Appendix A: Supplementary Data

Table S1
Example of search strategy used across databases

Database	**Search Term**	**Limits Applied**
EMBASE	(Rhodiola/ OR Withania/ OR Eleutherococcus/ OR Panax/ OR Ginseng.mp. OR Schisandra/ OR (Astragalus plant/ OR Astragalus membranaceus/)) OR (Adaptogen.mp.) OR ((Adaptation, Physiological/ OR Stress, Physiological/) AND (Phytotherapy/ OR Plants, medicinal/ OR Herbal medicine/ OR Plant extracts/))	Humans Clinical trials

Table S2 *Summary of the characteristics of included studies*

Author, Year, Country	Study design and duration	Participants, setting and sample	Research objective	Herb Being Examined	Outcomes Measured\ Domains Used	Summary of Findings	Comments
Auddy et al. (2008), India	Randomised, placebo-controlled study. 60 Days.	Ninety-eight participants, men and women, 18-60 years, identifying as stressed, but otherwise healthy.	To examine the efficacy of *Withania somnifera* in reducing stress-related parameters in chronically stressed humans.	*Withania somnifera* (L.) Dunal Standardised extract	1) mHAM-A questionnaire 2) Serum cortisol 3) BP + HR	Analysis: 1-way ANOVA, pair-wise. 1) Significant improvement in wellbeing in Withania group at day 30 and day 60 $p < 0.001$. 2) Significant decrease in serum cortisol in Withania group at day 60 $p < 0.05$. 3) Significant decrease in BP + HR $p < 0.05$.	Found that Withania reduces experiential feelings of stress and anxiety at all dosage levels at both day 30 and day 60.
Benson et al. (2014), Australia	Double-blind, placebo controlled, cross-over. Acute dosing.	17 volunteers (4 male and 13 female) 18-44 years.	To examine whether a standard clinical dose of an extract of *Bacopa monnieri* would acutely effect cognition, mood, anxiety, and stress.	*Bacopa monnieri* (L.) Wettst. standardised (CDRI 08)	Four MTF tasks set to 'medium' difficulty with the score being dictated by the accuracy and speed of response: 1) Mental arithmetic 2) Stroop 3) Letter Search 4) Visual tracking Three treatment groups: a) Placebo b) 320mg c) 640mg Testing occurred 1h post-dose and 2h post dose. Mood Measures: Bond-Lader VAS and STAI (STAI-S and STAI-T). Biological measures: Salivary samples of cortisol levels.	Total MTF: no significant effect by any of the three treatments. 1) N.S. by any treatment. 2) Increase from baseline to 1h post-dose in 320mg $p=.028$; Placebo increase in baseline to 2h post-dose $p=.000$; Increase from baseline to 1h post-dose in 640mg $p=.001$ and baseline to 2h post-dose $p=.003$. 3) Significant main effect of time $p=.033$. Baseline to 2h post-dose change score greater in 320mg compared to placebo $p=.028$. 4) N.S. Mood: In absence of MTF significant main effect of condition (by ANOVA) $p=.023$. Change baseline to 2h greater in 320mg $p=.001$. State anxiety scores trend for a main effect of condition $p=.086$. No other statistically significant effects. Cortisol: In absence of MTF main effect of condition $p=.012$. At 1h greater change in 640mg to 320mg $p=.017$ and placebo $p=.018$. At 2h greater change score in 640mg to 320mg $p=.002$ and placebo $p=.022$. No significant effects in change scores post-MTF.	N/A

