Appendix 1. Quality rating scale assessment for all studies with prospective data.

1. Did the study include a theoretical framework?
2. Was the study powered to detect a non-trivial correlation?
3. Was the study design prospective in order to infer an influence of stress on PA?
4. Did the study include a control group comparison?
5. Was an objective measure of stress used? If experimental, was a manipulation check included for the stress condition?
6. Were the measures of stress reliable (e.g., pre-tested)?
7. Was an objective measure of physical activity/inactivity used? If the outcome is exercise intervention adherence/compliance, were participants monitored?
8. Were the measures of physical activity/inactivity reliable (e.g., pre-tested)?
9. Were statistically appropriate/acceptable methods of data analyses used to address the specific question of interest in the current study?

	1	2	3	4	5	6	7	8	9	Rating [a]
Allard et al., 2011	X		X		X	X	X		X	6
Bell et al., 2006	X		X		X	X	X	X	X	7
Brown et al., 1988	X	X	X		X	X	X		X	6
Brown et al., 2003	X		X		X	X	X	X	X	7
Brown et al., 2009	X		X		X	X	X	X	X	7
Budden & Sagarin, 2007	X	X	X		X	X	X		X	7
Burton et al., 1999	X		X		X	X	X		X	6
Burton et al., 2010	X		X		X	X	X	X		6
Castro et al., 2002	X	X	X		X	X	X		X	7
Chambers et al., 2009	X		X		X	X	X	X	X	7
Delahanty et al., 2006		X	X		X	X	X	X	X	7
Dobkin et al., 2005	X	X	X		X	X	X		X	7
Dobkin et al., 2006	X	X	X		X	X	X		X	7
Dougall et al., 2011	X	X	X		X	X	X	X	X	8
Dunton et al., 2009		X	X		X	X	X		X	6
Durrani et al., 2012		X	X		X	X	X	X	X	7
Grace et al., 2006	X	X	X	X	X	X	X	X		8
Griffin et al., 1993		X	X		X	X	X	X	X	7
Groeneveld et al., 2009			X		X		X		X	4
Ho et al., 2002	X	X	X		X		X		X	6

Hooper et al., 1995		X	X		X		X	X	X	6
Hull et al., 2010	X	X	X		X	X	X	X	X	8
Johnson-Kozlow et al., 2004	X	X	X		X	X	X	X	X	8
Jones et al., 2007	X	X	X		X	X	X		X	8
Jouper et al., 2009	X	X	X		X	X	X	X	X	8
King et al., 1997		X	X		X	X	X	X	X	7
LeardMann et al., 2011			X		X	X	X	X	X	6
Lutz et al., 2007		X	X		X	X	X	X	X	7
Lutz et al., 2010		X	X		X	X	X		X	6
Macleod et al., 2001			X		X	X	X		X	5
Miller et al., 2004		X	X		X		X	X	X	6
Moen et al., 2011	X	X	X	X	X	X	X		X	8
Oaten et al., 2005	X	X	X	X	X	X	X		X	8
O'Connor et al., 2009	X	X	X		X		X		X	6
Oman & King, 2000	X	X	X		X	X	X	X	X	8
Payne et al., 2002	X	X	X		X	X	X		X	7
Payne et al., 2005	X	X	X		X	X	X		X	7
Payne et al., 2010	X	X	X		X	X	X		X	7
Phongsavan et al., 2008		X	X		X	X	X	X		6
Reynolds et al., 1990			X		X	X	X	X	X	6
Rod et al., 2009	X		X		X		X		X	5
Rodriguez et al., 2000	X	X	X		X	X	X		X	7
Roemmich et al., 2003		X	X	X	X	X	X	X	X	8
Sherman et al., 2009		X	X		X	X	X		X	6
Smith et al., 2005	X	X	X	X	X	X	X	X	X	9
Smith et al., 2008	X		X		X	X	X		X	6
Sonnentag et al., 2009	X	X	X		X	X	X		X	7
Steptoe et al., 1996		X	X	X	X	X	X		X	7
Steptoe et al., 1998		X	X		X	X	X		X	6
Twisk et al., 1999	X	X	X		X	X	X		X	7
Stetson et al., 1997		X	X		X	X	X	X	X	8
Urizar et al., 2005	X	X	X		X	X	X	X	X	8
Vitaliano et al., 1998	X	X	X	X	X	X	X		X	8
Wilcox et al., 2004	X	X	X		X	X	X	X	X	8
Williams et al., 1995			X		X	X	X	X	X	6

[a] Rating is the total number of yes ("X") responses.

Appendix 2. Cross-sectional (n = 100), retrospective (n =4[a]) and qualitative (n = 9) studies investigating the effects of stress on indices of physical activity. See main text for full citations.

Study	Sample	Participants (n)	Theoretical framework or model	Study design	Stress measure[s]	Physical activity measure[s]; Data transformation	Significant findings, associations, effect sizes
Ahola, 2012 Journal of Occupational and Environmental Medicine	Random sample from National Population Register of Finland M + W Mean age = 44.5y (SEM = 0.15)	3,264	Job strain; Effort-reward imbalance	Cross-sectional	Maslach Burnout Inventory- General Survey	1-item survey Binary respondent classification; "Active" classified as > 4 hours of LTPA/week.	Work-related burnout syndrome related to low PA. When sex, age, marital status, and occupational grade were taken into account, 1 SD increase in burnout score was related to a 1.21-fold increase (95% CI, 1.12–1.30) in the likelihood of low PA. Work-related exhaustion was associated with low physical activity (OR, 1.23; 95% CI, 1.14–1.32).
Aldana, 1996 Perceptual and Motor Skills	Working adults at Connecticut General Life Insurance Company M+ W Mean age = 37.3y	32,229	None	Cross-sectional	Strain Questionnaire Life Events Schedule	Items from NHIS survey; FREQ and DUR for 22 different activities; converted into kcal Binary respondent classification: "high active" classified as > 3 kcal/kg/day	Higher PA related to lower stress. Low active subjects – 31.7% had moderate stress. 24.4% had high stress High active subjects- 9.2% had moderate stress (OR = .75, 95% CI = .70-.80) 4.7% had high stress (OR = .49. 95% CI = .46-.53)
Ali, 2006 Scandinavian Journal of Public Health	Working adults M + W Age range = 18-64y	5,180	Job strain	Cross-sectional	Karasek job control/latitude Economic stress (1 item question) Unemployment	1 item survey (4-point scale) Binary respondent classification: low PA vs. all other categories.	M and W classified as having job strain (OR = 1.50, 95% CI = 1.07, 2.10; OR = 1.60, 95% CI = 1.06, 2.44), unemployed (OR = 1.64, 95% CI = 1.13, 2.37; OR = 1.81, 95% CI = 1.16, 2.44) or under economic stress were more likely to be inactive (OR = 1.87, 95% CI = 1.37, 2.54; OR = 1.76, 95% CI = 1.26, 2.46) were more likely to be inactive than relaxed employees.

