and yielded values of 2.84 and 2.86 respectively. The largest deviation from normality, as indicated by kurtosis and skewness, was found in the African group for items 6, 15, 16, 19 and 20. The kurtosis for the African group yielded values of between -0.95 and 2.68, and all items in this group were negatively skewed, yielding values between -1.78 and -0.21. Within the Caucasian group kurtosis yielded values that ranged between -1.04 and -0.14, and most items, excluding item 6, 7 and 16, were negatively skewed, yielding values between -0.67 and 0.18, indicating smaller deviations from normality.

<Insert Table 2 approximately here>

Exploratory Factor analysis

Exploratory factor analysis and item analysis were conducted separately for the different ethnic groups. Items 1, 3 and 6 did not load significantly on any of the extracted factors, with double loadings on more than one factor for both ethnic groups. The possible reasons and implication hereof will receive further attention during the discussion of the results. Items 1, 3 and 6 were omitted from further factor analysis.

A principal component analysis with oblimin rotation and Kaiser Normalization was subsequently conducted on the total group. This analysis revealed two factors, as extracted according to Kaiser’s criteria, which explained 54.6% of the total variance. The results of the

factor analysis are provided in Table 3. The same factor structure was confirmed by both the principal axis and maximum likelihood factor analysis.

<Insert Table 3 approximately here>

Items with a double loading, namely items 12 and 18, were classified according to best interpretability. The two extracted factors lent themselves to theoretical interpretation, and can be described as follows: (1) *General circumstance related stress* consisting of ten items (α = 0.89), and (2) *Learner related stress* consisting of seven items (α = 0.87). Elaboration on the content of this two-factor model will follow in the discussion.

In addition to the theoretical interpretability of these factors, they could also be considered statistically robust. As a sufficient amount of variance is explained by these factors, and communalities varied between 0.41 and 0.65, the results of the factor analysis can be considered meaningful. These results support the construct validity of the TSI.

A correlation of 0.53 exists between the two factors, which, according to the guideline values proposed by Steyn and Ellis (2009), is indicative of a strong relationship, especially within the human sciences.

Reliability

The reliability indices and mean inter-item correlations for the total group as well as for each ethnic group are provided in Table 4.

According to Nunnally and Bernstein (1994), Cronbach's coefficient alpha estimates the reliability of a scale by determining the internal consistency, or the average correlation between interrelated items within that test. A modest reliability of 0.7 could be regarded as sufficient during the early stages of scale validation, but a Cronbach's coefficient alpha of above 0.7 is desired (Nunnally & Bernstein, 1994). As indicated in Table 4, the Cronbach

alpha indices for both factors in the total participant group and the two subgroups were well above 0.7, indicating the reliability of the instrument.

The mean inter-item correlation also serves as an indicator of internal consistency (Clark & Watson, 1995). Mean inter-item correlations for the study population and subgroups yielded values ranging from 0.35 to 0.52. With all items yielding values that fall within the desired range of 0.15 to 0.55 as indicated by Clark and Watson (1995), it can be concluded that the internal consistency of the TSI in this context is satisfactory.

<Insert Table 4 approximately here>

The correlation of all items contributing to a specific factor with its total score was also larger than 0.3, indicating that each item contributes significantly to its relevant subscale. The Cronbach alpha values if items were deleted also show that all items contribute meaningfully to their respective factors, as internal consistency decreases when individual items are removed. These results are presented in Table 5.

<Insert Table 5 approximately here>

Confirmatory Factor Analysis

Results of the confirmatory factor analysis performed for the two factor model are reported in Table 3.

Because the Chi-square test is viewed by some as an overly strict indicator of model fit, given its power to detect even trivial deviations from the proposed model (Hancock & Mueller, 2010), Mueller (1996) suggested that the Chi-square test statistic be divided by degrees of freedom. The two-factor model yielded a Minimum Sample Discrepancy divided by Degrees of Freedom (CMIN/DF) value of 4.463. Interpretation of the size of this value depends to a large extent on the viewpoint of the investigator, but in practice some interpret

ratios as high as 3, 4 or even 5 as still representing a good model fit (Mueller, 1996). It is however considered good practice to report multiple fit indices, typically from three broad classes (Hancock & Mueller, 2010). Mueller (1996) described values of above 0.9 as indicative of a good overall fit for a Comparative Fit Index. A relatively acceptable Comparative Fit Index (CFI) of 0.87 was found for the two-factor model while a Root Mean Square Error of Approximation (RMSEA) value of 0.09 with a 90% confidence interval of [0.08; 0.10] was obtained. Blunch (2008) stated that models with RMSEA values of 0.10 and larger should not be accepted.

All estimated regression weights, means, variances and correlations between the two factors were statistically significant and interpretable. The confirmatory factor analysis estimated the correlation between the two factors as 0.79 which may indicate that one factor would have been sufficient. A confirmatory factor analysis was therefore done for a one-factor model. Results indicated a less acceptable fit than the original two-factor model with respect to all the fit indices (Table 6). Thus, despite the high correlation between the two factors, the reported indices of fit indicated the two factor model to be the model of choice.