Cardinal & Engels (2001), USA	Prospective, double-blind, placebo-controlled, randomised clinical trial. 60 days.	96 original participants with 83 completing the study. Healthy volunteers.	To determine whether chronic ginseng supplementation enhances affect or mood.	*Panax ginseng* C A Meyer (G115)	Measures administered pre and post-intervention consisting of 3 psychological variables: positive effect, negative effect, and total mood disturbance. Positive and negative affect determined from PANAS. Total mood disturbance determined from POMS.	Positive effect for both pre and post-intervention were normally distributed *K-S d=.08, P>.05* and *K-S d.08, P>.05,* respectively. Total mood disturbance was normally distributed at both time periods *K-S d=.14, P>.05* and *K-S d=.13, P<.05,* respectively. Negative effect data were not normally distributed at either pre- or post-intervention, *K-S d=.15, P<.05* and *K-S d=.20, P<.05,* respectively. All main effects and interaction effects P>.016 .	Does not support favourable claims for chronic ginseng supplementation on mood and effect.
Cropley et al. (2002), UK	Randomised, controlled experiment. 7 days.	Fifty-four volunteer students at the University of Surrey (30 female, 24 male) from 18-30 years.	Effect of Kava and Valerian on human physiological and psychological responses to mental stress assessed under laboratory conditions.	*Piper methysticum* G. Forst. (Kava) and *Valeriana officinalis* L. (Valerian) Standardised	6 min colour/word interference task completed with BP and HR measured at 0.5, 2.5 and 4.5 min. Post task subjects completed rating of pressure with 7-point scale. Final BP and HR measurements taken after 5 min of rest. Identical testing was completed after 7 days of either kava or valerian supplementation. Differences between resting and task BP and HR were calculated at both Time 1 (T1 – pre-intervention) and Time 2 (T2 – post-intervention).	T1: n.s. change in BP between groups. T2: Resting systolic BP P<.0.05 and diastolic P<0.005, resting HR P<0.01 – significant difference. Valerian group: Reduction at T2 in resting systolic BP P<0.05 and HR P<0.05; reduction in diastolic BP P<.0.06 approaching significance. Kava: Reduction at T2 in resting diastolic BP P<0.05. No significant difference in BP or HR between T1 and T2 in controls.	N/A
D'Angelo et al. (1986), Italy	Double-blind, placebo-controlled clinical trial. 12 weeks.	Thirty-two male university students, 20-24 years.	A study on the effect of a standardised ginseng extract on psychomotor performance in healthy volunteers.	*Panax ginseng* C.A. Mey. (G 115 standardised extract)	1) Tapping test. 2) Simple (visual and auditory) reaction time 3) Choice reaction time 4) Cancellation test 5) Digit symbol substitution test 6) Mental arithmetic 7) Logical deduction	1) Neither treatment significantly affected performance. 2) Neither treatment affected visual reaction time significantly. Auditory reaction time post-treatment P<0.05 or better. 3) Post-treatment P<0.05 or better. 4) Post-treatment G 115 group p<0.05 or better from pre-treatment. 5) N.S. 6) Post-treatment G 115 P<0.05 or better from pre-treatment, and between the two experimental groups. 7) Post-treatment G 115 P<0.05 or better.	G115 superior to placebo in at least four independent and objective parameters.
Darbinyan et al. (2000), Armenia	Randomised, placebo-controlled, double-blind, cross-over study with	Fifty-six young, healthy physicians on night duty (both genders).	A study to investigate the efficacy of a standardised extract	*Rhodiola rosea* L.standardised extract SHR-5 170mg.	1) Speed of determination of words associated by meanings, scored in seconds. 2) Speed of backward spelling of a 6-letter word, scored in seconds.	1) Group A: P-0.013 Group B: P-0.005 2) Group A: P-0.01 Group b: P-0.006 3) Group A: P-0.002 Group B: P; 0.0001	N/A

	wash-out period. 6 weeks.		SHR/5 from *Rhodiola rosea* rhizome in non-specific fatigue.		3) Speed of subtraction of a given digit sequentially as far as possible from a number between 90 and 99 to 0, scored in seconds. 4) The number of correctly recalled words, irrespective of sequence and with no time-limit, ten of which were presented audially to the subject, scored in numbers. 5) Speed of rearranging digits into an order of decreasing magnitude. The digits were randomly distributed in a square, scored in seconds. Each test was given a fatigue index. Group A: treatment Group B: placebo.	4) Group A: P-0.54 Group B: P-0.003 5) Group A: P-0.075 Group B: P-0.712 Total fatigue index significantly improved after two weeks' treatment.	
De Bock et al. (2004), Belgium	Double-blind, placebo-controlled trial with two phases. Acute dosing and four weeks.	Twenty-four healthy and physically active male and female students.	Examining the hypothesis that acute Rhodiola rosea intake can improve endurance exercise performance.	*Rhodiola rosea* L. extract 100mg (standardised)	Phase I: 1h post treatment Phase II: Identical testing post daily treatment for 4 weeks. Testing: Day 1: 1) Speed of limb movement 2) Reaction time 3) Ability to sustain attention Day 2: 4) Muscle strength 5) Endurance exercise capacity	1) N.S. result in phase I or II. 2) N.S. change in visual or aural reaction time in phase I or II. 3) N.S. changes in phase I or II. 4) No change in phase I or II. 5) Phase I: Compared with P, R intake increased time to exhaustion $p<.05$. Phase II: N.S. difference in parameters.	Articles examining exercise endurance only, were excluded from the review, however this article was included due to mental parameters being included (ability to sustain attention).
Downey et al. (2013), Australia	A double-blind, placebo-controlled, crossover design.	Twenty-four (4 male, 20 female) healthy participants. Acute dosing.	To investigate the effects of a standard clinical dose (320mg) and a 640mg dose of Bacopa on mood, cardiovascular activity and mentally demanding cognitive tasks.	*Bacopa monnieri* (L). Wettst. Standardised CDRI 08.	1. Cognitive Demand Battery (CDB) comprised of a) Serial 3s + serial 7s b) 'stress and mental fatigue' VAS 2) Blood pressure	1.a) Serial 3s significant improved performance after 320mg $p = 0.02$ and trend towards improvement in 640mg. Serial 7s Improved performance in 640mg $p < 0.05$. b) VAS neither treatments attenuated the stress or fatigue of CDB. 2) No significant change in blood pressure.	Study found evidence for cognitive facilitation but did not find the treatments to attenuate stress or fatigue induced by a cognitively demanding battery.

