

**UNIVERSITI SAINS MALAYSIA
GERAN PENYELIDIKAN UNIVERSITI PENYELIDIKAN
LAPORAN AKHIR**

**THE EFFECTIVENESS OF MEDICAL STUDENT WELL-
BEING WORKSHOP FOR STRESS MANAGEMENT OF
MEDICAL STUDENTS, SCHOOL OF MEDICAL SCIENCES,
USM**

PENYELIDIK

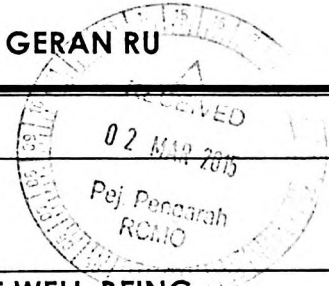
MUHAMAD SAIFUL BAHRI YUSOFF

PENYELIDIK BERSAMA

**ABDUL RAHMAN ESA
MOHD JAMIL YAACOB
AHMAD FUAD ABDUL RAHIM**

2015

SENARAI SEMAKAN UNTUK BUKU LAPORAN AKHIR GERAN RU



NAMA PENYELIDIK UTAMA	: MUHAMAD SAIFUL BAHRI YUSOFF
NAMA CO-RESEARCHER	: ABDUL RAHMAN ESA MOHD JAMIL YAACOB AHMAD FUAD ABDUL RAHIM
TAJUK GERAN	: THE EFFECTIVENESS OF MEDICAL STUDENT WELL-BEING WORKSHOP FOR STRESS MANAGEMENT OF MEDICAL STUDENTS, SCHOOL OF MEDICAL SCIENCES, UNIVERSITI SAINS MALAYSIA
NO.AKAUN	: 1001/PPSP/812086

SENARAI SEMAKAN SEMASA PENYERAHAN BUKU LAPORAN AKHIR
(Sila Tandakan (✓) Pada Kotak Yang Berkenaan)

NO.	PERKARA	ADA	TIADA
1.	Borang Laporan Akhir Projek Penyelidikan Geran RU	/	
2.	i) Salinan Menuskrip/Publication	/	
	ii) Salinan surat/email bukti penghantaran kepada mana-mana journal		
3.	Penyata Perbelanjaan (Financial Statement) (Sila dapatkan daripada Jabatan Bendahari)	/	
4.	Laporan Komprehensif (termasuk kertas persidangan atau seminar dan penerbitan saintifik hasil daripada projek ini)	/	
5.	Surat pemakluman penghantaran Laporan Akhir (Geran RU) ke Bhg. Penyelidikan	/	

Nota:

- * Sila buat 2 salinan buku laporan Akhir
- * No. 1-5 - Perlu dimasukkan dalam Buku Laporan Akhir
- * No.6 - Hantar terus Kepada Pn. Noor Adnie Bajuri (RCMO) hanya salinan sahaja kepada Bhg. R&D, PPSP

My doc/checklist borang2/sue





**UNIVERSITY RESEARCH GRANT
FINAL REPORT**
*Geran Penyelidikan Universiti
Laporan Akhir*

Please email a copy of this report to rcmo@usm.my
Sila emel salinan laporan ini ke rcmo@usm.my

A.	PARTICULARS OF RESEARCH / MAKLUMAT PENYELIDIKAN:
(i)	Title of Research: <i>Tajuk Penyelidikan:</i> THE EFFECTIVENESS OF MEDICAL STUDENT WELL-BEING WORKSHOP FOR STRESS MANAGEMENT OF MEDICAL STUDENTS, SCHOOL OF MEDICAL SCIENCES, UNIVERSITI SAINS MALAYSIA
(ii)	Account Number: <i>Nombor Akaun:</i> 1001/PPSP/812086
B.	PERSONAL PARTICULARS OF RESEARCHER / MAKLUMAT PENYELIDIK:
(i)	Name of Research Leader: <i>Nama Ketua Penyelidik:</i> MUHAMAD SAIFUL BAHRI YUSOFF
	Name of Co-Researcher: <i>Nama Penyelidik Bersama:</i> ABDUL RAHMAN ESA MOHD JAMIL YAACOB AHMAD FUAD ABDUL RAHIM
(ii)	School/Institute/Centre/Unit: <i>Pusat Pengajian /Institut/Pusat/Unit:</i> SCHOOL OF MEDICAL SCIENCES
D.	Duration of this research: <i>Tempoh masa penyelidikan ini:</i> *Duration : 3 YEARS <i>Tempoh :</i> From : 01/01/2011 To : 31/12/2014 <i>Dari: Ke :</i>

E. ABSTRACT OF RESEARCH

(An abstract of between 100 and 200 words must be prepared in **Bahasa Malaysia and in English**. This abstract will be included in the Annual Report of the Research and Innovation Section at a later date as a means of presenting the project findings of the researcher/s to the University and the community at large)

Abstrak Penyelidikan

(Perlu disediakan di antara 100 - 200 perkataan di dalam **Bahasa Malaysia dan juga Bahasa Inggeris**.)

Abstrak ini akan dimuatkan dalam Laporan Tahunan Bahagian Penyelidikan & Inovasi sebagai satu cara untuk menyampaikan dapatan projek tuan/puan kepada pihak Universiti & masyarakat luar).

Many researchers have emphasized the importance of teaching stress management and self-care skills to medical students as they are vulnerable to develop health problems related to physical, mental and behavior. A 4-hour medical student wellbeing intervention was designed based on the DEAL model to address these problems. A randomized controlled trial study was conducted on 171 medical students. They were randomly allocated into intervention and control groups. Their stress, anxiety, depression, coping strategies and perceived academic stress were measured by validated tools at five different intervals; at 2 weeks before the intervention, and at 1 week, 8 weeks, 16 weeks and 32 weeks after the intervention. The repeated measure ANCOVA was applied to determine the effect of intervention across the five intervals. A total of 153 medical students (intervention = 73 and control = 80) completed this study. Between group analysis showed that the intervention group significantly experienced lower stress ($p = 0.009$) and depression ($p = 0.013$) symptoms, less frequent of denial ($p = 0.002$), less frequent of self-blame ($p = 0.002$) and lower perceived academic stress ($p = 0.009$) than the control group. The results support the positive impacts of the DEAL-based intervention on the medical students' wellbeing. It is a promising intervention to be adopted by higher education as it consumes minimal amount of time, money, training and man power as well as simple to be implemented.