Confirmatory factor analysis was also performed to test whether the two factor model is the same in structure for the African and Caucasian groups, as well as to test if the regression weights are the same across these groups. The CMIN/DF of 2.8 indicated that the difference between the SEM fit of the Caucasian and African groups for the two-factor model was not significant. This was also supported by a CFI of 0.857 and a RMSEA of 0.067 [0,061; 0.073]. It could thus be accepted that the factor structure (i.e. the two factor model) for the African and Caucasian group did not differ in practice.

The goodness of fit indices for the three different structural equation models is reported in Table 6.

<Insert Table 6 approximately here>

Criterion-related validity with psychometric measures of stress

Criterion-related validity was determined with the calculation of correlations between the TSI total score as well as its two sub-scales and indicators of psychological health, namely the GHQ and its subscales as well as the MHC-SF and its subscales. The Spearman Rank Order correlation was used as a measure of this relationship, to account for deviations in normality in raw data. The results are reported in Table 7.

<Insert Table 7 approximately here>

As indicated in Table 7, the TSI-total score and that of its sub-constructs showed statistically significant correlations of 0.2 or larger with the GHQ and all its subscales within the total group, thus indicating a medium practical significance. The Caucasian group's TSI-total score and that of its sub-constructs showed statistically and practically significant correlations with the GHQ, with all but two sub-constructs, namely Social Dysfunction (SD) and Severe Depression (DS). The TSI-total score and that of its sub-constructs for the African group showed significant correlations with the GHQ sub-construct, Anxiety and Insomnia (AS), as well as the GHQ-total score. In the Caucasian group the TSI-total score and that of its sub-constructs showed significant correlations of 0.2 or larger with the MHC-SF for most of its sub-constructs indicating a medium practical significance. The total group's TSI-total score and that of its sub-constructs showed statistically and practically significant correlations with the MHC-SF Emotional well-being (EWB) sub-construct. However, in the African group, correlations between the TSI-total score and that of its sub-constructs and the MHC-SF proved not to be of any significance.

Criterion-related validity with physiological indicators of stress

Table 8 depicts the criterion-related validity of the TSI and its sub constructs as indicated by its correlations with physiological indicators of stress. The Spearman Rank Order correlation was again used as a measure of the relationship to account for deviations in normality in raw data.

<Insert Table 8 approximately here>

In the total study group a number of small to medium correlations were evident between the TSI total and subscale scores with body mass index (BMI), the liver enzyme, gamma-glutamyl transferase (GGT), and blood glucose levels. As further indicated by Table 8, no significant correlations were visible within either the African or the Caucasian subgroups. The possible reasons and implication hereof will receive further attention during the discussion of the results.

Discussion

The aim of this study was to validate the TSI for use in a South African context by assessing psychometric properties such as scale means (Paunonen & Ashton, 1998), variances (Paunonen & Ashton, 1998), reliability (Clark & Watson, 1995; Paunonen & Ashton, 1998), criterion related validity (Clark & Watson, 1995; Paunonen & Ashton, 1998) and factor structure (Clark & Watson, 1995; Paunonen & Ashton, 1998).

Although the overall homogeneity of the TSI proved satisfactory, results at item-level revealed some elements that warrant further discussion. The fact that most items within both the African and Caucasian groups were negatively skewed, indicate that most individuals in these groups reported experiencing high levels of occupational stress. This is in accord with the findings of other Southern African studies such as Oliver and Venter (2003), who reported that most of the secondary school teachers in the George area reported high levels of

stress, and Mwamwenda, Monyooe and Glencross (1997), who reported that more than 90% of African secondary school teachers in the Transkei area reported significant levels of stress. This may thus be a true reflection of this group of teachers' overall high levels of occupational stress. In comparison, item means for the African group was substantially higher than that of the Caucasian group, and ranged between the scores of 3 ("moderate stress") and 4 ("much stress"). Although it is a rather common occurrence with measures using a five point Likert-type design for individuals to be more prone to endorse response options that fall in the middle of the continuum (i.e. exclude the options "extreme stress" and "no stress"), this seems not to be the case with the African group. These individuals were more prone to endorse the response options "much stress" or "extreme stress" than to use the terms "moderate stress", "mild stress" and "no stress" when describing their stress levels. This may well be a true reflection of the African group's higher levels of occupational stress, as it seems to be in accord with observations of Antonovsky (1979) and Hobfoll and Lilly (1993) who indicated that common resistance resources are lower in historically black communities, and therefore individuals from these communities are generally prone to higher levels of stress. However, the possibility also exists that the African group's higher self-reported stress levels is an artefact of the more collectivistic cultural orientation of the African group, which would make them more prone to acquiesce, or respond in a manner they deem socially acceptable. The disadvantages of using self-report instruments, like the TSI, in collectivistic cultural contexts thus warrants further research attention.

Exploratory factor analysis and item analysis conducted separately on the different ethnic groups showed that items 1, 3 and 6 did not load significantly on any of the extracted factors, and produced double loadings on more than one factor within both ethnic groups. This could be ascribed to various possible reasons. When the content of these items was reviewed, it became apparent that these items did not fit with either of the indicated factors.