Edwards et al. (2012), UK.	Multi-centre, non-randomised, open-label, single-arm study. Four weeks.	Ninety-three participants, 30-60 years, with life-stress symptoms.	To investigate the effects of Rhodiola treatment in subjects with life-stress symptoms.	*Rhodiola rosea* L. . Standardised extract (WS 1375).	1) Numerical Analogue Scales (NAS) of subjective stress symptoms. 2) Perceived Stress Questionnaire (PSQ) 3) MFI-20 4) Numbers Connecting Test (NCT) 5) Multidimensional Mood State Questionnaire (MDMQ) 6) Sheehan Disability Scale 7)Clinical Global Impressions (CGI)	1) Significant reduction in stress symptoms $p < 0.0001$) 2) Improvements post 4-week treatment $p < 0.0001$. 3, 4, 5) Significant improvements after 4 weeks' treatment $p < 0.05$ 6) Improvement after 4 weeks' $p < 0.0001$. 7) All changes statistically significant at any time point.	N/A
Ellis & Reddy (2002), USA	Randomised, double-blind, placebo-controlled trial. 8 weeks.	Thirty healthy subjects 18 years or older recruited through the University of Connecticut.	To assess the effects of Panax ginseng on health-related quality of life (HRQOL).	*Panax ginseng* C.A. Mey. 200mg/day (G115)	HRQOL assessed with the Short Form-36 Health Survey version 2 (SF-36v2) at baseline and at 4 and 8 weeks.	4 weeks: social functioning was significantly higher in *Ginseng* group p=0.014; higher mental health score p=0.075 in *Ginseng* group; mental health component summary score higher in *Ginseng* group p=0.019. No of these differences persisted to the 8-week time point. No other significant differences between groups detected at 4 and 8-week time points.	P. ginseng improves aspects of mental health and social functioning after 4 weeks of therapy although these differences attenuate with continued use.
Facchinetti et al. (2002), Italy	Randomised, placebo-controlled trial. 30 days.	Forty-five healthy volunteers 18-30 years, students.	To examine the hypothesis that *Eleutherococcus senticosus* reduces cardiovascular response to stress in healthy subjects. To verify previously reported evidence that Eleutherococcus increases arousal, stamina and	*Eleutherococcus senticosus* (Rupr. & Maxim.) Maxim. (extract type not reported)	Analysis of cardiovascular responses to Stroop Colour-Word test (Stroop CW).	Before treatment subjects reacted to Stroop CW with an increase in both systolic BP and HR and a small increase in diastolic BP. A reduced response of both systolic BP and HR to the Stroop CW was seen in *Eleutherococcus* group in both males and females. Males in *Eleutherococcus* group: systolic and diastolic p=n.s. Females: systolic p=0.01; diastolic p=n.s.; HR p=0.01 significant.	N/A