Allen, 2006 American Behavioral Scientist	Working adults (at least 20 hours of work/week) and either married or living with partner with at least one child at home M + W Age range = 19-78y	246	Work-family conflict	Cross-sectional	FIW WIF	1-item survey (yes/no) Binary respondent classification: Yes = participation in any PA outside work in past month (example activities provided)	Path analysis (BMI model) – FIW associated with no PA (B = -.20, p = .036), but not WIF. PA correlated with FIW, r = -.16 (p < .05), but not WIF (r = -.10).
Allison, 1999 Canadian Journal of Public Health	Canadians enrolled in the 1994 National Population Health Survey M + W Age range = 20-24y	1,395	Life events	Cross-sectional	Chronic Stress Psychological distress	Physical inactivity measured with Physical Activity Index Binary respondent classification: "inactive" if energy expenditure < 1.5 kcal/kg/day	The most consistent predictors of risky behaviors were chronic stress and "main" occupational activity; however, chronic stress and distress did *not* predict physical inactivity status.
de Assis et al., 2008 Clinics	Able-bodied Brazilian patients with PTSD M + W Mean age = 40.1y Age range = 15-68y	50	None	Retrospective	Clinician Administered Post Traumatic Stress Disorder Scale SCID Beck Depression and Anxiety Inventories	Binary respondent classification: "Active" defined as exercising > 3 days/week, > 20 min/session at an "adequate intensity".	Significant changes in PA were observed after the onset of PTSD (52% before onset of PTSD, 22% afterwards). Stated lack of time and motivation for justification for stopping PA.
Bennett, 2006 Annals of Behavioral Medicine	Working adults from 26 small manufacturing firms in USA M + W Mean age = 43.2y (SD = 11.7)	1,442	Job strain	Cross-sectional	Karasek Job Content Q. (modified)	LTPA survey FREQ of 8 activities causing labored breathing in last 4 weeks Continuous hours/week r = .53 w/ accelerometery	LTPA related to job strain (p = .01) and job control (p = .01) but not job demands (p = .25). Job strain by ethnicity interaction (p = .03). Whites experiencing job strain reported 1 fewer hours a week of leisure PA compared to whites not reporting job strain. Contrary to predictions, minorities increased leisure PA with job strain, compared to whites.
Berger, 2008 Sport Management Review	Canadian adolescents M + W Age range = 15-19y	Not stated	None	Qualitative	N/A	N/A	Respondents report: 1) Physical and mental stress of home difficulties makes planning for sport participation difficult. 2) Sport is alternatively used as a coping mechanism for difficulties at home.

Bopp, 2004 Women & Health	Older, rural African American and white adults Women only Mean age = 70.6y (SD = 9.2)	102	None	Cross-sectional	1 item of perceived stress taken from NHIS survey: FREQ of stress in last two weeks.	PA Scale for the Elderly 2 data transformations Hours/week of strength training Binary respondent classification: Any strength training participation	No relationship between stress and strength training participation. Stress and strength training (r = -.12, p = .24) Stress and strength training hours/week (r = 0.11, p = .27)
Boutelle, 2000 Preventive Medicine	Working adults at 24 worksites M + W Age range unclear	9,043	None	Cross-sectional	PSS-4	Godin Leisure Time Q 4-category respondent classification- quartiles of LTPA	Classification into higher exercise quartiles is associated with less perceived stress in both M and W. OR of low exercise for men who are high stress = 0.67 (95% CI = .56-.81) OR of low exercise for women who are high stress = 0.74 (95% CI = .63-.88)
Brannagan, 2011 Health Education Journal	College freshmen M + W Mean age = 18.5y (SD = 1.08) Age range = 18-24y	369	Social-Cognitive Theory; Health Promotion Model	Cross-sectional; data collected 3 months post-disaster	Impact of Event Scale (subjective distress scale specifically related to hurricane distress)	Stanford 7 Day PA Recall Data transformed into energy expenditure (kcal/day)	Positive relationship between stress and PA in path analysis (β = .162, *p* = .05). Higher stress related to greater PA. Self-efficacy did not mediate the relationship between stress and PA.
Bray & Born, 2004 Journal of American College Health	College freshmen M + W Mean age = 17.8y (SD = .54) Age range = 18-19y	145	Life transitions	Cross-sectional Retrospective self-report of change	POMS-Adolescent GHQ-28; Emotional distress	Items from YRBS and National College Health Risk Behavior Survey; FREQ and DUR of vigorous PA 2 time points: PA in last 8 weeks of HS and 1st 8 weeks of college 4-category respondent classification: If FREQ > 3sessions/week for > 20 min classified as "active" (both recalled baseline and in college)	Transitioning students, overall, declined in PA from 3.32 (SD = 2.12) sessions/week to 2.68 (SD = 2.24) sessions/week (p < .01, ES = 0.30). Insufficiently active students were lower on vigor (*p* < .01), higher on tension and fatigue (p's < .05).

Bray, 2006 Journal of American College Health	College freshmen M + W Mean age= 17.8y (SD = .54) Age range = 17-19y	175	Transitions	Cross-sectional	Distress: GHQ-28	Items from BRFSS (2003); FREQ and DUR of vigorous exercise > 10 min over last 7 mos Binary respondent classification: Those exercising > 3 sessions/week for > 20 minutes classified as "sufficiently active"	Insufficiently active students reported more somatic symptoms (p = .02), but no difference in anxiety/insomnia (p = .10). Insufficiently active students scored lower on psychological wellbeing. No difference in upper respiratory infectious illnesses between sufficiently and insufficiently active students.
Brisson, 2000 Journal of Occupational and Environmental Medicine	White collar workers in 21 organizations M + W Mean age (M) = 41.4y (SD = .14) Mean age (W) = 38.5y (SD = .13)	6,995	Job strain	Cross-sectional	Karasek Job Content Questionnaire (18-items)	1 item survey Binary respondent classification: Sedentary defined as FREQ <1x/ weekly during the previous 6 months Exercise defined as "rigorous" LTPA > 20 min	Prevalence of sedentary behavior was elevated in men in the lowest quartile of decision latitude (OR = 1.3; 95% CI = 1.0 - 1.7), in the passive group (OR, 1.3; 95% CI, 1.0 -1.5), and in the high strain group (OR = 1.2; 95% CI = 1.0 - 1.6). In women, this prevalence was elevated in the third quartile of psychological demand (OR = 1.3, 95% CI = 1.1 to 1.6). Associations remained even after adjustment for age, education, PA at work, social support, hostility and cynicism.
Buchman, 1991 Journal of Psychosomatic Medicine	First-year medical school students M + W Mean age = 23.4y	200	None	Cross-sectional	1 item survey for daily stress (5-point scale) CES-D	FREQ of vigorous LTPA or exercise > 20 minutes without stopping. DUR of exercise routine in months. 1-item rating of exercise level compared to peers (5-point scale) Fitness - Aerobic Step Test	Daily stress was weakly associated with fitness, FREQ of PA, peer-PA comparison rating in men (r = -.16, -.23, -.29, respectively) but not in women. Daily stress predicted FREQ of PA (B = -.62, SE = .236, p = .009) and peer-PA comparison rating (B = -.27, SE = .087, p = .002). Stress correlated with BMI in women (r = .35). Depression also negatively associated with fitness, FREQ of PA and peer-PA comparison rating.
Burdette, 2008 Social Science Medicine	Adults in Texas M +W Mean age = 45.8y (SD = 16.6)	1,504	Neighborhood Disorder and Distress Model	Cross-sectional	Kessler K-6 Distress Scale Perceived Neighborhood Disorder (3 items)	3- items for FREQ of walking, MVPA. Binary respondent classification	Distress and irregular exercise correlated, r = .11 (p < .001). Distress did not predict exercise after controlling for other variables (p = .085). Irregular exercise was a partial mediator of the association between psychological distress and obesity (z = 2.46, p < 0.05).