Further, the formulation of item 3 *("lack of recognition for good teaching")* is particularly ambiguous and unclear, which may have negatively influenced participant's responses by making double interpretation possible. When the content of item 1 *("poor career structure / poor promotional prospects")* was reviewed, it became evident that the cross-loading of this item may be due to the discrepancy between the literacy of some participants and the level of vocabulary used in this item. Both item 1 and item 6 *("too short rest periods / mid-morning break, mid-day break")* have a low level of applicability in terms of the socio-economic and cultural context of some participants. This may have further contributed to the cross-loading of these items by negatively influencing participant's responses through unclear understanding and double interpretation. Item 6 further produced the lowest item means for the African group (m = 3.22) as well as for the Caucasian group (m = 2.84), and was one of the items with the largest deviation from normality in the African group. Items 1, 3 and 6 were subsequently omitted from further factor analysis and careful reformulation or possible replacement is advised for the further refinement of the TSI.

Exploratory factor analysis which was conducted on the total group yielded two robust factors which were previously reported. The content of these two factors can be described as follows: Factor 1 (*General circumstance related stress*) contains items that constitute stress related to a variety of general circumstances within the teaching environment. Item 17 (*"Attitudes and behaviour of other teachers"*), as well as Item 16 (*"Shortage of equipment and poor facilities"*), serve as good examples of the items included in this factor. Factor 2 (*Learner related stress*) contains items that constitute stress more specifically related to learners, and especially the experience and management of poor learner attitude and misbehaviour. Item 5 (*"Noisy learners"*), as well as Item 11 (*"Maintaining class discipline"*), serve as good examples of the items included in this factor.

When comparing these two factor groupings with the five-factor model proposed by Boyle et al. (1995), some overlapping elements were revealed. As an example, there was an apparent similarity between Factor 2 (*Learner related stress)* in the current study, and what Boyle et al. (1995) described as Factor 3 (*Student misbehaviour).* Despite this degree of overlap, it was apparent that factor groupings as described by Boyle et al. (1995) had slightly different emphases than the factor groupings in the current study. Boyle et al. (1995) identified *workload, poor colleague relations, professional recognition,* and *time/recourse difficulties* as four different factors, where all except one factor contained only 2 items each. In this study, these aspects grouped together in a single factor (*General circumstance related stress*), and collectively represented aspects of occupational stress related to the working environment.

Overall, the results of the factor analysis proved to be meaningful as the two extracted factors are theoretically interpretable, explaining a sufficient amount of variance and yielded satisfactory communalities. Reliability indices for both factors in the total participant group and the two subgroups were satisfactory, and together with the mean inter-item correlations indicated adequate internal consistency of the TSI.

Criterion-related validity was determined by correlating the TSI-total score and the two extracted factors with psychological and physiological measures that have a well-established association with stress. In terms of the two factors retained in factor analysis, the TSI displayed sound criterion-related validity by correlating significantly, and in expected directions with measures of psychological well-being and symptoms of mental illness within the total group. However, in the African group, correlations between the TSI-total score and that of its sub-constructs and the MHC-SF proved not to be of any significance. This lack of association was also evident when the TSI was correlated with physiological measures of stress. The low and variable correlations that were found within the African group could

possibly be explained by the restricted range of stress-data found within this sub-group. From the descriptive statistics for the study population, it is evident that the African group as a whole experienced ‘much’ to ‘extreme’ stress, with mean values on the TSI that was also substantially higher than the levels of stress reported by the Caucasian group. This lack of spread within the stress-data might have had a negative influence on the visibility of the correlations between the measured constructs, possibly resulting in low and variable correlations that were observed. This possible explanation is substantiated by the fact that limited but visible correlations with physiological data was observed in the total group, where the combined results of the Caucasian and African groups resulted in a larger spread within the data. It can thus be hypothesized that within a more heterogeneous study population, which would possibly have shown a less restricted range in stress-data, larger correlations between the TSI and physiological measures of stress might have been observed.

Despite the above results suggesting the reliability and validity of the TSI in the current study population, the question of whether the TSI is truly culture sensitive and applicable in the broader South African context requires further research attention. Descriptive statistics in this study clearly indicate significant differences between African and Caucasian South Africans on indices of psychological and physiological health. This could be explained by a number of possible factors. Firstly, it is known that the effects of stress on individuals and their functioning are multiple on both psychological and physiological levels. A possible shortcoming of the current study is that it did not explore the coping mechanisms of teachers from different cultural backgrounds that were involved in this study. In the absence of effective coping strategies, individuals may turn to negative coping behaviour, such as alcohol use (Oliver & Venter, 2003). This could not only contribute to stress, but could also have a negative influence on an individual’s physical health and psychological well-being.

Although the African group had significantly lower levels of emotional well-being, an interesting finding was that their general psychological well-being was comparable with, and in some instances higher, although not significantly so, than that of the Caucasian group. Wissing and van Eeden (2002) predicted that new socio-political dispensations that guarantee equality and equity in human rights would eventually bring about higher levels of psychological well-being in the historically disadvantaged groups. When evaluating racial and ethnic differences with regard to psychological well-being in the United States of America, Ryff, Keyes and Hughes (2003) reported that, black, relatively collectivistic individuals, in general reported higher levels of psychological well-being than more Westernized and relatively more individualistic individuals. It can be speculated from our results that the same trend exists within the African context, but more research in this regard is needed.