			stress resistance.				
Jezova et al. (2002), Slovakia	Parallel, randomised, double-blind, placebo-controlled trial. Single dose administration.	Seventy (33 male and 37 female) healthy volunteers 20-30 years, university students.	To evaluate the effects of EGb 761 (standardised *Ginkgo biloba* extract) on salivary cortisol and blood pressure responses during stress in healthy volunteers.	*Ginkgo biloba* L. (EGb 761 standardised extract 120mg).	Stress model: A combined stimulus consisting of mental load (memory test) and static exercise (hand grip) was applied. Salivary cortisol, blood pressure and heart rate were measured just prior to treatment or placebo administration and just after mental load and static exercise testing	Static exercise: BP: EGb 761 had a significant effect on systolic ($p<0.05$) and diastolic ($p<0.05$) blood pressure in handgrip test. HR responses were similar in both treatment groups (not significant). Salivary Cortisol: EGb 761 prevented a stress-induced rise in cortisol levels (noted at pre-stress testing) in males. In the same time period of investigation, no effect of stress exposure or of EGb 761 was observed in women. Memory Test: EGb 761 administration failed to modify the memory performance.	Single administration. Reduced BP and cortisol to a combined stress stimulus.
Kennedy et al. (2004), UK	Double-blind, placebo-controlled, counter-balanced experiment. Five study days, seven days apart.	Nineteen female and nine male healthy undergraduate volunteers.	To examine the effects on cognitive performance of Guarana and Panax ginseng in humans.	*Panax ginseng* C.A. Mey. (standardised extract G115 200mg) and *Paullinia cupana* Kunth. (Guarana standardised extract 75mg)	Outcomes from CDR battery: 1)Speed of Attention factor – 1.1 simple reaction time, 1.2 choice reaction time and 1.3 digit vigilance 2)Speed of memory factor 3)Accuracy of attention factor 4)Secondary memory factor 5)working memory factor Other measures: a) Logical reasoning task b) Sentence verification task c) Serial threes' and 'Serial sevens' subtraction tasks Subjective mood measure: d)The Bond-Lader Visual Analogue Scales	1) Effect following guarana at 1h $p=0.011$, 4h $p=0.007$, 6h $p=0.025$ post-dose; ginseng at 4h $p=0.003$, 6h $p=0.04$ post-dose. 1.1 ginseng at 6h $p=0.005$ post-dose 1.2 Guarana at 1h pp=0.029, 4h $p=0.031$ post-dose; ginseng at 4h $p<0.001$, 6h $p=0.047$ 1.3 Guarana at 1hr $p=0.011$, 4h $p=0.018$, 6h $p<0.001$ post-dose; ginseng at 6h $p=0.005$ post-dose. 2) Enhanced performance following ginseng at 1h post dose $p=0.03$ and 4h $p=0.001$; guarana n.s. 3)N.S. differences. 4) Enhanced for guarana $p=0.002$ and ginseng $p=0.04$ at 2.5h testing post-dose. 5) Not significantly affected by the treatment. Other measures: a) Not significantly affected. b) Significantly speeded for both guarana $p=0.003$ at 2.5h, $p=0.029$ at 4h and $p=0.038$ at 6h and ginseng at 1h $p=0.007$, 2.5h $p=0.001$, 4h $p=0.002$, 6h $p=0.005$. c) No effect on total number of subtractions in serial threes. Serial sevens: Guarana at increase at 1h $p<0.001$, 4h $p=0.011$, 6h $p=0.012$; ginseng at 1h $p=0.001$, 6h $p=0.024$. d)N.S. effect of treatments.	The study also tested the combination of Guarana and Ginseng together, however this review is only including trials on single herbal medicines, so those results have not been recorded. In part c) ginseng led to reduction in errors at 2.5h $p=0.03$, 4h $p=0.049$.