Chang, 2008 Journal of the American Dietetic Association	Low income overweight and obese mothers W only Mean age = 27.2y (SD = 4.7) Age range = 18-35y	80	Barriers for activity	Qualitative	Open-ended questions about health and lifestyle	None	Decreases in PA may be exacerbated by stressful situations. Stress is a significant barrier for physical activity. Time availability; demands from family Mothers consistently commented about lack of adequate personal time. They said that if they had time, they would take a walk to relieve their stress. However, feelings of exhaustion and lack of time made routine exercise nearly impossible.
Chang, 2008 BMC Public Health	Low income mothers (55% African American) W only Mean age = 27.1y (SD = 6.0)	216	None	Qualitative; Factor analysis	Personal factors affecting stress management (9 items) Environmental factors affecting stress management (2 items)	Personal factors affecting physical activity (11 items) Environmental factors affecting physical activity (5 items)	In "Additional file 2" (supplementary file), women report that they do not exercise when they feel stressed, depressed, angry, upset. Also exercise "helps me to relieve my stress"
Choi, 2010 Journal of Occupational and Environmental Medicine	Workers from National Survey of Midlife Development M + W Age range = 32-69y 36.5% of sample between 50-59y	2,019	Job strain	Cross-sectional	Karasek Job Content Q.: Job demands, Job control	2 items for LTPA (moderate LTPA, vigorous LTPA) FREQ of MVPA. MVPA defined for participants.	After controlling for covariates (e.g., age, race, education, income, physical effort at work, obesity, and alcohol consumption), high job control was associated with active LTPA. Active jobs (high control and low demands) and low-strain jobs (high control and high demands), compared to passive jobs (low control and low demands), increased the odds for active LTPA. The associations varied by sex and education level. Job demands alone were not associated with active LTPA.
Cohen, 1991 Preventive Medicine	Working adults at PA power plants M + W Mean age (M) = 36y (SD = 9) Mean age (W) = 30y (SD = 5)	> 1,100	None	Cross sectional	Job demands, life events, and marital conflict	Lack of PA = not exercising at least once or twice in last month	No main effect of stress on exercise. Women who work full time exercise less. Men who have high job demands and marital conflict exercise more. Employment status
Cohen, 1998 Health Psychology	Healthy adults M + W Age range = 18-55y	276	Stress-health model	Cross sectional	Life Events and Difficulties Schedule	Exercise frequency per week (dichotomous)	"Marginal association" of stress and exercise. 62.9% of those with a chronic stressor exercise <2x/week compared to 49.0% of those without a chronic stressor. (OR = 1.57, 95% CI = 0.86-2.86)

Connell, 1994 American Journal of Alzheimer's Care	Caregivers M + W Age range = 43-88y	44	Spouse care giving	Cross-sectional	Q that addressed health behavior, status, coping strategies, relationship between caregiver and spouse	1-item indicator of changes in exercise since starting care giving; 1-item indicator of using exercise to cope with care giving stress	33% report lower levels of exercise. 9.7% reported an increase in exercise. 20.5% report using exercise to cope with care giving stress.
Conroy, 2007 Medicine and Science in Sports and Exercise	Early post-menopausal women W only Mean age = 56.9y	497	None	Cross-sectional	PSS-4	Modifiable Activity Q (MAQ)	PSS did not predict PA (spearman rho = -.04) PSS did not predict PA lapse. Women with high activity levels reported higher self-efficacy and greater perceived benefits from PA than women with lower activity levels.
Devine, 2000 Social Science and Medicine	Pregnant women W only Age range = 18- 40y	36	Life transitions Life course perspective	Qualitative Prospective Multiple interviews over time	Interview guide covered smoking and alcohol use, social roles, and emotional well-being	Interview guide covered perceptions and practices for lifestyle behaviors (i.e. diet, PA, etc) and physical well-being	Pregnancy disrupts attempts to be physically active. Stress and age or role related changes in perspective interrupted the continuity of weight orientations and PA behavior patterns. Some respondents reported exercising for their mental health.
Devonport, 2012 Journal of Sports Behavior	Habitual exercisers in the United Kingdom M + W	9	Stress and coping	Qualitative	Semi-structured interview	Semi-structured interview (exercise regime)	All participants modified their exercise regime when they experienced water loss. However, these modifications varied by individual, from minimal to considerable changes, which also effected psychological and physiological wellbeing.
Divin, 2009, 2010 a) Dissertation at Oklahoma State; b) Medicine and Science in Sports and Exercise	Student athletes; Female student athletes M + W	a) 98 b) 52	None	Cross-sectional	PSS-10	HPLP PA	2009: PA and stress were associated in NCAA Division I athletes (r=-.35) but no association in NAIA athletes. 2010: PA and stress associated (r = -.30) No relationship for male athletes (Personal communication with author). Athletic Division p = .006

Emeny, 2012 Brain, Behavior, and Immunity	Workers in southern Germany M + W Mean age = 46.4y (SD = .4; low strain); 46.8y (SD = .3; high strain) Age range = 35-74y	951	Job strain	Cross-sectional	Karasek Job strain index	Physical inactivity versus physical activity was defined by 2 separate 4-category interview questions that assessed hours/week spent on sports activities during leisure time in summer and winter. Each participant was asked: How often do you carry out sports in the winter? How often do you carry out sports in the summer? Answers were given on a four-level graded scale (no activity, <1 hour/week, 1 to 2 hour/week, and >2 hour/week). One variable was created, whereby a participant was considered inactive if he or she participated in less than 1 hour/week of regular physical activity in at least 1 season. Two items: hours/week of activity in summer and winter (Likert items): binary for active or inactive	Workers with high job strain were more likely to be physically inactive than workers with low job strain (61.6% vs. 48.6%, $p < .0001$). Physical inactivity mediated the association between job strain and C-Reactive Protein (inflammation) ($\beta = .17$, SE = .06, $p = .007$). In mediation model, job stain predicts physical inactivity ($\beta = 1.06$, $p = .003$).
Fan, 2011 Health & Place	Chicago urban dwellers M + W	1,544	Author-proposed conceptual model	Cross-sectional	Two items: Victim of violence and Threatened or harassed	Three items: Trying to lose weight, Health limited moderate PA, and importance of getting exercise	No relationship of stress to PA.