The prominent differences between the African and Caucasian groups in terms of their self-reported levels of stress and psychological well-being, is of great significance when evaluating the cross-cultural validity of the TSI. Peng, Nisbett and Wong (1997) noted that people from different cultural groups use different points of reference in their self-reports. For example, it may be that the Caucasian group evaluated themselves in comparison with other Caucasians, whereas the African group evaluated themselves with reference to other Africans. Heine, Lehman, Peng and Greenholtz (2002) term this the *reference-group effect.* Both these groups may likely have conflated what is true of their culture with what they assume to be the norm for teachers in general, thus projecting their subjective ways of thinking onto the rest of the teacher population (Heine et al., 2002). The fact that an important goal of cross-cultural validity is to explicitly assess the norms in different cultures (Clark & Watson, 1995; Paunonen & Ashton, 1998), undeniably renders the reference-group effect problematic (Heine et al., 2002). This is not an issue only for cultural comparisons, but

for any comparison of subjective Likert scale responses between groups of different cultures or referents (Heine et al., 2002). It can thus not be concluded with confidence that the cultural similarities, or differences in this case, are valid, or merely due to artefacts of the TSI as a self-report questionnaire.

Conclusion

In an attempt to contribute to the existing literature on teacher stress (e.g., Brown, Howcroft & Jacobs, 2010; Chaplain, 2008; Ngidi & Sibaya, 2002; Olivier & Venter, 2003; Schwarzen & Hallum, 2008; Sharplin, O'Neill & Chapman, 2011; Vandeyar, 2005), this study aimed at determining the validity of the TSI in a South African context.

From results obtained during the validation process, the following can be concluded with regards to the applicability of the TSI in a South-African context. The factor analysis proved to serve as a good testimony of the construct validity of the TSI. The two-factor model showed good comparison with the 5 factors initially identified by Boyle et al. (1995) and the reliability indices indicated good reliability of the instrument, allowing reliable conclusions to be drawn from the data. From results obtained during the analysis of criterion-related validity, it can be concluded that stress, as measured with the TSI, generally shows expected associations with measures of psychological well-being and mental illness within this multicultural sample of South African adults. However, users should remain cautious when using the TSI as direct predictor of psychological and physical stress until its validity and reliability has been ascertained within a more heterogeneous study population which is more representative of the diverse South African context. Should results be replicated, stress managing programmes aimed at enhancing teacher well-being would have to take the present findings into account in order to be successful. The factors identified in the present study as contributing to teacher stress suggests that teacher stress is primarily a direct function of

generally poor circumstances regarding the teaching situation, including workload, poor resources and poor colleague relationships, together with learner related stressors, such as student misbehaviour. Future studies could focus on determining the impact of these different sources of teacher stress. This could have important implications for public policy with regard to the management of teacher stress and mental health care.

In conclusion, the TSI proved to be a useful, brief self-report questionnaire for the assessment of occupational stress within this cohort of South African teachers. Further psychometric evaluation is however necessary before the TSI can be considered to be a valid instrument in the broad South African context.

Acknowledgements

An acknowledgement is hereby provided to the following persons or institutions that contributed to this research process:

- Prof. L. Malan who acted as principal investigator of the SABPA project.
- The contributions of the following SABPA team members: the anthropometric measurements done by biokineticists, supervised by Prof JH de Ridder, cardiovascular measurements supervised by cardiovascular physiologists, and the psychological data supervised by psychologists.
- This study was financially supported by the North-West University: AUTHER (African Unit for Transdisciplinary Health Research), and the National Research Foundation (NRF), Metabolic Syndrome Institute (France).
- The research participants who provided the information needed to compile this research

This manuscript is based on a mini-dissertation, requirement for a Magister Scientiae (Clinical Psychology) degree, by the first author, under supervision of the co-authors.

References

Antonovsky, A. (1979). *Health, stress and coping.* San Francisco: Jossey-Bass.

Beck, C.L., & Garguilo, R.M. (2001). Burnout in teachers of retarded and nonretarded children. *Journal of Educational Research, 76*, 169-173.

Billingsley, B.S. (2004). Special education teacher retention and attrition. *The Journal of Special Education, 20*, 39-55.

Blase, J.J. (1982). A social-psychological grounded theory of teacher stress and burnout. *Educational Administration Quarterly, 18*(4), 93-113.

Blunch, N.J. (2008). *Introduction to structural equation modelling using SPSS and AMOS*. London: Sage.

Borg, M.G., Riding, R.F., & Falzon, J.M. (1991). Stress in teaching: a study of occupational stress and its determinants, job satisfaction and career commitment among primary school teachers. *Educational Psychology, 11*, 59-75.

Boyle, G.J., Borg, M.G., Falzon, J.M., & Baglioni, A.J. (1995). A structural model of the dimensions of teacher stress. *The British Journal of Educational Psychology, 65*(1), 29-67.

Brown, O., Howcroft, G., & Jacobs, T. (2010). The coping orientation and resources of teachers educating learners with intellectual disabilities. *South African Journal of Psychology, 39*(4), 448-459.

Chaplain, R.P. (2008). Stress and psychological distress among trainee secondary teachers in England. *Educational Psychology, 28*, 195–209.

Clark, L.A., & Watson, D. (1995). Constructing validity: Basic issues in objective scale development. *Psychological Assessment, 7*(3), 309-319.

Cox, T. (1978). *Stress.* London: Macmillan.

Ellis, S.M., & Steyn, H.S. (2003). Practical significance (effect sizes) versus or in combination with statistical significance (p-values). *Management Dynamics*, *12*(4), 51-53.