Kennedy et al. (2001), UK	A placebo-controlled, double-blind, balanced, cross-over design. Five study days conducted seven days apart.	Fourteen female and six male healthy undergraduate volunteers. .	To investigate whether acute and differing doses of *Ginseng* had any consistent effect on mood and cognitive performance .	*Panax ginseng* C.A. Mey. extract (G115 200, 400, or 600mg)	Tailored CDR battery test. 1) Quality of Memory (Incl. percentage accuracy scores from spatial working memory, numeric working memory, word recognition, picture recognition, immediate word recall and delayed word recall) 2) Speed of memory (incl. combined reaction times of numeric working memory, spatial working memory, delayed word recognition and delayed picture recognition) 3) Speed of Attention (incl. combined reaction times of simple reaction time, choice reaction time and digit vigilance) 4) Accuracy of Attention (incl. combined percentage accuracy of choice reaction time and digit vigilance tasks) Secondary cognitive measures: a) Working memory sub-factor. b) Secondary memory sub-factor. Subjective Mood Measure: The Bond-Lader Visual Analogue Scales ('alert', 'calm' or 'contented' factors).	1) Improvement in accuracy of memory task for 400mg *Ginseng* at 1h p=0.0043, 2.5h p=0.026, 4h p=0.035 and 6h post-dose p=0.002. No improvement with 200mg. 2) Decrement in speed for 200mg *Ginseng* at 4h p=0.0045 only significant difference. 3) Speed of performance reduced with 200 (p=0.0001) and 600mg (p=0.0019) respectively at 4h; and 6h p=0.0006 and p=0.0003 respectively. Speed was not however affected for 400mg dose. 4) Enhancement in accuracy of performance restricted to 200mg dose at 6h post-dose p=0.048. Secondary measures: a) No significant difference at any dose or any time point. b) Performance enhanced by 600mg *Ginseng* at 1h p=0.046, 2.5h p=0.0034, 4h p=0.034. 400mg *Ginseng* at 1h p=0.0022, 2.5h p=0.0027, 4h p=0.013 and 6h p=0.0036; restricted to 4h post-dose for 200mg *Ginseng* p=0.039. Subjective measures: 200 and 400mg *Ginseng* significant reduction in scores on 'alert' factor (p<0.001 and p<0.01 respectively). No significant difference in 'calm' or 'contented' factors.	Quality of memory factor enhanced at all time points following 400mg of *Ginseng*.
Kennedy et al. (2002), UK.	A randomised, placebo-controlled, double-blind, balanced, cross-over design. Five study days conducted seven days apart.	Fifteen female and five male healthy university students.	To directly compare the effects of single doses of *Ginkgo biloba* and *Panax ginseng* on two aspects of mood and cognitive performance in healthy volunteers.	*Ginkgo biloba* L. (GK501) 60mg and *Panax ginseng* C.A.Mey. (G115) 100mg.	Cognitive measures: 1) Quality of Memory factor 2) Secondary Memory factor (accuracy of immediate and delayed word recall, picture, and word recognition tasks). 3) Speed of Memory factor (speed of performance of spatial and numeric working memory and picture and word recognition) 4) Speed of Attention factor (speed of performing simple and choice reaction time tasks and digit vigilance task). 5) Quality of Attention factor (accuracy of performing choice reaction time and digit vigilance tasks)	1) Significant improvement in accuracy of memory task for both *G. biloba* (6h post-dose p=.008 and *P. ginseng* 4h p=.015. 2) Performance enhanced in both treatments Ginkgo at 1h p=.032, 6h p=0.011; ginseng improvements at 4h p=.029 and 6h p=.019. Immediate word recall: ginkgo at 6h improvement p=.0005 and 4h p=.09; ginseng improvement at 4h p=.00008 and 6h p=.00002; delayed work recall improvement with ginkgo1h p=0.015, 6h p=0.024; ginseng improvement 2.5h=.033, 6h p=.001 3) Spatial memory ginseng at 2.5h p=.014 and word recognition p=.022 the latter at 4h p=.001. 4) N.S. differences. 5) Ginseng at 2.5h p=.004. Ginkgo reduced false alarms at 2.5h p=.036.	Modest improvement in quality of memory factor. Study also looked at ginkgo/ginseng combination however this data isn't included in the review due to combination treatment not fitting the inclusion criteria.