Ramai penyelidik telah menekankan kepentingan pengajaran kemahiran pengurusan tekanan dan penjagaan diri kepada pelajar-pelajar perubatan kerana mereka mudah untuk mengalami masalah kesihatan yang berkaitan dengan fizikal, mental dan tingkah laku. Satu modul 4 jam kesejahteraan pelajar perubatan telah dibangunkan berdasarkan model DEAL untuk menangani masalah-masalah ini. Satu kajian percubaan rawak terkawal telah dijalankan ke atas 171 pelajar perubatan. Pelajar-pelajar tersebut telah diagihkan secara rawak ke dalam kumpulan intervensi dan kumpulan kawalan. Tahap tekanan, kegelisahan, kemurungan, strategi menangani masalah, dan tekanan berkaitan akademik telah diukur oleh alat yang telah disahkan sebanyak 5 kali; pada 2 minggu sebelum intervensi, dan pada minggu pertama, kelapan, ke-16 dan ke-32 selepas intervensi. Analisa *repeated measure ANCOVA* telah digunakan untuk menentukan kesan intervensi merentasi 5 kali pengukuran. Seramai 153 pelajar perubatan (intervensi = 73 dan kawalan = 80) menamatkan kajian ini. Analisa di antara kumpulan menunjukkan bahawa kumpulan intervensi secara ketara mengalami penurunan gejala tekanan ($p = 0.009$) dan kemurungan ($p = 0,013$), kurang kerap penafian ($p = 0.002$), kurang kerap menyalahkan diri ($p = 0.002$) dan menurunkan tekanan berkaitan akademik ($p = 0.009$) berbanding kumpulan kawalan merentasi 5 kali pengukuran. Keputusan ini menunjukkan kesan positif intervensi berasaskan model DEAL kepada kesejahteraan para pelajar perubatan. Ia adalah satu intervensi yang berpotensi untuk digunapakai oleh pihak pengajian tinggi kerana ia memerlukan masa, wang, dan latihan tenaga kerja yang minimum serta mudah untuk dilaksanakan.

F. SUMMARY OF RESEARCH FINDINGS

Ringkasan dapatan Projek Penyelidikan

This study found that the stress management module that was designed based on the DEAL model significant reduced stress, anxiety and depression symptoms, reduced negative coping strategies that were denial and self-blame, and reduced perceived-academic stress of medical students in USM. In addition, the stress management module was well accepted by the medical students and received positive feedback from them.

G. COMPREHENSIVE TECHNICAL REPORT

Laporan Teknikal Lengkap

Applicants are required to prepare a comprehensive technical report explaining the project.

(This report must be attached separately)

Sila sediakan laporan teknikal lengkap yang menerangkan keseluruhan projek ini.

[Laporan ini mesti dikepulkan]

List the key words that reflect our research:

Senaraikan kata kunci yang mencerminkan penyelidikan anda:

English	Bahasa Malaysia
Stress Management Intervention	Intervensi Pengurusan Tekanan
Medical Student	Pelajar Perubatan
Mental Health	Kesihatan Mental

H. a) Results/Benefits of this research
Hasil Penyelidikan

No. Bil:	Category/Number: <i>Kategori/ Bilangan:</i>	Promised	Achieved
1.	Research Publications (Specify target journals) <i>Penerbitan Penyelidikan (Nyatakan sasaran jurnal)</i>	At least one in medical education journal	Published 7 articles
2.	Human Capital Development		
	a. Ph. D Students	1	1
	b. Masters Students	na	na
	c. Undergraduates (Final Year Project)	na	na
	d. Research Officers	na	na
	e. Research Assistants	1	2
	f. Other: Please specify	na	na
3.	Patents <i>Paten</i>	na	na
4.	Specific / Potential Applications <i>Spesifik/Potensi aplikasin</i>	Stress management model for medical students	Stress management model for medical students – DEAL model
5.	Networking & Linkages <i>Jaringan & Jalinan</i>	na	na
6.	Possible External Research Grants to be Acquired <i>Jangkaan Geran Penyelidikan Luar Diperoleh</i>	na	na

- Kindly provide copies/evidence for Category 1 to 6.

b) Equipment used for this research.
Peralatan yang telah digunakan dalam penyelidikan ini.

Items <i>Perkara</i>	Approved Equipment	Approved Requested Equipment	Location
Specialized Equipment <i>Peralatan khusus</i>	na	na	na
Facility <i>Kemudahan</i>	na	na	na
Infrastructure <i>Infrastruktur</i>	na	na	na

- Please attach appendix if necessary.

H.

COMMENTS OF PTJ'S RESEARCH COMMITTEE
KOMEN JAWATANKUASA PENYELIDIKAN PERINGKAT PTJ

General Comments:

Ulasan Umum:

laporan akhir adalah cemerlang,
objektif tercapai dan output oral cemerlang
diperakui utk pautan graa tersebut.



PROFESOR (DR) ROSLINE HASSAN
Chairman Of Research committee
School Of Medical Sciences
Health Campus
Universiti Sains Malaysia
16150 Kubang Kerian, Kelantan.

Signature and Stamp of Chairperson of PTJ's Evaluation Committee
Tandatangan dan Cop Pengerusi Jawatankuasa Penilaian PTJ

Date :
Tarikh :

Signature and Stamp of Dean/ Director of PTJ
Tandatangan dan Cop Dekan/ Pengarah PTJ



PROFESOR (DR) AHMAD SUKARI HALIM
Dekan
Pusat Pengajian Sains Perubatan
Kampus Kesihatan
Universiti Sains Malaysia
16150 Kubang Kerian, Kelantan.