Eloff, I., Engelbrecht, P., Oswald, M., & Swart, E. (2003). Including learners with intellectual disabilities: Stressful for teachers? *International Journal of Disability, Development and Education*, *50*, 293-308.

Ferreira, R. (2008). Culture at the heart of coping with HIV/AIDS. *Journal of Psychology in Africa*, *18*(1), 97-104.

Goldberg, D.P., Gater, R., Sartorius, N., Ustun, T.B., Piccinelli, N., Gureje, O., et al. (1997). The validity of two versions of the GHQ in the WHO study of mental illness in general health care. *Psychological Medicine*, *27*, 191-197.

Goldberg, D.P., & Hillier, V.F. (1979). A scaled version of the General Health Questionnaire. *Psychological Medicine*, *9*, 139-145.

Hancock, G.R., & Mueller, R.O. (2010). *The reviewer's guide to quantitative methods in the social sciences*. New York, NY: Routledge.

Heine, S.J., Lehman, D.R., Peng, K., & Greenholtz, J. (2002). What's wrong with cross-cultural comparisons of subjective likert scales?: The reference-group effect. *Journal of Personality and Social Psychology*, *82*(6), 903-918.

Hobfoll, S.E., & Lilly, R.S. (1993). Resource conservation as a strategy for community psychology. *Journal of Community Psychology*, *21*, 128-148.

Keyes, C.L.M. (1998). Social well-being. *Social Psychology Quarterly*, *61*, 121–140.

Keyes, C.L.M. (2002). The mental health continuum: From languishing to flourishing in life. *Journal of Health and Social Behaviour*, *43*(2), 207-222.

Keyes, C.L.M. (2005). The subjective well-being of America's youth: Toward a comprehensive assessment. *Adolescent and Family Health*, *4*, 3–11.

Keyes, C. L. M., Wissing, M., Potgieter, J.P., Temane, Q.M., Kruger, A., & van Rooy, S. (2008). Evaluation of the Mental Health Continuum–Short Form (MHC–SF) in Setswana-Speaking South Africans. *Clinical Psychology and Psychotherapy*, *15***,** 181–192.

Kyriacou, C. (1987). Teacher stress and burnout: an international review. *Educational Research*, *29*, 146-152.

Kyriacou, C., & Sutcliffe, J. (1978). Teacher stress: prevalence, sources and symptoms. *British Journal of Educational Psychology*. *48*, 159-167.

Lund, C., & Fisher, A.J. (2006). Norms for mental health services in South Africa. *Social Psychiatry & Psychiatric Epidemiology*, *41*, 587-594.

Malan, L., Malan, N.T., Wissing, M.P., & Seedat, Y.K. (2008). Coping with urbanization: A cardionmetabolic risk? The THUSA study. *Biological Psychology*, *79*(3), 323-328.

Malan, L., Schutte, A.E., Malan, N.T., Wissing, M.P., Vorster, H.H., Steyn, H.S., et al. (2006). Specific coping styles of Africans during urbanization: comparing cardiovascular responses and perception of health data. *Biological Psychology 72*(3), 305–310.

Mashele, N., van Rooyen, J.M., Malan, L., & Potgieter, J.C. (2010). Cardiovascular function and psychological distress in urbanised black South Africans: The SABPA study. *Cardiovascular Journal of Africa*, *21*(4), 206-211.

Mearns, J., & Cain, J.E. (2003). Relationship between teachers' occupational stress and their burnout and distress: Roles of coping and negative mood regulation expectancies. *Anxiety, Stress and Coping*, *16*(1), 71-82.

Møller, V. (2007). Quality of life in South Africa – The first ten years of democracy. *Social Indicators Research*, *81*(2), 181-202.

Mueller, R.O. (1996). *Basic principles of structural equation modeling: an introduction to LISREL and EQS.* New York, NY: Springer.

Mwamwenda, T.S., Monyooe, L.A., & Glencross, M.J. (1997). Stress of secondary school teachers in Transkei, South Africa. *Psychological Reports, 80*, 378-382.

Naring, G., Briet, M., & Brouwers, A. (2006). Beyond demand and control: Emotional labour and symptoms of burnout in teachers. *Work and stress, 20*(4), 303-315.

Ngidi, P.D., & Sibaya, P.T. (2002). Black teacher personality dimensions and work related stress factors. *South African Journal of Psychology, 32*(3), 7-15.

Nunnally, J.C., & Bernstein, I.H. (1994). *Psychometric theory* (3rd ed.). New York, NY: McGraw-Hill.

Olivier, M.A.J., & Venter, D.J.L. (2003). The extent and causes of stress in teachers in the George region. *South African Journal of Education, 23*(3), 168-192.

Paunonen, S.V., & Ashton, M.C. (1998). The structured assessment of personality across cultures. *Journal of Cross-cultural Psychology, 29*(1), 150-170.

Peng, K., Nisbett, R.E., & Wong, N.Y.C. (1997). Validity problems comparing values across cultures and possible solutions. *Psychological Methods, 2*, 329–344.

Rosmond, R. (2005). Role of stress in the pathogenesis of the metabolic syndrome. *Psychoneuroendocrinology, 30*, 1–10.

Ryff, C.D. (1989). Happiness is everything, or is it? Explorations on the meaning of psychological well-being. *Journal of Personality and Social Psychology, 57*, 1069-1081.