					6) Serial Threes 7) Serial Sevens 8) Bond-Lader visual analogue mood scales ('alert', 'content' and 'calm' factors)	6) both ginkgo and ginseng improved performance at same time point p=.064 and p=.064 respectively. 7) Ginkgo at 6h p=.0012. 8) Alert factor: Ginkgo more alert at each time point 1h p=.025, 2.5h p=.024, 4h p= .005, 6h p=.001. Content factor: more content following ginkgo at 1h p=.005, 4h p=.0006, 6h p=.0007. Calm factor: no significant differences.	
Olsson et al. (2009), Sweden	Randomised, placebo-controlled study with parallel groups. Twenty-eight days.	Sixty volunteers 20-55 years, presenting with stress-related fatigue (a diagnosis of "fatigue syndrome") with no co-morbidities (healthy subjects)	To assess the efficacy of the standardised extract SHR-5 of *Rhodiola rosea* L. in the treatment of stress related fatigue in humans.	*Rhodiola rosea* L. extract SHR-5	1) Primary endpoint: reduction in fatigue symptoms assessed according to Pines' burnout scale. 2) Reduction in depressive symptoms estimated with Montgomery-Asberg depression rating scale (MADRS). 3) Quality of life (QOL) measured with SF-36 questionnaire. 4) Cortisol response to awakening measured from saliva samples. 5) Attention assessed with CCPT II (incl. five indices: omissions, commissions, response reaction time (Hit RT), standard error of the reaction time (Hit RT SE) and variability of the response).	1) Pines' burnout scale p=0.047. 2) MADRS p=0.64 3) Physical health SF-36 p=0.056; mental health SF-36 p=0.33 4) Significant reduction in cortisol and cortisol response to awakening stress post-treatment: Treatment vs placebo p=0.08; pre-treatment vs post-treatment p=0.30; response x treatment vs placebo p=0.67. 5) Tendency towards positive effect in treatment group: Omissions p=0.02; Commissions p=0.35; Hit RT p=0.06; Hit RT SE p=0.001; Variability p=0.005.	At least one of the saliva samples was lost for eight subjects in the treatment group (8/29) and for five in the placebo group (5/30).
Panossian, et al. (1999), Armenia	Three trials on three groups of athletes: Study 1) Double-blind, randomised, placebo-controlled trial for 10 days (*Bryonia &* placebo*)* Study 2) Double-blind, randomised study (*Schisandra* & *Bryonia*) for Study 3) Double-blind,	Study 1) Forty-four 15-16 year-old athletes (jumpers, sprinters, wrestlers and sprinters). Study 2) Thirty-two 15-16 year-old athletes (jumpers). Study 3) One hundred and nine athletes (boxers, wrestlers and weightlifters).	To evaluate the effects of *Schisandra chinensis* and *Bryonia alba* on concentration of NO and cortisol in blood plasma, and determine whether NO test can be used for evaluation of stress protective	*Schisandra chinensis* (Turcz.) Baill. and *Bryonia alba* L. Both standardised	During the three trials athletes followed the same training course and feeding regimes. Tested before and after treatment and before and after exercise for: 1) Salivary NO 2) Plasma and salivary cortisol 3) Working capacity (maximal oxygen consumption/physical working criteria, PWC_{170} test) 4) Endurance (number of jumps per minute for boxers, throw of wrestling dolly for wrestlers, maximal weight jerk lifted in 12 approaches for weightlifters, etc.).	1) After treatment with adaptogens (both *Schisandra* and *Bryonia*) heavy physical exercise does not increase salivary NO in athletes p<0.05. In placebo control group heavy physical exercise increased salivary NO. 2) Both *Bryonia* and *Schisandra* decreased plasma and saliva cortisol in well-trained athletes.	Blood cell counts were also performed; these are not reported in this review due to not being relevant to the topic. *Bryonia* and *Schisandra* have the same effect as heavy physical exercise in beginner athletes: elevation of both NO and cortisol

	randomised, placebo-controlled trial (*Schisandra* & *Bryonia* & placebo) for 8 days.		effect of an adaptogen.				in plasma and saliva. In well-trained athletes, both adaptogens decreased salivary cortisol and increased salivary NO. Physical exercise did not increase both NO and cortisol levels in saliva after treatment with adaptogens.
Reay et al. (2010),	Placebo-controlled, double-blind, randomised, cross-over trial. 8 days.	Thirty healthy adult volunteers.	To investigate *Panax ginseng's* effects upon working memory processes following single and repeated ingestion.	*Panax ginseng* C.A.Mey. (G115)	Groups: Placebo 200mg 400mg 1) Subjective mood: Bond-Lader visual analogue scales (16 items combined to form three mood factors: 'alert', 'calm' and 'contented'. Cognitive battery: 2) Working memory: Computerised Corsi block tapping task. 3) N-back task: Three-back sensitivity index (SI) and reaction time (RT) recorded. 4) Random number generation task.	Sub-chronic effects (7 days treatment). No significant treatment related effects for any outcome measure. Acute effects (day 1) 1) Significant main effect of treatment 'calmness' ratings ($p=0.014$) at 2.5h $p=0.012$ and 4h $p=<0.0001$. Significantly improved ratings of 'calmness' on day 8 post-treatment (at the same dose) at 1h $p=0.029$ and 4h $p=0.015$. 2) Not significantly modulated. 3) RT: significant main effect of treatment on average reaction times $p=0.006$. SI: Significant main effect (average of treatment doses) of treatment $p=0.003$. 4) N.S.	Findings confirm that acute dose can modulate cognitive function and mood, however no effects following 7-day dosing.
Schaffler et al. (2013), Germany	A multi-centre, prospective, exploratory, open, controlled, randomised 3-arm parallel group comparison study. Two and eight weeks.	One hundred and forty-four participants, male and female, 30-50 years with symptoms of fatigue and chronic exposure to occupational and/or social stress.	To explore efficacy of *Eleutherococcus senticosus* (ES) compared to stress management training (SMT) and combination of ES and SMT (COM)	*Eleutherococcus senticosus* (Rupr. & Maxim.) Maxim. Extract not sufficiently described.	1. Cognitive performance (memory, attention, verbal, visual); 2. Sheehan Disability Scale (SDS); 3. Fatigue, exhaustion MFI-20; 4. Multi-dimensional mood state questionnaire (MDMQ); 5. ASS-SYM; Beck depression inventory (BDI-II); 6. Well-being index (WHO-5); 7. Leeds Sleep Evaluation Questionnaire (LSEQ); 8. Heart rate (HR); electrodermal activity; 9. Salivary cortisol.	Test parameters improved from visit to visit in all 3 treatment groups with the exception of WHO-5 and the BDi-II score reporting values within the reference range for normal population. Indicates ES was not significantly different to SMT, and COM may be more effective the ES alone.	N/A