Date : 20/11/15
Tarikh :



UNIVERSITI SAINS MALAYSIA

JABATAN BENDAHARI

PENYATA PERBELANJAAN SEHINGGA 30 NOVEMBER 2014

Projek :

No. Akaun : 1001.PPSP.812086.

Vot	Nama Vot	Peruntukan Projek	Perbelanjaan Terkumpul Sehingga Thn Lalu	Baki Peruntukan Tahun Lalu	Peruntukan Thn Semasa	Jumlah Peruntukan Thn Semasa	Tanggung Semasa	Bayaran Thn Semasa	Jum Belanja Thn Semasa	Baki Projek
111	GAJI	-23,754.57	0.00	-23,754.57	0.00	-23,754.57	0.00	720.35	720.35	-24,474.92
115	LAIN-LAIN EMOLUMEN	-1,000.00	0.00	-1,000.00	0.00	-1,000.00	0.00	0.00	0.00	-1,000.00
221	PERJALANAN DAN SARA HIDUP	-5,653.68	0.00	-5,653.68	0.00	-5,653.68	0.00	0.00	0.00	-5,653.68
223	PERHUBUNGAN DAN UTILITI	643.87	0.00	643.87	0.00	643.87	0.00	3.71	3.71	640.16
227	BEKALAN DAN BAHAN LAIN	12,617.05	0.00	12,617.05	0.00	12,617.05	0.00	0.00	0.00	12,617.05
229	PERKHIDMATAN IKTISAS & HOSPITALITI	20,397.07	0.00	20,397.07	0.00	20,397.07	0.00	2,140.00	2,140.00	18,257.07
335	HARTA MODAL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Jumlah	3,249.74	0.00	3,249.74	0.00	3,249.74	0.00	2,864.06	2,864.06	385.68

Penyata ini adalah cetakan komputer tiada tandatangan diperlukan

Penyata ini adalah dianggap tepat jika tiada maklumbalas dalam tempoh masa 14 hari dari tarikh penyata

LAPORAN TEKNIKAL

PUBLICATION

1. Muhamad Saiful Bahri Yusoff and Ab Rahman Esa (2012). Stress Management for Medical Students: A Systematic Review, Social Sciences and Cultural Studies - Issues of Language, Public Opinion, Education and Welfare, Prof. Asunción Lopez-Varela (Ed.), ISBN: 978-953-51-0742-2, InTech, DOI: 10.5772/37095. Available from: <http://www.intechopen.com/books/social-sciences-and-cultural-studies-issues-of-language-public-opinion-education-and-welfare/stress-management-for-medical-students-a-systematic-review>

Stress Management for Medical Students: A Systematic Review

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1. Introduction

Tertiary education has always been regarded as highly stressful environment to students (Saipanish, 2003; Sherina et al., 2003). Medical training further adds to the already stressful environment. Studies have revealed a high prevalence of psychological distress in medical students, ranging from 21.6% to 56% (Aktekin et al., 2001; Chandrasekhar et al., 2007; Dahlin et al., 2005; Firth, 1986; Guthrie et al., 1995; Miller & Surtees, 1991; Johari & Hashim, 2009; Saipanish, 2003; Sherina et al., 2003; Yusoff et al., 2011; Yusoff et al., 2010; Zaid et al., 2007). Two studies in Malaysian government universities reported that 29.1 % to 41.9% of the medical students surveyed had psychological distress (Sherina et al., 2003; Yusoff et al., 2010) and another study in a Malaysian private medical school reported that 46.2% had psychological distress (Zaid et al., 2007). Apart from that, the stress level is higher in medical students compared to students in other courses. A study in Singapore reported that 57% of medical students had psychological distress compared to 47.3% of law students (Ko et al., 1999). Another study in Turkey reported that 47.9% of medical students had psychological distress compared to 29.2% of economic and physical education students as measured by GHQ (Aktekin et al., 2001). The alarming facts suggested that a sense of growing pressure on medical students.

The prevalence of psychological distress among year 1 medical students ranged from 17.6% to 50% (Aktekin et al., 2001; Guthrie et al., 1998; Sherina et al., 2003; Yusoff et al., 2011; Zaid et al., 2007). The prevalence of psychological distress among year 2 medical students ranged from 36.5% to 47.9% (Aktekin et al., 2001; Sherina et al., 2003; Yusoff et al., 2010). The prevalence of psychological distress among year 3 medical students ranged from 29.8% to 40.5% (Sherina et al., 2003; Yusoff et al., 2010; Zaid et al., 2007). The prevalence of psychological distress among year 4 medical students ranged from 28.3% to 48.7% (Guthrie et al., 1998; Sherina et al., 2003; Yusoff et al., 2010; Zaid et al., 2007). The prevalence of stress among year 5 medical students ranged from 21.9% to 62.7% (Guthrie et al., 1998; Sherina et al., 2003; Yusoff et al., 2010; Zaid et al., 2007;). These facts showed that psychological distress were different depending on the stages of medical training (Yusoff et al., 2010).

Chronic exposure to stressful condition exerts negative effects on emotional, mental and physical well-being of the students. Numerous studies have revealed that persistence stressful condition associated with mental and physical health problems in medical students at various stages of their training (Aktekin et al., 2001; Firth, 1986; Guthrie et al., 1995; Miller and Surtees, 1991; Sherina et al., 2003; Zaid et. al, 2007). Studies reported an association of prolongeds psychological distress with lowered medical students' self-esteem (Silver & Glicken, 1990; Linn & Zeppa, 1984), anxiety and depression (Rosal et al., 1997; Shapiro et al., 2000), difficulties in solving interpersonal conflicts (Clark & Rieker, 1986), sleeping disorders (Niemi & Vainiomaki, 2006), increased alcohol and drug consumption (Flaherty & Richman, 1993; Newbury-Birch et al, 2000; Pickard et al., 2000), cynicism, decreased attention, reduced concentration and academic dishonesty (Liselotte et. al, 2005). It also associated with inhibition of students' academic achievement and personal growth development (Linn & Zeppa, 1984). Prolonged psychological distress was also linked with medical student suicide (Hays et al., 1996). As a result, medical students may feel inadequate and unsatisfied with their career as a medical practitioner in the future (Saipanish, 2003). It is noteworthy that many researchers stated the importance of early diagnosis as well as effective intervention programmes, that can prevent possible future mental illnesses among medical students (Aktekin et al., 2001; Firth, 1986; Sherina, 2003).