Ryff, C.D., & Keyes, C.L.M. (1995). The structure of psychological well-being revised. *Journal of Personality and Social Psychology, 69*(4), 719-727.

Ryff, C., Keyes, C.L.M., & Hughes, D. (2003). Status inequalities, perceived discrimination and eudaimonic well-being: Do the challenges of minority life hone purpose and growth? *Journal of Health and Social Behavior, 44*, 275-291.

Sarafino, E.P. (2008). *Health psychology: Biopsychosocial interactions* (4th ed.). New York, NY: Wiley.

Schwarzen, R., & Hallum, S. (2008). Perceived teacher self-efficacy as a predictor of job stress and burnout: Mediation analysis. *Applied Psychology: An International Review, 57*, 152-171.

Selye, H. (1975). Confusion and controversy in the stress field. *Journal of Human Stress, 1*, 37-44.

Sharplin, E., O'Neill, M., & Chapman, A. (2011). Coping strategies for adaptation to new teacher appointments: Intervention for retention. *Teaching and Teacher Education, 27*(11), 37-44.

SPSS Inc. (2009). PASW Statistics 18, Release Version 18.0.0. Chicago: Illinois. Retrieved March 20, 2011, form www.spss.com.

Steyn, H.S. Jr., & Ellis, S.M. (2009). Estimating an effect size in one-way multivariate analysis of variance (MANOVA). *Multivariate Behavioural Research, 44*,106-129.

Temane, Q.M., & Wissing, M.P. (2008). The role of personality factors in the dynamics of context and psychological well-being. *Journal of Psychology in Africa, 18*(1), 105-114.

Travers, C.J., & Cooper, C.L. (1996). *Teaching under pressure: stress in the teaching profession*. London: Routledge.

Vandeyar, S. (2005). Conflicting demands: Assessment practices in three South African primary schools undergoing desegregation. *The Ontario Institute for Studies in Education of the University of Toronto. Curriculum Inquiry, 35*(4), 461-481.

Williams, E.E. (2003). Teaching the mentally handicapped child: Challenges faced by teachers. Unpublished Master's dissertation, University of Port Elizabeth, Port Elizabeth.

Wissing, M.P., & Temane, Q.M. (2008). The structure of psychological well-being in cultural context: Towards a hierarchical model of psychological health. *Journal of Psychology in Africa*, *18*(1), 45-56.

Wissing, M.P., Thekiso, S., Stapelberg, R., van Quickelberge, L., Choabi, P., Moroeng, C., et al. (1999, July). The psychometric properties of scales measuring psychological well-being in an African group: The THUSA study. Paper presented at the Internation Africa Psychology Congress, Durban, South Africa.

Wissing, J.A.B., Wissing, M.P., Du Toit, M.M., & Temane, Q.M. (2006). Patterns of psychological well-being and satisfaction with life in a cultural context. In A. Delle Fave (Ed.), *Dimentions of well-being: Research and intervention* (pp. 14-33). Milano, Italy: Franco Angeli.

Wissing, M.P., & van Eeden, C. (2002). Empirical clarifications of the nature of psychological well-being. *South African Journal of Psychology*, *32*(1), 32-44.

Addenda

Table 1

Descriptive statistics of the study population and the t-test p-values for the differences between ethnic groups.

	African (n=200)		Caucasian (n=209)		t-test	
	M	SD	M	SD	Effect size	p-values
TSI_Total	77.66	12.86	66.00	15.56	0.75	<0.001
GHQ_AS	2.63	2.43	1.32	1.93	0.54	<0.001
GHQ_SD	2.01	2.12	0.82	1.46	0.56	<0.001
GHQ_DS	1.11	1.86	0.22	0.93	0.48	<0.001
GHQ_T	8.26	6.50	3.75	4.69	0.69	<0.001
MHC_EWB	10.14	3.01	11.63	2.28	0.50	<0.001
MHC_SWB	14.91	5.32	13.80	4.74	0.21	0.026
MHC_PWB	23.24	4.99	22.44	4.42	0.16	0.086
MHC_T	48.30	10.94	47.86	9.88	0.04	0.674
AGE (years)	44.28	8.01	44.92	10.86	0.06	0.494
BMI (kg/m^2)	30.13	7.01	27.60	5.94	0.36	<0.001
METS (kcal/d)	2680.87	793.69	3017.56	813.83	0.41	<0.001
GGT (μ/ℓ)	66.33	82.39	26.87	34.43	0.48	<0.001
NaF GLUCOSE (mmol/ℓ)	5.64	2.06	5.67	0.81	0.02	0.821
DBP (mmHg)	83.46	10.70	76.50	8.01	0.65	<0.001
SBP (mmHg)	133.19	16.18	124.00	12.06	0.57	<0.001

Note. M = Mean; SD = Standard Deviation; GHQ_SS = General Health Questionnaire Somatic Symptoms; GHQ_AS = GHQ Anxiety and Insomnia; GHQ_SD = GHQ Social Dysfunction; GHQ_DS = GHQ Severe Depression; GHQ_T = GHQ Total; MHC_EWB = Mental Health Continuum Emotional well-being; MHC_SWB = MHC Social well-being; MHC_PWB = MHC Psychological well-being; MHC_T = MHC Total; TSI_Total = Teacher Stress Inventory Total; BMI = Body Mass Index; METS = "Metabolic equivalent for task" / Physical activity; GGT = Gamma-glutamyl transferase; NaF GLUCOSE = Sodium fluoride glucose; DBP = Diastolic Ambulatory Blood Pressure and SBP = Systolic Ambulatory Blood Pressure.