			for stress-related symptoms.				
Scholey et al. (2010), Australia	A randomised, double-blind, placebo-controlled crossover trial. 4 study days, 7 days apart.	Thirty-two (16 male and 16 female) healthy participants 18-40 years.	To evaluate the effects of a highly standardised extract of *P. quinquefolius* for its effects on cognitive function, mood and blood glucose in humans.	*Panax quinquefolius* L.commercial extract Cereboost.	Four doses: 0mg, 100, 200 and 400mg. Cognitive measures: Computerised Mental Performance Assessment System (COMPASS) battery incl.: 1)Word presentation 2)Immediate word recall 3)Picture presentation 4)Face presentation 5)Simple reaction time 6)Choice reaction time 7)Four choice reaction time 8)Stroop colour-word task 9)Numeric working memory 10)Alphabetic working memory 11)Corsi blocks (tapping task) 12)N-back 13)Delayed word recall 14)Delayed word recognition 15)Delayed picture recognition 16)Delayed face recognition 17)Serial sevens subtraction task 18)Serial threes subtraction task 19)Rapid visual information processing or Bakan task Mood measures: Bond-Lader VAS Other: a) Depression anxiety and stress scale (DASS) b) State-trait anxiety inventory (STAI) c)Symptom checklist	2) Significant main effect of Treatment p=0.006 and a Treatment x Time interaction p=0.006 improvements associated with 200mg dose at all time points (p=0.003, p=0.002, p=0.002 at 1hr, 3h, 6h respectively). 6) Significant main effect of treatment p=0.030. 9) Significant main effect of treatment p=0.007. 10) Significant main effect of treatment p=0.04. 11) Significant main effect of treatment p=0.041. Mood: single effect of treatment, the Treatment x Time interaction on self-rated calmness p=0.034. No significant effects on 1, 3, 4, 5, 7, 8, 12, 13, 14, 15, 16, 17, 18, 19 or on a, b or c.	Blood glucose results not included due to not being relevant to this review.
Scholey & Kennedy, (2002), UK	Two randomised, double-blind, counterbalanced, placebo-controlled trials. Five study days,	Study 1: Eighteen female and two male healthy undergraduate volunteers. Study 2: Fourteen female and six	To examine the dose-dependent cognitive effects of *Ginkgo biloba* and *Panax ginseng* in healthy	*Ginkgo biloba* L. (GK501) and *Panax ginseng* C.A. Mey. (G115).	Cognitive measures: 1)Serial threes 2)Serial sevens Testing took place at 1, 2.5, 4 and 6h following each treatment.	Ginkgo: !) Significant increase in number of subtractions at 4h following 120mg p=<0.05, 240mg p=<0.001, and 360mg p=<0.01. More errors were made at 120mg at 4h p<0.01. 2)No significant reduction for number of subtractions for any dose, though significant improvement in number of errors for all doses at 2.5h p=<0.05 Ginseng:	Ginkgo/Ginseng combination was also tested in a third trial and those results not included in this review due to combinations falling outside