Studies revealed that the stressors affecting medical students' well being seems to be related to the medical training especially related to academic matters (Aktekin et al., 2001; Guthrie et al, 1995; Kaufman et al., 1996, 1998; Saipanish, 2003; Yusoff et al., 2011; Yusoff et al., 2010). They found that the top four stressors were tests and examinations, time pressure, too many content to be studied, and getting behind in work. Another three common stressors were conflicting demands, not getting work done within time planned and heavy workload. A small number of medical students suffer from personal problems, but the effect of this on medical students' psychological morbidity and academic success is unclear (Guthrie et al, 1995; Firth, 1986; Saipanish, 2003). Curriculum differences in medical schools may not necessarily cause differences in the overall pattern of stressors (i.e. most of the top stressors are related to academic matters), although frequency (rank) of some stressors may be significantly different (Kaufman et al., 1996, 1998).

It is worth to highlight that several medical education constituencies have emphasized the importance of teaching stress management and self-care skills to medical students (Steven et al., 2003; Susan et al., 2007). A recent literature review discovered that, although more than 600 articles addressed the importance of stress management programs in medical curricula, only 24 reported intervention programs with accompanying data; however none of the programmes provide convincing evidence of their effectiveness (Shapiro et al., 2000). Apart from that, their specific applications to medical education have been largely unexplored (Shapiro et al., 2000). Therefore a systematic review was done to evaluate the effectiveness of stress management specifically done on medical students with regard to five aspects which were 1) nature of participation, 2) research methods, 3) structure, facilitator and duration of intervention, 4) measured outcomes and instruments used to measure them and 5) outcomes of the intervention. On top of that we also categorized studies based on country.

2. Methodology

The literature search was performed using the Google Scholar, PubMed database, EbscoHost databases, Cochrane Library database, Scopus database, and Science Direct database. Keywords used in searching include 'medical student', 'stress management', 'medical student wellbeing', and 'stress intervention'. No time limit was specified in searching. Abstracts of the searched articles were read through for relevance. Participants, sampling method, study design, intervention structure, content and technique, and outcomes were the key issues of inclusion criteria for in-depth study of the full articles. Articles must describe stress management specifically for medical students otherwise they were not included in this review. Some of the articles were searched from the reference lists of the articles of primary search.

3. Results

Based on the keywords stated in the method, our search found that Google scholar database yielded over 1000 articles, Pubmed database yielded 275 articles, Cochrane Library database yielded 99 articles, EBSCO host database yielded 408 articles, Scopus database yielded 324 articles and Science Direct yielded 14 articles. However, based on abstract reading we found 28 articles fulfilled our inclusion criteria and they were selected for in-depth review. After the in-depth review 22 articles were included for review, 6 articles were excluded due to irrelevant content for current review. A new article was found from the reference list of the primary search and it was included in this current review. Approximately 23 articles were appraised and the results were summarised in tables. The earliest study was found in 1978 and the latest study was found in 2011. The earliest study was reported in 1978 (Soskis, 1978) and the latest study was reported in 2011 (Yusoff, 2011). Results of this systematic review were tabulated based on the five areas which were 1) nature of participants, 2) research methods (table 1), 3) structure, facilitators and duration of intervention (table 2), 4) measure outcomes and instrument used to measure them (table 3) and 5) outcomes of the interventions (table 4-8).

In general, participation of the interventions were categorized into random (i.e. selection of participants were made based on random sampling method) (Mitchell et al., 1983) and non-random (i.e. selection of participants were made based on non-random sampling method such as volunteer, convenient and purposive sampling method). Majority of the studies (i.e. 22 out of 23 studies) used non-random sampling method in selecting participants (Bughi et al., 2009; Finkelstein et al., 2007; Hassed et al., 2008; Hassed et al., 2009; Holtzworth-Munroe et al., 1985; Jain et al., 2007; Kelly et al., 1982; Kiecolt-Glaser et al., 1986; Klamen, 1997; Lee & Graham, 2001; MacLaughlin et al., 2010; Michie & Sandhu, 1994; Nathan et al., 1987; Rosenzweig et al., 2003; Redwood & Polak, 2007; Simard & Henry, 2009; Shapiro et al., 1998; Soskis, 1978; Whitehouse et al., 1996; Yusoff & Rahim, 2010; Yusoff, 2011; Zeitlin et al., 2000).

As shown in table 1, approximately 10 (43.48%) studies had no comparison groups (Bughi et al., 2009; Hassed et al., 2008; Hassed et al., 2009; Lee & Graham, 2001; Klamen, 1997; Redwood & Polak, 2007; Simard & Henry, 2009;; Soskis, 1978; Yusoff & Rahim, 2010; Zeitlin et al., 2000;) and 13 (56.52%) studies had comparison groups (Finkelstein et al., 2007; Holtzworth-Munroe et al., 1985; Jain et al., 2007; Kelly et al., 1982; Kiecolt-Glaser et al., 1986;

MacLaughlin et al., 2010; Michie & Sandhu, 1994; Mitchell et al., 1983; Nathan et al., 1987; Rosenzweig et al., 2003; Shapiro et al., 1998; Whitehouse et al., 1996; Yusoff, 2011). Out of 13, about seven studies randomly assigned participants to control and intervention groups (Holtzworth-Munroe et al., 1985; Jain et al., 2007; Kiecolt-Glaser et al., 1986; Mitchell et al., 1983; Nathan et al., 1987; Shapiro et al., 1998; Whitehouse et al., 1996). Out of the seven randomized control studies, only one study sampled their participants randomly (Mitchell et al., 1983). Even more only two studies (Jain et al., 2007; Yusoff, 2011) clearly mentioned about sample size calculation for the intervention and comparison groups while the rest of studies had not mentioned about it. The longest follow up duration for measurement of outcomes was 12 months (Nathan et al., 1987) and the shortest follow up duration for measurement of outcomes was immediately right after the intervention completed (Klamen, 1997; Redwood & Polak, 2007; Soskis, 1978; Zeitlin et al., 2000).