Table 2

Descriptive statistics for the TSI

	African (n=200)				Caucasian (n=209)			
Item	M	SD	Skew	Kur	M	SD	Skew	Kur
TSI1	3.68	1.11	-0.70	0.00	3.21	1.10	-0.23	-0.49
TSI2	3.71	1.12	-0.69	-0.27	3.55	1.15	-0.42	-0.67
TSI3	3.88	1.07	-0.78	-0.05	3.27	1.14	-0.27	-0.69
TSI4	3.88	1.12	-0.87	0.08	3.55	0.96	-0.41	-0.14
TSI5	3.90	1.11	-0.77	-0.23	3.63	1.15	-0.53	-0.61
TSI6	3.22	1.26	-0.21	-0.95	2.86	1.19	0.06	-0.81
TSI7	4.37	0.81	-1.35	1.83	3.71	1.08	-0.67	-0.16
TSI8	4.52	0.82	-1.78	2.68	3.75	1.20	-0.57	-0.72
TSI9	4.27	0.91	-1.39	1.80	3.62	1.04	-0.52	-0.16
TSI10	4.37	0.91	-1.51	1.79	3.49	1.26	-0.56	-0.66
TSI11	3.56	1.20	-0.53	-0.60	3.20	1.17	-0.24	-0.79
TSI12	3.58	1.17	-0.44	-0.58	3.44	1.13	-0.31	-0.57
TSI13	3.18	1.27	-0.21	-0.95	2.92	1.14	-0.08	-0.76
TSI14	3.84	1.07	-0.56	-0.55	3.12	1.08	-0.09	-0.61
TSI15	4.12	1.00	-1.18	1.20	3.34	1.16	-0.22	-0.81
TSI16	4.42	0.83	-1.46	1.85	2.84	1.20	0.18	-0.88
TSI17	3.51	1.12	-0.27	-0.71	2.90	1.18	0.07	-0.79
TSI18	3.97	1.03	-0.60	-0.72	3.49	1.14	-0.44	-0.67
TSI19	3.84	1.16	-0.78	-0.29	3.05	1.14	-0.01	-0.82
TSI20	3.85	1.26	-0.82	-0.44	3.08	1.29	-0.13	-1.04

Note. TSI = Teacher Stress Inventory; M = Mean; SD = Standard deviation; Skew = Skewness; Kur = Kurtosis.

Table 3

Pattern Matrix of Exploratory Factor Analysis using the Principal Components Method of Factor Extraction, with Oblimin Rotation

Variable	Factor Loading	
	Factor 1	Factor 2
17. Attitudes and behavior of other teachers.	0.819	
19. Pressure from principal and education officials.	0.804	
16. Shortage of equipment and poor facilities.	0.801	
14. Ill-defined syllabuses (e.g. not detailed enough).	0.783	
15. Lack of time to spend with individual learners.	0.701	
20. Having extra learners because of absent teachers.	0.624	
13. Pressure from parents.	0.615	
8. Inadequate salary.	0.541	
9. Too much work to do.	0.540	
18. Learners' impolite behavior or cheek.	0.435	0.349
5. Noisy learners.		0.915
2. Difficult class.		0.835
11. Maintaining class discipline.		0.676
4. Responsibility for learners (e.g. exam success).		0.643
7. Learners' poor attitudes to work.		0.572
10. Having a large class (i.e. too many learners).		0.542
12. Administrative work (e.g. filling in forms).	0.352	0.383

Note. Values less than 0.35 are not displayed.

Table 4

Reliability Indices and Mean inter-item correlations for the study population and subgroups

	CA			MIIC		
	Total group	Caucasian	African	Total group	Caucasian	African
Factor 1: General	0.89	0.89	0.84	0.45	0.45	0.35
Factor 2: Learner	0.87	0.89	0.82	0.48	0.52	0.39

Note. Factor 1: General circumstances related to stress; Factor 2: Learner related stress; CA = Cronbach's Alpha and MIIC = Mean inter-item correlation.

Table 5

Item analysis of the TSI items

		African		Caucasian	
	Item	Item Total	CA ID	Item Total	CA ID
Factor 1: General	TSI12	0.44	0.84	0.66	0.88
	TSI13	0.68	0.81	0.60	0.88
	TSI14	0.68	0.81	0.67	0.88
	TSI15	0.64	0.82	0.70	0.87
	TSI16	0.53	0.83	0.63	0.88
	TSI17	0.41	0.84	0.57	0.88
	TSI20	0.57	0.82	0.57	0.88
	TSI19	0.62	0.82	0.70	0.87
	TSI8	0.40	0.84	0.56	0.88
	TSI9	0.44	0.84	0.65	0.88
Factor 2: Learner	TSI2	0.57	0.79	0.70	0.87
	TSI4	0.49	0.81	0.57	0.88
	TSI7	0.50	0.80	0.65	0.87
	TSI10	0.55	0.80	0.68	0.87
	TSI11	0.61	0.79	0.80	0.85
	TSI18	0.51	0.80	0.59	0.88
	TSI5	0.70	0.77	0.77	0.86

Note. Factor 1: General circumstances related to stress; Factor 2: Learner related stress; Item Total = Correlation between item and subscale total; CA ID = Cronbach's Alpha if item deleted.