Fondell, 2011 Medicine and Science in Sports and Exercise	Population-based web cohort of adults M + W Age range = 20-60y	1,509	None	Cross-sectional	PSS-14	Time for nine activity levels (including sleep), converted to MET/hour/day 3-category respondent classification: "Medium" active "High" active" = PA > 55 MET/hour/day	At baseline: More low stress (PSS < 23) individuals classified as "high" active vs. high stress (PSS > 23) individuals, 57.4 vs. 42.6%. The same trend seen for "medium" PA classification: 56.1 vs. 43.9%. Among those who have had an upper respiratory tract infection: Low stress: 268 individuals classified as achieving MVPA. High stress: 174 individuals classified as achieving MVPA. Appropriate stats not provided.
Fredman, 2006 Preventive Medicine	179 caregivers, 670 non care-givers Women only Age range >80y	849	Caregiving	Cross-sectional Case control	PSS-14 CES-D	Daily PA (includes blocks of walking and flights of stairs) Leisure PA: walk for exercise, any other exercise	Spouse caregivers were higher than non-caregivers for perceived stress and depression. Spouse caregivers had higher daily physical activity than other groups (p = 0.03) but lower leisure time PA (OR = 0.64, 95% CI = 0.41-1.00).
Fry, 1985 Journal of Social Psychology	Vietnamese youth refugees M + W Age range = 25-30y	150	Stressed population	Qualitative	Interview for stress ideations- hopelessness (3 items), low self-esteem (2 items), social isolation (3 items), general anxiety (4 items)	None	Subjects reported decreased physical activity when they felt general anxiety. Low self-esteem and self-criticism made the subjects feel inadequate, which made it difficult for them to attain their goals.
Fuller-Jonap, 1995 Journal Aging and Health	52 caregivers 53 controls Men only Age range = 65-91y	105	Spouse care giving	Case control	Brief Symptom Inventory	1 item from Cornell Medical Index (dichotomous)	Regular exercise habit was lower in caregivers ($\chi^2 = 3.96$, $p < .05$). Male spouse caregivers had poorer mental and physical outcomes in certain health domains than male non-caregivers.
Gadalla, 2012 Chronic Disease and Injuries in Canada	Canadian adolescents M + W Age range = 12-17y	5,476	Unhealthy behaviors in adolescents	Cross-sectional	Canadian Community Health Survey (1 stress item; Age range = 15-17y)	Level of PA (active) determined by total energy expenditure, which was calculated by FREQ, time, and MET per session. Sedentary activity (inactive)	1/3 of adolescents engaged in unhealthy behaviors (i.e. drinking, smoking, etc) and it was significantly associated with income, education, and sex. While the percentage of adolescents consuming a healthy diet increased over the study, at least 50% were still leading unhealthy lifestyles.
Gallant, 1997 Journal of Aging and Health Gallant, 1998 Research on Aging Gallant, 2003 Psychology and Aging	Caregivers M + W Age range = 30-92y	233	Spouse care giving	Cross-sectional (mail survey)	Social and Emotional Burden subscales of the Caregiver Burden Inventory	1 item adapted from the Alameda County Study: PA frequency Composite index of five health behaviors	Since starting care giving: 49.3% of all subjects are less active 9.2% of subjects are more active No gender differences Path analysis model including neuroticism found no support of perceived stress impacting physical activity. Objective burden of care giving and depressive symptoms predict health behaviors.

Giuli, 2012 Archives of Gerontology and Geriatrics	Italians M + W Age range = 65-85<y Mean Age = 76.9y (SD = 8.5y)	306	Elderly PA	Cross-sectional	PSS-14	1 item on frequency of exercise per week. Subjects classified as active (> 1 hour week) or non-active	PA levels decreased in subjects with probable cognitive decline, depression and high-perceived stress levels ($p < 0.001$).
Goston, 2012 American Journal of Industrial Medicine	Brazilian civil servants M +W Age range <35-54< y Mean age= 40.2y (SD = 11.1)	893	None	Cross-sectional	Job Stress Scale – Brazilian version	1 item – any activity in the last year (yes or no)	The stress scale shows that 29.6% of public servants were in the low strain group, 21.4% were in the high strain group, and 19% were in the active group.
Gottlieb, 1984 Health Education Quarterly	Random sample M + W Age range = 20-64y	3,025	Life events and life style	Cross-sectional	Telephone Interview- Life Events	Exercise freq for specific activities; including dancing, gardening, sports	Men have higher PA with stress, yet the findings were not significant. However, education and social network directly effected life-style health practices. No association for women, yet social network and life events were negatively related to life-style health practices.

Griffith, 2011 Health Education and Behavior Journal	African American urban dwellers in the American Midwest Men only	105	Role Strain	Qualitative	Exploratory focus groups to examine perspectives on social, cultural, and economical barriers to health behaviors	Exploratory focus groups to examine barriers to health behaviors associated with PA	This article focuses on five themes representing male roles and associated stressors and strains that inhibited greater participation in physical activity: men's time was filled by commitments associated with male roles and responsibilities; men prioritized the roles of father, spouse, community member, and particularly provider/employee over other aspects of their lives, including their individual health; social and cultural norms, many developed during childhood, about the importance of work; social and cultural norms around physical activity; and employment-related strain, exhaustion, and stress coping strategies. Men like this one felt as though they were just "getting by" and keeping their lives from falling apart. In this context of working long and stressful hours, not only is physical activity a low priority, but alternative activities may provide outlets for coping with stress. The stress and exhaustion these men experienced resulting from fulfilling provider and other key family and social roles seemed to be major obstacles inhibiting them from participating in physical activity more regularly. Not only did they report the stress and strain of prioritizing work, but these African American men noted how physically and mentally draining it was to seek to be good providers, fulfill family roles, and contribute to their communities. They also had other strategies for coping with stress that further reduced their motivation to consistently engage in physical activity. Finally, the stress and exhaustion of seeking to fulfill employment, family, and community roles decreased African American men's likelihood of being active, and their strategies for coping with stress, stressors, and strains typically did not include physical activity. Although engaging in physical activity has been associated consistently with better psychological health, the men in our focus groups rarely reported physical activity as a strategy for stress management. Our participants described stress management activities that promoted relaxation or "non-brain activity" after work or during other leisure time. Leisure time also was considered time to spend with family, not for pursuing individual interests or needs such as engaging in physical activity.
Grzywacz, 2001 Journal of Health and Social Behavior	Workers in the National Survey of Midlife Development M + W Age range = 25-74y	3,032	Social inequalities	Cross-sectional	Decision latitude Work-family spillover	Two items (summer and winter exercise frequency). Items averaged for analysis.	Younger, non-black men with a higher education and larger household income tend to exercise more regularly. Higher education contributes to a slower decline in PA throughout life.

Hansen, 2010 International Archives of Occupational and Environmental Health	Danish white collar workers M + W Age range = 25-67y	389	Job demand and control	Cross-sectional	Copenhagen Psychosocial Q (job control and job demand) Stress-Energy Questionnaire	International Physical Activity Questionnaire	No relationship (see page 147, paragraph two of results). No difference between PA groups for stress. However, physically active men perceived lower stress.
Harper, 2007 Psycho-Oncology	Individuals with diagnosis and treatment of cancer 6 months – 10 years before study M + W Age range = 20-84y Mean age = 49.9y (SD = 12.1)	216	None	Cross-sectional	Cancer distress – IES intrusions and avoidance	Five questions: 1. Whether they currently engage in behavior on a regular basis (yes/no), 2. More than or less than 6 months, 3. Changed or not changed since diagnosis, 4. Exercise sessions per month, 5. Average minutes per session.	Exercise behavior increased in 26% of sample after cancer diagnosis. IES-Intrusions, but not IES-avoidance related to greater change in physical function behaviors ($\beta = .03$, SE = .01, OR = 1.03, $p < .05$). Appraisal of cancer diagnosis as a major trauma not predictive of physical function behaviors. No specific analysis conducted for exercise with IES or cancer stress appraisal.
Hellerstedt, 1997 International Journal of Epidemiology	MN worksite Employees M + W	3,843	Job strain	Cross-sectional	Karasek Job strain (demands)	Exercise sessions/week 12 g's about specific activities	No relationship. More job latitude predicts exercise, however. Women who are more stressed may actually exercise more, though this was not significant.
Heslop, 2001 British Journal of Health Psychology	Scottish employees from a variety of occupations M + W Age >16 y	6,000 +	Stress-health model	Cross-sectional	Reeder Stress Inventory (4-item)	Hours of work and recreational exercise	Lower levels of recreational exercise were associated with higher levels of stress for men only. Higher socio-economic groups had higher perceived stress, which was associated with little recreational exercise and other behaviors, such as smoking and drinking alcohol.
Hoffman, 2012 Gerontologist	Caregivers and non-caregivers M + W Age range = 45-63y "Baby Boomers"	5,688 informal caregivers 12,941 caregivers	Caregiving	Cross-sectional	Kessler K6 Distress Scale	Two items, combined to form Sedentary behavior score (dichotomous) Multidimensional Health Behavior Measure	Caregivers and non-caregivers differed in levels of distress (p = .003) No correlation of distress and sedentary behavior. Caregivers and non-caregivers did not differ in levels of sedentary.