Study design (frequency)	Measurement of outcomes (frequency)	Source (arranged based on year of study)	Country (frequency)
Randomized controlled trial (7)	Four times: pre (1x) and post (3x) intervention	Nathan et al (1987) and Whitehouse et al (1996).	US (7)
	Three times: pre (1x) and post (2x) intervention	Holtzworth-Munroe et al (1985), Shapiro et al (1998), Jain et al (2007), and Mitchell et al (1983).	
	Two times: pre and post intervention	Kiecolt-Glaser et al (1986).	
Quasi-experimental: nonequivalent comparison group (6)	Three times: pre (1x) and post (2x) intervention	Michie & Sandhu (1994) and Finkelstein et al (2007).	US (4) UK (1) Malaysia (1)
	Two times: pre and post intervention	Kelly et al (1982), Rosenzweig et al (2003) and MacLaughlin et al (2010).	
	Two times: post (2x) intervention	Yusoff (2011).	
Quasi-experimental: time series without comparison group (10)	Three times: pre (1x) and post (2x) intervention	Simard & Henry (2009).	US (6) Australia (2) Canada (1) Malaysia (1)
	Two times: pre and post intervention	Klamen (1997) and Zeitlin et al (2000).	
	Two times: post (2x) intervention	Lee & Graham (2001), Hassed et al (2008), Hassed et al (2009), Bughi et al (2009) and Yusoff & Rahim (2010).	
	Once: post-intervention	Soskis (1978) and Redwood & Polak (2007).	

Table 1. Summary of research design, frequency measurement of outcomes and country of the 23 studies were conducted.

Approximately 34.8% (n=8) of interventions was offered as elective course, 26.1% (n=6) was offered as a seminar/workshop, 17.4% (n=4) was offered as a specific training/therapy, 8.7% (n=2) was offered as support group, 8.7% (n=2) was offered as a program built in the core curriculum and 4.3% (n=1) was offered as a volunteer program (table 2).

Structure (frequency)	Name of intervention	Number of Participant	Facilitator	Total Duration	Source and Country
Elective course (8)	The Meditation & Healing.	42: 1 st and 2 nd year medical students.	A Psychiatrist and Professional teachers.	Not mentioned.	Soskis (1978), US.
	The stress management training course.	96 to 103: 1 st year medical students.	Psychiatrists and Clinical Psychologist.	400 minutes over 8 weeks.	Nathan et al (1987), US.
	The stress management course.	69: 1 st clinical year (3 rd year) medical students	A Clinical Psychologist.	360 minutes over 3 weeks.	Michie & Sandhu (1994), UK.
	The Mindfulness Based Stress Reduction.	38: 1 st and 2 nd year medical students. 35: premedical students	Clinical Psychologists	1050 minutes over 7 weeks.	Shapiro et al (1998), US.
	The Help programme.	66: 1 st and 2 nd year medical students.	Physicians	360 minutes over 6 weeks.	Lee & Graham (2001), US.
	The Mind-Body Medicine: An Experiential Elective	32: 2 nd year medical students.	Not mentioned.	1200 minutes over 10 weeks.	Finkelstein et al (2007), US.
	The Brief Behavioural Intervention Program (BPIP)	34: 3 rd and 4 th year medical students.	Not mentioned.	Over one month duration.	Bughi et al (2009), US.
	The Mind Body Medicine Skills.	24: 1 st year medical students.	Faculty members.	1320 minutes over 11 weeks.	MacLaughlin et al (2010), US.
Volunteer program (1)	Student-led stress management program	1282 (over 16 years): 1 st year medical students. Average participant in a year was 80.	2 nd year medical students trained and guided by two Psychologists.	420 minutes over 7 weeks.	Redwood & Polak (2007), US.
Seminar/workshop (6)	Seminar	38: 1 st , 2 nd and 4 th year medical students. 10: residents and nurses	Four Clinical Psychologists.	360 to 540 minutes over 3 weeks.	Kelly et al (1992), US.

Structure (frequency)	Name of intervention	Number of Participant	Facilitator	Total Duration	Source and Country
	Workshop	40: 1 st and 2 nd year medical students.	A Clinical Psychologist.	360 minutes over 6 weeks.	Holtzworth-Munroe et al (1985), US.
	The stress management workshop	30: 1 st year medical students.	A Psychiatrist.	360 minutes over 3 weeks.	Klamen (1997), US.
	The Mindfulness Based Stress Reduction seminar	302 (1996-2000): 2 nd year medical students. Average participant in a year was 60.	Not mentioned.	900 minutes over 10 weeks.	Rosenzweig et al (2003), US.
	The Medical Student Wellbeing Workshop.	34: 2 nd , 3 rd , 4 th and 5 th year medical students.	Faculty members.	240 minutes over a half-day.	Yusoff & Rahim (2010), Malaysia.
	The Medical Student Wellbeing Workshop.	48: 1 st year medical students.	Faculty members.	240 minutes over a half-day.	Yusoff (2011), Malaysia.
Built in core curriculum (2)	The Health Enhancement Programme (HEP)	315: 1 st year medical students.	Not mentioned	1260 minutes over half of a semester.	Hassed et al (2008), Australia.
	The Health Enhancement Programme (HEP)	148: 1 st year medical students.	12 trained tutors.	1260 minutes over half of a semester.	Hassed et al (2009), Australia.
Support group (2)	Support group	38: 1 st year medical students.	Two Clinical Psychologists.	400 minutes over 8 weeks.	Mitchell et al (1983), US.
	Support group	34: 1 st year medical students	A Clinical Psychologist.	Not mentioned.	Kiecolt-Glaser et al (1986), US.
Specific training/therapy (4)	Self-hypnosis training	35: 1 st year medical students	Two Psychiatrists	1260 minutes over 14 sessions throughout one semester.	Whitehouse et al (1996), US.
	Massage therapy	9: 1 st and 2 nd year medical students	Not mentioned	60 minutes one day before examination.	Zeitlin et al (2000), US.