	conducted 7 days apart.	male healthy undergraduate volunteers.	young volunteers, and to examine differential interactions with cognitive demand.			1) N.S. differences from placebo in number of subtractions or number of errors at any dose. 2)Significant decrement in performance for 200mg (fewer subtractions) p=<0.05 at 1h, 2.5h and 6h. Significant improvement in accuracy following 400mg at 4h an d6h p=<0.05.	the inclusion criteria.
Shevtsov et al. (2003), Russia	Randomised, double-blind, placebo-controlled, parallel-group study. Acute dose (1 day).	One hundred and twenty-one healthy male volunteers.	To study the anti-stress and stimulant effects of a single dose of SHR-5 in healthy young males against a background of fatigue and stress.	*Rhodiola rosea* L. (SHR-5) 370mg (2capsules) and 555mg (3 capsules).	1. Capacity for mental work: Total Anti-fatigue Index (TAFI) (assessing visual perception, short-term memory and perception of order). 2. Pulse pressures	1. Rhodiola 2 capsules difference in TAFI p<0.0001 Rhodiola 3 capsules p<0.0001. Highly significant difference in TAFI between the placebo and the Rhodiola groups, specifically the Rhodiola 3 capsules. 2. Significant beneficial effect of treatment p0.007 for Rhodiola 2 capsules and 3 capsules.	N/A
Spasov et al. (2000), Russia	Randomised, double-blind, placebo-controlled trial, Twenty days	Forty male students from India 17-19 years old during an examination period of first year studies at Volgograd Medical Academy.	To study the anti-stress and stimulatory effects of SHR-5 in healthy foreign students during stressful circumstances.	*Rhodiola rosea* L. (SHR-5)	1. Physical fitness - two parameters: a) veloergonomic test PWC-170 measured in kg/min, and b) pulse rate before and after the ergometric test. 2. Psycho-motoric function: a) Maze test b) Tapping test. 3. Mental work capacity: Correction of text test. 4. Tests based on self-evaluation: mental fatigue. 5. General well-being test (SAM test).	Improvement of verum vs placebo: 1. a) p~0.1 (N.S.) b) Improvement of pulse rate p<0.05 2. a) p<0.05 b) N.S. 3. N.S. 4. p<0.01 5.p<0.05	N/A
Sunram-Lea et al. (2005), UK	Double-blind, placebo-controlled, balanced, cross-over design. Two study days with 7 day washout	Thirty (15 male, 15 female) healthy participants, 18-25 years.	To examine the effect of acute administration of 400mg of *Panax ginseng* on cognitive performance	*Panax ginseng* C.A. Mey. (G115)	1. CDR Battery with primary outcome measures: a) Quality of memory factor b) Speed of memory factor c) Speed of Attention factor d) Accuracy of attention Secondary outcome measures: e) Working memory sub-factor f) Secondary memory sub-factor	1. a) N.S. b) N.S. c) p=0.03 d) N.S. e) N.S. f) N.S. g) N.S.	400mg improved speed of attention indicating a beneficial effect on subjects' ability to allocate attentional processes to a

	period between these days.		and mood in healthy young volunteers.		g) CDR factor scores Bond-Lader VAS		particular task. No other effects seen.

Table S3

Critical appraisal results across studies using the Jadad tool

Literature	Auddy et al. (2008)	Benson et al. (2014)	Cardinal et al. (2001)	Cropley et al. (2002)	D'Angelo et al. (1986)	Darbinyan et al. (2000)	De Bock et al. (2004)	Downey et al. (2013)	Edwards et al. (2012)	Ellis & Reddy (2002)	Facchinetti et al. (2002)	Jezova et al. (2002)
Described as randomised[a]	1	0	1	1	1	1	1	1	0	1	1	1
Described as double-blind[a]	1	1	1	0	1	1	1	1	0	1	1	1
Description of withdrawals[a]	1	0	1	0	0	1	1	0	1	1	0	0
Randomisation method described and appropriate[b]	1	1	0	0	0	0	0	1	0	1	0	0
Double-blinding method described and appropriate[b]	0	0	0	0	0	1	0	0	0	1	0	0
Score	**4**	**2**	**3**	**1**	**2**	**4**	**3**	**2**	**1**	**5**	**2**	**2**

Literature	Kennedy et al. (2004)	Kennedy et al. (2001)	Kenned y et al. (2002)	Olsson et al. (2009)	Panossian et al. (1999)	Reay et al. (2010)	Schaffler et al. (2013)	Scholey et al. (2010)	Scholey & Kennedy, (2002)	Shevtsov et al. (2003)	Spasov et al, 2000	Sunram-Lea et al. (2005)
Described as randomised[a]	1	0	1	1	1	1	1	1	1	1	1	0
Described as double-blind[a]	1	1	1	1	1	1	0	1	1	1	1	1
Description of withdrawals[a]	0	0	0	1	0	1	1	0	0	0	0	0
Randomisation method described and appropriate[b]	1	1	1	1	0	1	1	1	1	1	1	1
Double-blinding method described and appropriate[b]	1	0	0	1	0	1	1	1	0	0	1	1
Score	**4**	**2**	**3**	**5**	**2**	**5**	**4**	**4**	**3**	**3**	**4**	**4**

a) A study receives a score of 1 for "yes" and 0 for "no"

b) A study receives a score of 0 if no description is given, 1 if the method is described and appropriate, and -1 if the method is described but inappropriate