Ishizaki, 2008 Scandinavian Journal of Work, Environment, and Health	Japanese working adults M + W Age range = 30-53y	3,571	Job strain	Cross-sectional (Prospective stress data over 7 years but PA data reported only at the first time point)	Job strain questionnaire (not specified)	1 item for exercise FREQ 4-category respondent classification: "almost no exercise", "light exercise", "brisk and sweating exercise 1-2x/week", brisk and sweating exercise > 3 x/week"	High strain associated with no regular exercise in both men and women. No data shown. No statistical tests printed.
Iwasaki, 2001 Canadian Journal of Public Health	Canadian population sample M + W	17,626	Stress-health model	Cross-sectional	Adjusted Specific Chronic Stress Index; Adjusted Recent Life Event Index	Physically active leisure, measured by three indicators (PA index, daily PA participation, PA frequency)	SEM models show that chronic stress predicts PA (B = .04, p < .05) and life event stress predicts PA (B = .08, p < .05).
Johansson, 1991 Social Science Medicine	Swedish workers M + W Age range = 16-65y	7,201	Work organization	Cross-sectional	Job demands, non validated (6 items); job resources	Exercise Sedentary behavior, 1 item Likert scale	Demands and resources related to sedentary behavior, but not exercise. Autonomy related to exercise.
Jones, 1992 Journal of America College Health	College students; national probability sample M + W Age range = 18-25y	1,411	Health-risk behavior	Cross-sectional	2 items of perceived stress: how much; sought help for stress	Minutes of aerobic activity: a) group activity or b) solo activities	Stress did not predict solo or group aerobic activity. Negative affect was inversely related to health behaviors in both men and women, yet amount of hours worked only had a negative impact on women.
Jonsson, 1999 Journal of Cardiovascular Risk	Age-stratified random sample M + W Age range = 25-64y	1,618	Job control and demands	Cross-sectional	Job content Q	Physical/laboratory investigations	Women with high stress tended to have low job control and low social support at work. For both genders, high stress was reported when job demands were high Men with high social support and job control would exercise more during leisure time. Job control was positively related to education, social class, and PA.
Kelsey, 2006 American Journal of Health Behavior	Blue collar workers from 12 worksites in five rural counties in North Carolina W only Age >18y	1,093	None	Cross-sectional	Perceived Stress Scale (PSS-4) [Coping items assessed as well]	11 item checklist assessing frequency and duration of different activities	No relationship between stress and PA.
Kornitzer, 1986 Postgraduate Medical Journal	Belgian white collar workers M only Age range = 40-55y	3,179	Job strain	Cross-sectional	Job stress Q (13 items)	Minnesota Leisure time PA Q (total energy expenditure); also occupational PA	No correlation between stress and exercise, but there was between stress and fitness. Fitness and stress inversely related. Note: Professional status and study level related to higher PA.

Kouvonen, 2005 Preventive Medicine	Municipal and hospital workers M + W Age range = 17-64y	46,573	Job strain	Cross-sectional	Karasek's Job Content Q.	Leisure PA intensity and duration Average weekly participation Met hours/week	Individuals with high job strain, passive jobs, and low control had less PA (MET hours/week) than those with low strain and high control ($p < .001$). Job type - Strain and passive jobs associate with low PA only among non-manual employee ($p < .001$).
Kouvonen, 2006 Occupational and Environmental Medicine	Public sector workers M + W Age range = 17-64y	38,151	Effort/reward imbalance	Cross-sectional	Effort/reward ratio (1 effort item, average of 3 reward items)	No validated survey. Report average time per week in leisure and commuting activity. Stratified by intensity and weighted by METS. Binary: < 2.0 MET hours/day defined as sedentary.	Women with high imbalance more sedentary (OR = 1.10, 95% CI = 1.03 to 1.18, adjusted for age; OR = 1.08, 95% CI = 1.01 to 1.16, adjusted for age, other demographic, occupational and behavioral factors). Men with high imbalance more sedentary (OR = 1.22, 95% CI = 1.07 to 1.39, adjusted for age; OR = 1.17, 95% CI = 1.02 to 1.33, adjusted for age, other demographic, occupational and behavioral factors). Adjusting for job strain (job control and demands) at the group level did not impact OR's, however, adjustment for individual level job strain resulted in disappearance of effect.
Krause, 1993 Social Science and Medicine Journal	Japanese elderly M + W Age > 60y	2,220	Elderly PA	Cross-sectional	Health stress; Financial stress	Three questions about exercise frequency	Health "stress" ($p < .001$) but not financial stress related to lesser physical activity. Social support tends to promote frequent exercise and more physical exercise leads to less psychological distress.
Kuper, 2002 Occupational and Environmental Medicine	Civil servants from Whitehall II Study M + W Age range = 33-55y	10,308	Effort/reward imbalance	Cross-sectional	Effort-reward imbalance scale	1 item, exercising > 1.5 hours per week (moderate or vigorous)	In relation to rewards, there was a high incidence of CHD, as well as poor physical and mental functioning at phase 5. People who exercise have worse balance of effort/reward.
Kye, 2012 Asian Pacific Journal of Cancer Prevention	Random population sample of Korean adults M + W Age range = 30-69y	1,500	Psychosocial factors and health behaviors	Cross-sectional	Psychosocial Well-Being Index: Short form	Dichotomous – exercise 5 days a week for 30 minutes (yes or no)	Exercise not predicted by stress. Self-efficacy was a strong predictor of health behaviors.
Lallukka, 2004 Preventive Medicine	Workers in Finland M + W Age range = 40-60y	6,243	Working conditions and health behaviors	Cross-sectional	Karasek Job Content Q	PA past 12 months, 4 different intensity levels, conversion to METS, binary based on public health dosage	Women with low demands and high control (low strain) had more PA than high strain women, adjusting for age, education, occupational class, and marital status (OR = 1.29, 95% CI = 1.07-1.56).
Lallukka, 2008 Social Science and Medicine Journal	Workers in 3 United Kingdom, Finland, and Japan M + W Age range= 45-60y	11,680	Job strain	Cross-sectional	Karasek Job Strain	London: Physical Inactivity < 1 hour of active/week Finland and Japan: lowest quintile of activity	Job strain was associated with less PA among men in the United Kingdom and women in Finland. Men in London who reported passive work were more likely to be physically inactive, along with women in Helsinki.