Structure (frequency)	Name of Intervention	Number of Participant	Facilitator	Total Duration	Source and Country
	Mindfulness Meditation-Somatic Relaxation	81 (divided into 3 groups which were Mindfulness, Somatic & Control): mixture of medical and allied health students.	Two mindfulness instructors and two relaxation instructors	360 minutes over 4 weeks.	Jain et al (2007), US.
	Yoga exercise	16: 1 st year medical students.	A certified yoga teacher.	1920 minutes over 16 weeks.	Simard & Henry (2009), Canada.

Table 2. Summary of structure, participants, facilitator and total duration of interventions of the 23 studies were conducted.

Approximately 43.5% (n=10) of interventions was conducted by Psychologist/Psychiatrist, 13% (n=3) by trained instructor, 13% (n=3) by faculty member, 4.3% (n=1) by medical student, 4.3% (n=1) by physician and 21.7% (n=5) was not reported (table 2).

The shortest duration of intervention was 60 minutes as massage therapy over an afternoon (Zeitlin et al., 2000) and the longest duration of intervention was 1920 minutes (32 hours) over a 16-week yoga exercise (Simard & Henry, 2009). However majority of intervention (n=9) utilised 360 to 540 minutes over 3 to 8 weeks (table 2).

The smallest and biggest number of participants involved in an intervention were 9 (Zeitlin et al., 2000) and 315 (Hassed et al., 2008) respectively. However, majority of those studies (n=12) had involved 30 to 50 participants in an intervention (table 2).

Most of studies (n=11) measured participants' perception on acceptability and feasibility of stress management interventions using evaluation questionnaire at the end of the interventions (table 3). Items of the evaluation questionnaires used were different between studies depending on objectives of the interventions. Despite of the differences, this fact clearly suggested that perception of participants towards feasibility and acceptability of stress management interventions were considered as one of important outcomes of the interventions. Apart from participants' feedback on acceptability and feasibility of the interventions, there were three other most common measured outcomes that were considered as major indicators of effectiveness of stress management interventions regardless of its types which were anxiety (n=14), depression (n=13) and psychological distress (n=10) as shown in table 3. Majority of studies (n=7) measured anxiety level among participants using the State-Trait Anxiety Inventory (STAI) followed by the Brief Symptom Inventory (BSI) (n=3), the Anxiety Subscale of Symptom Checklist Revised (n=2), The Depression Anxiety Stress Scale (n=1) and other inventories (table 3). Depressive symptoms were mostly measured by the Brief Symptom Inventory (BSI) (n=3) and the Depression Subscale of Symptom Checklist Revised (n=3) followed by the Beck Depression Inventory (n=1), the Depression Anxiety Stress Scale (n=1) and others inventories (table 3).

Outcomes Measured (frequency)	Instrument (frequency)	Source
Students' perception on feasibility and acceptability of intervention (11)	Evaluation Questionnaire (11)	Soskis (1978), Nathan et al (1987), Michie & Sandu (1994), Klamen (1997), Shapiro et al (1998), Lee & Graham (2001), Rosenzweig et al (2003), Redwood & Polak (2007), Hassed et al (2008), Simard & Henry (2009), Yusoff & Rahim (2010).
	Interview (1)	Soskis (1978).
	Essay (1)	Lee & Graham (2001).
Psychological Distress (10)	Rating scales of the frequency and intensity of weekly tension and depression (1)	Holtzworth-Munroe et al (1985),
	Social Readjustment Rating Scale (1)	Nathan et al (1987),
	Distress subscale of Symptom Checklist Revised (SCL-90R) (2)	Shapiro et al (1998), Hassed et al (2008),
	Visual Analogue Perceived Stress (1)	Zeitlin et al (2000),
	Perceived Stress of Medical School (1)	Finkelstein et al (2007),
	General Health Questionnaire 12 item (2)	Simard & Henry (2009), Yusoff & Rahim (2010)
	Perceived Stress Scale (1)	Simard & Henry (2009),
	Saliva Cortisol Level (1)	MacLaughin et al (2010)
	Saliva Dehydroepiandrosterone-sulfate (DHEA-S) level (1)	MacLaughin et al (2010)
	Saliva Testosterone level (1)	MacLaughin et al (2010)
	Saliva Secretary Immunoglobulin A (sIgA) level (1)	MacLaughin et al (2010)
Anxiety (14)	Depression Anxiety Stress Scale 21-item (1)	Yusoff (2011)
	State-Trait Anxiety Inventory (7)	Kelly et al (1982), Mitchell et al (1983), Holtzworth-Munroe et al (1985), Nathan et al (1987), Michie & Sandu (1994), Shapiro et al (1998), Zeitlin et al (2000),
	Rating Scales of Anxiety and Intensity in Test and Social Situation (1)	Holtzworth-Munroe et al (1985),
	Brief Symptom Inventory (3)	Kiecolt-Glaser et al (1986), Whitehouse et al (1996), Jain et al (2007).
	7 Questions covered on anxiety, depression and satisfaction (1)	Michie & Sandu (1994).
	Anxiety subscale of Symptom Checklist Revised (SCL-90R) (2)	Finkelstein et al (2007), Hassed et al (2009).
	Anxiety subscale of General Well Being Scale (1)	Bughi et al (2009).
Depression Anxiety Stress Scale 21-item (1)	Yusoff (2011).	