Table 6

Goodness of fit indices for different structural equation models

Model	CMIN/DF	CFI	RMSEA [95% CI]
Two factor model	4.463	0.874	0.092 [0.084; 0.100]
One factor model	5.436	0.811	0.104 [0.098; 0.111]
Between African and Caucasian groups model	2.808	0.857	0.067 [0.061; 0.073]

Note. CMIN = Minimum Sample Discrepancy, DF = Degrees of Freedom, CFI = Comparative Fit Index, RMSEA = Root Mean Square Error of Approximation, CI = Confidence Interval.

Table 7

Criterion-related validity: Spearman correlation coefficients of the TSI components with other measure of psychological health

	Total Group (n = 409)								
	GHQ_SS	GHQ_AS	GHQ_SD	GHQ_DS	GHQ_T	MHC_EWB	MHC_SWB	MHC_PWB	MHC_T
TSI_Total	0.253**	0.313**	0.268**	0.237**	0.340**	-0.229**	-0.089	-0.055	0.313**
TSI_General	0.234**	0.289**	0.233**	0.245**	0.316**	-0.215**	-0.059	-0.026	-0.971*
TSI_Learner	0.240**	0.288**	0.258**	0.204**	0.319**	-0.185**	-0.101*	-0.080	-0.135**
	African Group (n = 200)								
	GHQ_SS	GHQ_AS	GHQ_SD	GHQ_DS	GHQ_T	MHC_EWB	MHC_SWB	MHC_PWB	MHC_T
TSI_Total	0.112	0.231**	0.181*	0.118	0.207**	-0.019	-0.003	-0.019	-0.012
TSI_General	0.087	0.203**	0.151*	0.11	0.178*	0.016	0.039	0.013	0.027
TSI_Learner	0.12	0.221**	0.174*	0.136	0.208**	-0.012	-0.06	-0.036	-0.041
	Caucasian Group (n = 209)								
	GHQ_SS	GHQ_AS	GHQ_SD	GHQ_DS	GHQ_T	MHC_EWB	MHC_SWB	MHC_PWB	MHC_T
TSI_Total	0.259**	0.262**	0.160*	0.147*	0.266**	-0.277**	-0.256**	-0.216**	-0.285**
TSI_General	0.213**	0.203**	0.074	0.135	0.192**	-0.235**	-0.226**	-0.149*	-0.236**
TSI_Learner	0.272**	0.279**	0.203**	0.152*	0.307**	-0.226**	-0.187**	-0.233**	-0.239**

Note. TSI_Total = Teacher Stress Inventory Total; TSI_General =TSI General Mean; TSI_Learner = TSI Learner Mean; GHQ_SS = General Health Questionnaire Somatic Symptoms; GHQ_AS = GHQ Anxiety and Insomnia; GHQ_SD = GHQ Social Dysfunction; GHQ_DS = GHQ Severe Depression; GHQ_T = GHQ Total; MHC_EWB = Mental Health Continuum Emotional well-being; MHC_SWB = MHC Social well-being; MHC_PWB = MHC Psychological well-being; MHC_T = MHC Total; ** = Correlation is significant at the 0.01 level (2-tailed); * = Correlation is significant at the 0.05 level (2-tailed).

Table 8

Criterion-related validity: Spearman correlation coefficients of the TSI components with other measure of physiological health

				Total Group (n = 409)			
	AGE	BMI	METS	GGT	NaF GLUCOSE	DBP	SBP
TSI_Total	0.03	0.18	-0.05	0.18	-0.17	0.13	0.14
TSI_General	0.02	0.21	-0.04	0.23	-0.14	0.16	0.16
TSI_Learner	0.05	0.13	-0.04	0.09	-0.15	0.09	0.10
				African Group (n = 200)			
	AGE	BMI	METS	GGT	NaF GLUCOSE	DBP	SBP
TSI_Total	0.14	0.19	0.11	-0.12	-0.14	-0.03	-0.02
TSI_General	0.14	0.22	0.13	-0.09	-0.09	-0.01	-0.01
TSI_Learner	0.11	0.15	0.07	-0.15	-0.15	-0.03	-0.01
				Caucasian Group (n = 209)			
	AGE	BMI	METS	GGT	NaF GLUCOSE	DBP	SBP
TSI_Total	-0.01	-0.02	-0.04	0.00	-0.06	0.03	0.05
TSI_General	-0.02	0.00	-0.01	0.03	-0.03	0.04	0.06
TSI_Learner	0.03	0.00	-0.02	0.00	-0.06	0.05	0.07

Note. TSI_Total = Teacher Stress Inventory Total Score; TSI_General = Teacher Stress Inventory General Mean; TSI_Learner = Teacher Stress Inventory Learner Mean; BMI = Body Mass Index; METS = “Metabolic equivalent for task” / Physical activity; GGT = Gamma-glutamyl transpeptidase; NaF GLUCOSE = Sodium fluoride glucose; DBP = Diastolic Ambulatory Blood Pressure and SBP = Systolic Ambulatory Blood Pressure.