Landsbergis, 1998 American Journal of Health Promotion	Employees M Only Age range = 30-60y	285	Job strain	Cross-sectional	Kasarek job demands, latitude	Dichotomous variable composed from frequency and duration of exercise.	Relationship between job demands and sedentary behavior ($p < .05$). Change in job characteristics was not associated with changes in being overweight.
Lang, 2003 Behavioral Medicine	Women who had visited a Veterans' Affairs clinic in California. Mean age = 46.6y (SD = 14.6) Age range = 20-86y	221	None	Cross-sectional	PTSD Checklist-Civilian Version PTSD Scale for DSM-IV	Exercise health behavior items Binary respondent classification for weekly moderate exercise and weekly vigorous exercise	No association of PTSD / stressful life experience and exercise behavior, but a trend was seen for an inverse relationship. Weekly moderate exercise: 60.0% for sexually assaulted group vs. 69.7% for non-assaulted group (not significant). Weekly vigorous exercise: 13.7% for sexually assaulted group vs. 24.0% for non-sexually assaulted group (not significant).
LaRouche, 2012 Journal of Physical Activity and Health	Adults M + W Mean age = 44.0y (SD = 1.2)	86	Life transitions	Cross-sectional – Follow up data from experiment	Life transitions (adolescence, beginning of college, entry into labor market, parenthood)	Interview data. Participants coded as inactive, insufficiently active, moderately or vigorously active FREQ and DUR of PA were examined during transitional life stages	Individuals taking more than 5 hours of PA/week decreased from 70.4% to 17.0% between adolescence and midlife. Declined when entering the labor market from 55.9% to 23.4%. No significant differences between the two groups at midlife.
Laugero, 2011 Appetite	Puerto-Rican adults M + W Age range = 45-75y	1,300	Relationship between stress and dietary/ activity patterns	Cross-sectional	PSS; Life Events Inventory	Modified Harvard Alumni Activity Survey	Highest quartile of stress worst for exercise. $P = .008$, even when controlling for cortisol and insulin (which were examined as mediators). Cortisol TV watching
Li, 2012 Women & Health	Low income mothers W only Age range<30- 40< y	131	Family functioning	Cross-sectional	PSS; Patient Health Questionnaire-9 (for depression)	Two question from International Physical Activity Questionnaire; Time watching television using standardized questions	PSS correlated with LTPA ($r = .25$, $p < .05$). PSS correlated with TV viewing ($r = .29$, $p < .001$). PSS predicts TV watching ($p < .001$). When depression entered into model, stress no longer predictive of TV viewing. PSS predicts low LTPA (OR = 1.79; $p < .05$) independent of depression. Depression does not predict LTPA when stress entered into the model.
Lim, 2005 Preventive Medicine	Random survey of community-dwelling older adults in Australia M + W Age range >65y	8,881	PA among elderly	Cross-sectional	Kessler 6 Distress	Single item; at least 30 minutes of walking or moderate or vigorous activity on at least five days of last week	Adequate PA was independently associated with males of a younger age who had better physical functioning, lower psychological distress, and an adequate consumption of fruits and vegetables. Health problems were often reported as barriers to PA.
Ludlow, 2008 Medicine and Science in Sports and Exercise	M + W Age range = 50-70y	69	None	Cross-sectional	PSS	Yale PA Q	$P = 0.12$ (not significant, but you see a trend).

Ma, 2008 Research in Nursing & Health	Taiwanese adults M + W Age range = 20-60y	239	Physical Activity for Persons with Anxiety model	Cross-sectional	Stressful Life Events Checklist	Past Year Regular PA Checklist	Beta = -.16 in SEM model Stress had a stronger influence on PA than anxiety. Perceived life stress events, perceived benefits of activity, and perceived self-efficacy for activity directly influenced PA.
Magoc, 2010 Health Education Journal	Predominantly Hispanic college students M + W Mean age = 22.05y (SD = 4.72)	392	Attitudes related to exercise importance	Cross-sectional	Not reported	Four items: FREQ, DUR, intensity, importance	Participation in exercise was high, but 69% did not meet the CDC recommendations for PA. Exercise importance and gender were strong predictors of PA.
Makinen, 2010 Scandinavian Journal of Work, Environment, and Health	Finnish workers M + W Age > 30y	3,355	Health behavior related to socioeconomic position	Cross-sectional, national survey	Karasek Job Strain	Inactive (e.g., reading during leisure) Active (e.g., walking >4 hour/week or PA >3 hour/week)	Blue-collar workers had more job strain. They were more likely to be inactive during leisure compared to office workers (OR = 1.44-1.62, 95% CI = 1.08, 2.09). White or blue collar work
Marquez, 2012 Geriatric Nursing	Caregivers and non-caregivers M + W Mean age (caregivers)= 68.6y (SD = 9.1) Mean age (non caregivers) = 67.7y (SD = 9.2)	24 caregivers 48 non caregivers	Caregiving	Case control; Cross-sectional	PSS-10	Objective: Actigraph GT1M & 7164 Subjective: PA scale for the elderly	Caregivers and non-caregivers only differed on one measure of PA, minutes of light intensity PA in the morning (caregivers, M = 2.0 (SD = 2.7); non-caregivers, M = 5.3 (SD = 9.2), p = .03, ES = .36. Non-caregivers reported stronger social support to exercise from family members.

McBride, 2000 Psycho-Oncology	Patients with early stage prostate cancer and breast cancer M + W Age range (prostate cancer) = 43-90y Age range (breast cancer) = 28-91y	920	Stressed population	Cross-sectional	Stress Event (cancer diagnosis) Impact of Events Scale	Routine exercise was assessed as exercise that gets your heart thumping or causes you to sweat for periods > 20 minutes Participants were asked whether they 'set aside time for exercise on a weekly basis', and if so, FREQ/week, average DUR/session and the length of time that exercise has been part of their routine. Binary respondent classification: Exercise weekly (yes/no) 2 items assessed stage of readiness to begin exercising Binary respondent classification: Pre-contemplation stage vs. all other stages	Prostate patients who reported exercising regularly had lower impact scores than those who were not exercising (medians: 0.13 vs 0.56, respectively; $p < 0.02$). Exercise stage of change was not related to stress.
Melamed, 1997 Journal of Psychosomatic Research	Israeli workers without CVD M Only Age range = 20-64y	1,859	Life events	Cross-sectional	Israeli Psychiatric Epidemiology Research Interview life event scale; Karasek job strain	Exercise: yes or no (binary)	There was a trend between intensity level of events in life and low exercise. Life events were positively associated with somatic complaints.
Miller, 2002 Health Psychology	Parents of a child with and without a cancer diagnosis M + W Age range (cancer) = 24-74y Age range (healthy) = 28-47y	50	Stressed population	Cross-sectional Case control; Cancer diagnosis vs. no diagnosis	PSS-10 POMS CES-D	Paffenberger Activity Scale Data analyzed as minutes/week of brisk activity and energy expenditure (kcal/week)	No association but an inverse trend observed. Brisk activity (minutes/week): Parents of children with cancer have less PA (Mean = 46.0, SD = 72.9) than parents with a healthy child (Mean = 80.2, SD = 103.5; not significant; ES = .33). Energy expenditure (Kcal/week): Parents of children with cancer have less energy expenditure (Mean = 875.1, SD = 659.8) than parents with a healthy child (Mean = 1193.9, SD = 1058.2; not significant; ES = 30.1).