Outcomes Measured (frequency)	Instrument (frequency)	Source
Depression (13)	Beck's Depression Inventory (1)	Mitchell et al (1983).
	Rating scales of the frequency and intensity of weekly tension and depression (1)	Holtzworth-Munroe et al (1985).
	Brief Symptom Inventory (3)	Kiecolt-Glaser et al (1986), Whitehouse et al (1996), Jain et al (2007).
	Depression Adjective Checklist (1)	Nathan et al (1987).
	7 Questions covered on anxiety, depression and satisfaction (1)	Michie & Sandu (1994).
	Depression subscale of Symptom Checklist Revised (SCL-90R) (3)	Shapiro et al (1998), Hassed et al (2008), Hassed et al (2009).
	2-item Depression Index (1)	Finkelstein et al (2007).
	The Center of Epidemiologic Studies Depression (CES-D) scale (1)	Simard & Henry (2009).
	Depression subscale of General Well Being Scale (1)	Bughi et al (2009).
	Depression Anxiety Stress Scale 21-item (1)	Yusoff (2011).
Loneliness (3)	UCLA Loneliness scale (3)	Kiecolt-Glaser et al (1986), Nathan et al (1987), Whitehouse et al (1996).
Mood state (3)	Profile of Mood States (POMS) (3)	Whitehouse et al (1996), Rosenzweig et al (2003), Finkelstein et al (2007).
Quality of life (2)	WHOQOL (2)	Hassed et al (2008), Hassed et al (2009)
Type A behaviour (2)	Jenkins Activity Schedule (2)	Kelly et al (1982), Nathan et al (1987)
	Bortner's short rating scale of Type A behaviour (1)	Nathan et al (1987)
Physiologic & Immunologic Health marker (3)	Helper/Inducer T Lymphocytes (2)	Kiecolt-Glaser et al (1986), Whitehouse et al (1996)
	Suppressor/Cytotoxic T Lymphocytes (2)	Kiecolt-Glaser et al (1986), Whitehouse et al (1996)
	Total Iron-Binding Protein (TIBC) (1)	Kiecolt-Glaser et al (1986),
	Transferrin (1)	Kiecolt-Glaser et al (1986),
	Albumin (1)	Kiecolt-Glaser et al (1986),
	Natural Killer Cell (NK-cell) (3)	Kiecolt-Glaser et al (1986), Whitehouse et al (1996), Zeitlin et al (2000)
	B Lymphocytes (1)	Whitehouse et al (1996)
	Monocytes (1)	Whitehouse et al (1996)
	Granulocytes	Whitehouse et al (1996)
	Total White Blood Count (1)	Zeitlin et al (2000),
	Mitogen-Induced Lymphocyte Stimulation (1)	Zeitlin et al (2000)

Outcomes Measured (frequency)	Instrument (frequency)	Source
	Respiratory Rate (1)	Zeitlin et al (2000)
	Blood Pressure (1)	Zeitlin et al (2000)
	Body Temperature (1)	Zeitlin et al (2000)
	Pulse Rate (1)	Zeitlin et al (2000)
Spiritual Experience (2)	INSPIRIT (2)	Shapiro et al (1998), Jain et al (2007)
Empathy (1)	Empathy Construct Rating Scale (1)	Shapiro et al (1998)
General Wellbeing (1)	General Well Being Scale (1)	Bughi et al (2009)
Academic performance (3)	Grade Point Average (3)	Mitchell et al (1983), Kiecolt-Glaser et al (1986), Nathan et al (1987).
Positive Psychological State (1)	Positive States of Mind Scales (1)	Jain et al (2007)
Self-esteem (1)	A Self-Esteem Measure (1)	Holtzworth-Munroe et al (1985)
Personality (3)	Minnesota Multiphasic Personality Inventory (2)	Mitchell et al (1983), Nathan et al (1987),
	16 Personality Factor Test (1)	Kiecolt-Glaser et al (1986)
Distractive & Ruminative thought (1)	Daily Emotion Report (1)	Jain et al (2007)
Knowledge of stress & its management (1)	Stress Knowledge Inventory (1)	Kelly et al (1982)
Perceived stressors (2)	Stressful Situations Rating (1)	Kelly et al (1982)
	Hassles Scale (1)	Nathan et al (1987)
Intrinsic & Extrinsic Satisfaction (1)	7 Questions covered on anxiety, depression and satisfaction (1)	Mitchie & Sandu (1994)
Quality of sleep (1)	Daily Dairies (1)	Whitehouse et al (1996)
Hypnotic ability (1)	The Harvard Group Scale of Hypnotic Susceptibility (1)	Whitehouse et al (1996)
	The Inventory of Self-Hyonosis (1)	Whitehouse et al (1996)
Preferred specialty choice (1)	Questionnaire on procedural and non-procedural specialty (1)	Klamen (1997)
General Health Status (2)	Self-Reporting questionnaire (1)	Kiecolt-Glaser et al (1986),
	Health Chart (1)	Nathan et al (1987)
	Duke-UNC Health Profile (1)	Nathan et al (1987)

Table 3. Summary of measured outcomes and instruments used to measure them.

Psychological distress level was measured by mostly by General Health Questionnaire 12-item (n=2) and the Distress Subscale of Symptom Checklist Revised (n=2) followed by the Depression Anxiety Stress Scale (n=1) and other inventories (table 3).

Despite of the four most common measured outcomes (i.e. students' perception, anxiety, depression and psychological distress), they were other important outcomes to be considered in future research such as loneliness (n=3), mood states (n=3), academic performance (n=3), health biomarkers (n=3), quality of life (n=2) and general wellbeing (n=1) (table 3).

Outcomes of interventions were summarized based on five categories which were brief intervention (less than 2 days), short-duration intervention (2 days to 4 weeks), medium-duration intervention (more than 4 weeks and up to 8 weeks), long-duration intervention (more than 8 weeks) and other (duration was not mentioned in the articles).

There were three brief interventions reported by previous studies (table 4) and all of them had significant positive impacts on psychological health of medical students (table 4). The massage therapy improved immunologic and physiologic health marker (Zeitlin et al., 2000). While the Medical Student Wellbeing Workshop improved awareness of participants about stress, its effect and management as well as a well-accepted intervention by participants (Yusoff & Rahim, 2010).

Source and Country	Name of Intervention	Outcome	Summary of outcome (n)
Zeitlin et al (2000), US.	Massage therapy	- Reduced respiratory rate - Decreased anxiety state. - Decreased perceived stress - Decreased percentage of T Lymphocyte cells post intervention - Increased natural killer cell activity post intervention.	- Improved psychological health (3) - Improved immunologic health marker (1) - Improved physiologic health marker (1)
Yusoff & Rahim (2010), Malaysia.	The Medical Student Wellbeing Workshop	- Reduced distress symptoms. - Well accepted intervention. - Rated as highly useful and successful intervention. - Increased awareness about stress, its effect and management.	- Increased awareness about stress, its effect and management (1) - Well accepted intervention (1)
Yusoff (2011), Malaysia.	The Medical Student Wellbeing Workshop	- Reduced anxiety level - Reduced depressive symptoms. - Reduction of distress symptoms. - Sustainability of those effects	

Table 4. Outcomes of brief stress management intervention (required duration of less than 2 days)

Five short-duration interventions were reported by previous studies (table 5). About three interventions were reported to have significant positive impacts on psychological health of medical students (Bughi et al., 2009; Jain et al., 2007; Michie & Sandhu, 1994) whereas other outcomes were different from each intervention (table 5). Nevertheless, these facts had provided evidence of positive impacts of short-duration intervention on medical students' psychological health, awareness and general wellbeing.

There were six medium-duration interventions reported and most of them were well accepted by medical students as well as increased awareness of the students about handling

Source and Country	Name of intervention	Outcome	Summary of outcome (n)
Kelly et al (1982), US.	Seminar	<ul style="list-style-type: none"> - Reduction of type A behaviour pre and post intervention. - Increased knowledge about stress, its effect and management. - Reduced stressful intensity perception of stressful events. - No measureable of anxiety state. 	<ul style="list-style-type: none"> - Improved psychological health (3) - Increase awareness on stress, its effect and management (2) - Well accepted intervention (2)
Michie & Sandhu (1994), UK.	The stress management course	<ul style="list-style-type: none"> - Increased intrinsic and extrinsic satisfaction. - Positive perception towards the intervention. - Increase awareness on stress, its effects and management. - Reduction of anxiety and depression symptoms pre and post intervention. 	<ul style="list-style-type: none"> - Increased knowledge on stress, its effect and management (1) - Reduced stressful perception toward stressor (1) - Increased self-satisfaction (1)
Klamen (1997), US.	The stress management workshop	<ul style="list-style-type: none"> - Well accepted course. - Increased interest to consider a career in psychiatry. - The intervention was very helpful in providing insight about stress and health. 	<ul style="list-style-type: none"> - Influenced career choice (1) - Enhanced positive state of mind (1) - Reduced negative positive state of mind (1)
Jain et al (2007), US.	Mindfulness Meditation-Somatic Relaxation	<ul style="list-style-type: none"> - Reduced ruminative thought and behaviour. - Reduced distractive thought and behaviour. - Reduced psychological distress symptoms. - Enhanced positive state of mind. - Reduced negative psychological state 	<ul style="list-style-type: none"> - Reduced ruminative and distractive thought (1) - Increased positive wellbeing (1)
Bughi et al (2009), US.	The Brief Behavioural Intervention Program (BPIP)	<ul style="list-style-type: none"> - Decreased anxiety level. - Increased positive wellbeing score. - No measureable effect on depression, self-control, vitality and general health. - Reduced prevalence of reported stress post intervention. 	

Table 5. Outcomes of short-duration stress management intervention (required duration of 2 days to 4 weeks)

stress (table 6). However other outcomes were different from each intervention. Among the interventions, the Mindfulness Based Stress Reduction demonstrated very positive impacts on medical students' psychological health, empathy and spirituality (Shapiro et al., 1998). Nonetheless, these facts had provided evidence of positive impacts of the medium-duration intervention on medical students' psychological health, empathy, spirituality, awareness related to handling stress as well as general wellbeing (table 6).

Source and Country	Name of Intervention	Outcome	Summary of outcome (n)
Mitchell et al (1983), US.	Support group	<ul style="list-style-type: none"> - No measureable effect on academic performance. - No measureable effect on anxiety or depression level. - No measureable effect of stress symptomatology. - No measureable effect on personality. 	<ul style="list-style-type: none"> - Well accepted intervention (5) - Increased awareness on stress, its effect and management (3). - Reduced type A behaviour (1) - Improved psychological health (1).
Holtzworth-Munroe et al (1985), US.	Workshop	<ul style="list-style-type: none"> - Increased awareness about stress, its effect and management - Positive perception toward the intervention. - No measureable effect on anxiety, depression and self-esteem. 	<ul style="list-style-type: none"> - Increased empathy (1) - increased spirituality feeling (1)
Nathan et al (1987), US.	The stress management training course	<ul style="list-style-type: none"> - Reduced hard-driving scale score of type A behaviour. - Positive perception towards the intervention. - No measureable effects on academic performance, general health, personality, stress symptoms, depression, anxiety, stressful intensity perception of stressor, and loneliness. 	
Shapiro et al (1998), US.	The Mindfulness Based Stress Reduction	<ul style="list-style-type: none"> - Well accepted intervention evidence by high rate completion. - Reduced in depressive symptoms. - Reduced anxiety state. - Increased in empathy - Increased in spirituality feelings. - Reduced in psychological distress symptoms. 	
Lee & Graham (2001), US.	The Help programme	<ul style="list-style-type: none"> - Positive feedback and well accepted intervention. - Increased insight about the need for self-care. - Increased awareness about stress, its effect and management. 	
Redwood & Polak (2007), US.	Student-led stress management program	<ul style="list-style-type: none"> - Well accepted as attendance rated more than 85%. - Useful and valuable intervention. - Increased stress management skills. 	

Table 6. Outcomes of medium-duration stress management intervention (required duration of more than 4 weeks and up to 8 weeks).

There were seven long-duration interventions reported and most of them had significant positive effects on psychological health of medical students as well as they were well accepted by the students (table 7) while other outcomes were varied from each intervention ranging from increased awareness about stress management and it's important to improved immunologic health markers. Among these interventions, the Mind Body Medicine Skills