Moore-Greene, 2012 Ethnicity & Disease	African American paraprofessionals W only Age range = 18-50y	90	Chronic stress	Cross-sectional	Salient Stressor Impact Q	Physical exercise subscale of the Brief COPE Inventory	Biggest stressors for women include finances (33%), work (28%), and family/friends (19%). Decreased physical exercise created the relationship between chronic stress and BMI, which was high for these women, as 90% of them were obese.
Morassaei, 2011 JOEM Journal of Occupational and Environmental Medicines	Canadian workers from Canadian National Population Health Survey M + W Age range = 25-60y	4,167	Working conditions and demands	Cross-sectional	Job Content Q (13-item)	Frequency and duration of 21 activities	Sense of mastery. Higher levels of skill discretion and decision latitude were associated with higher LTPA.
Mulder, 2011 BMC Public Health	Population of Utrecht, Netherlands M +W Mean age = 44.9y (SD = 15.9)	3,050	Socioeconomic position related to health behaviors	Cross-sectional	Kessler K-6 Distress Scale Financial Stress Health Stress	Participants reported the typical amount (min) of exercise per week	For example, by multiplying the B value of financial stress for exercise with the range of the financial stress scale (i.e. 2), it was found that the difference between a minimum and maximum score on the financial stress scale was associated with a reduction of approximately 35 minutes exercise per week.
Nelson, 2008 American Journal of Health Prom	College students M + W	4,167	Health risk behaviors	Cross-sectional	Job Content Q	FREQ and DUR of 21 common activities over last 3 months. Transformed to energy expenditure	Credit card debt was associated with being overweight/obese, insufficient PA, excess TV watching, fast food consumption, unhealthy weight control, and body dissatisfaction.
Nies, 1999 Public Health Nursing	African American women from Tennessee W only Age range= 35-50y	16	Life style Barriers to activity	Qualitative (focus groups)	Focus group discussion	Unstructured interview (3 open-ended questions)	Stress reduction acts as a facilitator of PA, along with daily routine, practical and convenient activities, weight loss, enjoyment, family and peer support, etc.
Ng, 2003 Health Psychology	Workers from 26 worksites M + W Mean age = 40y	12,000 +	Perceived stress and health behaviors	Cross-sectional	PSS-4	Godin – 7 day recall	Moderately vigorous PA debilitated by stress (p = .01).
Padden, 2011 Military Medicine	Military spouses W only Mean age = 30.54y (SD = 6.3)	105	Stressed population (Demands, burdens)	Cross-sectional	PSS-10 Personal demands (work hour, children at home)	Multidimensional Health Behavior Inventory exercise subscale	Exercise and stress were correlated (r = -.31). Exercise and stress management also related (r = .37). PSS predicted exercise behavior (β = -.278, p < .001). 22% of the variance in exercise was explained by perceived stress and hours worked. Personal demands (hours worked, but not children at home) also predicted exercise behavior (β = -.282, p < .05).

Palomo, 2008 Neurotoxicity Research	Middle and high school students, university students, white and blue collar employees, government and health worksites M + W	Unclean but over 413	None	Cross-sectional	Subjective Stress Experience scale Coping Resources Inventory	Unclear	Stress does not predict PA. Several other characteristics do predict PA, such as positive affect, energy, and health-seeking behavior.
Paluch, 2012 Medicine and Science in Sports	Young adults M + W Age range = 20-34y	52	None	Cross-sectional	PSS (high stress defined as > 12)	SenseWear Mini armband (worn average of 7.8 days)	MVPA & PSS, r = -.28 (p = .046). Odds of being high stress: a) 16% lower with every 10 minute increment higher of exercise (OR = .84, CI = .72-0.99, p = .04); b) 40% lower with every 30 minutes higher increment of exercise (OR = .60, CI = .37-.98, p = .04).
Park, 2008 Journal Health of Psychology	Middle-aged cancer survivors M + W Age range < 50y Mean age = 45.2y	250	Health behavior changes in cancer survivors	Cross-sectional	Brief COPE, modified for cancer	Change of exercise behavior (1 item)	Positive health behavior changes were related to social support, sense of control, life meaning, and coping. A lack of meaning of life and avoidance coping led to negative health behaviors.
Peker, 2011 Journal of Dental Education	Turkish freshman dental students M + W Age range = 18-22y Mean age = 19.43y (SD = .89)	111	Health promoting behaviors	Cross-sectional	PSS-10 (Turkish version)	HPLP II	No correlation between PA and PSS-10. Females reported having engaged in less PA than males, yet more responsible health behaviors.
Puustinen, 2011 European Archives of Psychiatry and Clinical Neuroscience	Population convenience sample from Finland M + W Age range = 35-56y	883	Psychological distress	Cross-sectional	Distress: GHQ-12	1 item: frequency of doing PA causing sweating	High levels of distress associated with low leisure time PA. Subjects with low psychological distress were younger and more physically active than subjects with medium or high psychological distress.
Rao, 2012 International Journal of Preventive Medicine	Random sampling of medical students M + W Age range = 17-25y	240	Barriers to PA	Cross-sectional	Open-ended	Semi-structured questionnaire; use of sports facilities	69% of the medical students had a normal BMI and more than half utilized the sports facility. Lack of time, laziness, and exhaustion from academics were the biggest hindering factors to exercise.

Reardon & Aydin, 1993 Health Communication	Breast cancer survivors 60% no longer in treatment W only Mean age = 58y (clinic group), 57y (support group) Age range = 35-80y	96 35 in clinic group 57 in suppose group	Stressed population, coping model	Cross-sectional Retrospective	Stressfulness of cancer-related problems 1 item survey- self reported change in stress Ways of Coping Scale	1 item survey- self reported change in exercise	Exercise and stressfulness of cancer-related problems correlated r = -.27 ($p < .05$). Behavioral change in stress inversely related to change in exercise r = -.24 ($p < .05$). Stressfulness of cancer-related problem predicts exercise behavior change ($\beta = -.25$, $t = -2.05$, $p = .04$).
Reed, 1989 American Journal of Epidemiology	Japanese descent in Hawaii cohort (1965) M only Born 1900-1919	8,006	Job strain	Cross-sectional	Job strain; job latitude	Physical activity index (no more information given)	No relationship between stress and exercise.
Rhodes, 2009 Health, Education, and Behavior	Random sample of adult Canadians M + W Mean age (study 1) = 50.6y (SD = 14.14) Mean age (study 2) = 53.9y (SD = 16.03)	358	Belief based promotion of leisure time	Cross-sectional	Behavioral beliefs of exercise (stress relief included)	Godin Leisure Time Q Exercise intention	People exercising 6 or 7 days a week had the highest endorsement of stress relief as a reason to exercise (72% and 71% endorsement respectively).
Rodgers, 1998 Journal of Applied Social Psychology	Community-based activity program W only Mean age = 38.33y (SD = 8.74)	178	Incentives for PA and self-efficacy	Cross-sectional	Incentives for stress reduction	Exercising < 2 or > 3 times/week	Incentives for stress reduction and mental health discriminated low active vs high active women. Highly active women also reported higher incentives for mental health and stress reduction.
Roohafza, 2007 Stress and Health	Iranian adults M + W Age range > 19y Mean age = 40.5y (SD = 15.4)	5,892	None	Cross-sectional	12-item general health Q (distress)	4 Types of PA (leisure, work, commuting, home). Duration converted to METS	No relationship between stress and PA.

Roos, 2007 Public Health Nutrition	Finnish adults M + W Age range = 45-60y	4,346	Work/ family conflicts	Cross-sectional	Mental workload of job Work-family conflict	12-month recall of PA intensity and duration (study created)	Higher mental workload not related to lower PA in men ($p<0.1$). More work-family conflict related to lesser PA (women, $p < .05$; men $p < .1$). Family-work conflict not related to less PA in women ($p < .1$).
Rose, 1998 Occupational Medicine	Blue and white-collar workers M only Mean age (blue collar) = 47.2y (SD = 1.51) Mean age (white collar) = 47.4y (SD = 1.46)	972 Blue collar = 375 White collar = 597	Life events	Cross-sectional	Life events (yes/no; 18 items) Mood, mental strain (9-grade scale; 2 items), and expression of feelings (0-24 visual analogue scale) Social support (yes/no; 8 items)	Health examination (i.e. cholesterol, BMI, blood pressure, concentration of serum lipids, etc.)	There is a significant correlation between PA and social support for both blue and white-collar workers ($r = .22$, $p < .0001$).
Rosengren, 1991 American Journal of Cardiology	Middle aged men who lived in Goteborg, Sweden M only Age range = 47-55y	6,935	Psychological stress and the incidence of coronary disease	Cross-sectional	1-item Likert scale on stress frequency	Single item: "PA during leisure was measured 1 to 4, with 1 denoting sedentary leisure time activity"	37% of subjects who report low physical activity also report high stress. Also collected life event stress data but did not report association with PA.
Sarafino, 1999 Journal of American College Health	UG students M + W Age range = 18-24y	104	Stressful events	Cross-sectional	Hassles Assessment Scale for Students in College	Hours per week of exercise	Modest but significant negative correlations between exercising and hassle frequency, $r (102) = -.19$, $p = .050$, unpleasantness, $r (102) = -.30$, $p = .002$, and severity $r (102) = -.21$, $p = .029$. Only unpleasantness of hassles predicted exercise in each analysis. $F (1, 80) = 6.41$, $p = .013$, and the beta value for unpleasantness was -.27.
Scelza, 2005 American Journal of Physical Medicine and Rehabilitation	Individuals with a spinal cord injury M +W Mean age = 44.1y (SD = 13.0)	72	Stressed population	Cross-sectional	PSS-14	Binary respondent classification: exercisers vs. non-exercisers Concern Index	No differences observed in perceived stress level of exercisers vs. non-exercisers. Stress and concern index were correlated ($r = .26$, $p = .036$).
Schulz, 1997 Annals of Behavioral Medicine	Population-based sample of caregivers M + W Age range (care recipients) > 65y	Care recipients: 333 Caregivers: 395 Non-caregivers: 424	Caregiving stress	Cross-sectional	1-item survey on emotional and/or physical strain of care giving	1-item survey Binary respondent classification: Report of "not having enough time to exercise" (agree or not agree)	Only half of caregivers report strain from spousal care. Strained caregivers reported more depression and anxiety symptoms and less exercise than controls and non-strained caregivers. Caregivers reporting strain more likely to endorse "not having enough time to exercise" than non-care giving controls (32% vs. 8%).

Seigel et al., 2002 Nordic Journal of Psychiatry	Random sample of Swedish adults W only Mean age = 20.2y (SD = 1.8) Age range = 18-23y	726	Defense-Defeat Model of Behavior	Retrospective	Emotional problems, including: perceived negative stress (1 item), nervousness (1 item), sadness (1 item)	Change in exercise due to stress (1 item) ‘‘Usually, does your drive or need to be physically active change during periods when you are significantly worried about something?’’ Responses included: ‘‘It increases; It decreases; No change’’. 3-category respondent classification: ‘‘behavioral activation’’, ‘‘behavioral inhibition’’ and ‘‘behavior unchanged’’.	The majority of the sample (60.1%) reported an unchanged drive to activity during emotional stress, or was classified as “behavior unchanged”. Subjects classified as “behavioral activation” were 22.0%. Subjects classified as “behavioral inhibition” were 16.5%. 1.4% of sample did not respond to the question. People with exercise “behavior unchanged” reported less stress than those classified as “behavior activation” ($p < .0001$) and “behavioral inhibition” ($p < .001$). The same trend was observed for reports of “feeling hurried”, “nervousness” and “panicky feelings.”
Spillman, 1990 Psychological Reports	College students M + W Age range = 18-22y	500	None	Cross-sectional	Open question	Open question	For 310 students, exercise used to cope with stress. Higher exercise during times of stress. More women students reported that exercise was used most often as an alleviator for stress compared to men (significant). This was a study of exercise coping.
Sternfeld, 2000 American Journal of Epidemiology	Multi-ethnic sample of adults W only Age range = 40-55y	13,621	None	Cross-sectional	PSS-4	Single global question asking women to compare exercise habits to other women their own age (validated item)	Women with a high quality of life and lower stress levels were mainly found in the higher activity categories. Women with low quality of life and higher stress levels were mainly found in the lower activity categories.
Strine, 2004 Preventive Medicine	Adults with heart disease from BRFSS dataset M + W Age > 45y	3,557	Psychological stress and the incidence of coronary disease	Cross-sectional	Single item: Number of days in last month with poor mental health (including stress, depression)	BRFSS exercise questions. Physical inactivity (no activity). Considered active if insufficiently active or more (moderate or vigorous activity).	Adults with Fibromuscular Dysplasia were more likely to be physically inactive and be obese. Frequent mental distress was associated with only physical inactivity.

Tucker, 2012 Journal of Nursing Administration	Nurses W only Age range = 18-83y Mean age = 42.5y (SD = 11.8)	2,247	Health behavior	Cross-sectional	PSS-14	HPLP II	PSS and PA subscale correlated -.28 ($p < .001$). PSS predicted health behaviors ($p < .001$). R^2 for health behaviors regressed on PSS (alone) was 0.30. **Personal communication June 28, 2012: The regression coefficient for PSS to predict physical activity was 0.026 (SE 0.002; $p < .001$), R^2 = 8.3%.
van Loon, 2000 International Journal of Epidemiology	Dutch workers M + W Age range = 20-65y	3,309	Job strain	Cross-sectional	Job strain Iso-strain (strain plus social isolation); Included as appendix	Hours of PA per week in low, medium or high intensity PA. Respondents classified as low vs medium/high	No association between those in the low PA category and job demands, job control, or job social support.
Vernon, 2010 Women & Health	First time mothers W only Mean age = 27.16y (SD = 4.88)	51	Maternal stress and PA first year postpartum	Cross-sectional	PSI	24-hour recall for weekday and weekend day. Selection of activity for each 30 min block. Rated by intensity. Ave hours of light, moderate and vigorous PA. See Figure 1.	Some betas are positive, indicating that there was a positive relationship between stress and PA. Light PA: predicted by PSI subscales competence (B = -.122, 95% CI = -.183, -.060, $p < .0001$), depression (B = .063, 95% CI = .024, .102, $p = .002$) and child moodiness (B = .033, 95% CI = .005, .062, $p = .024$). Model $R^2 = .48$. Moderate PA: predicted by PSI subscales competence (B = .127, 95% CI = .068, .187, $p < .0001$), depression (B = -.065, 95% CI = -.104, -.026, $p = .002$).
Vitaliano, 1996a Journal of Gerontology: Psychological Sciences	Caregivers of spouses with Alzheimer's; Matched controls M + W Mean age (care giver) = 69.8y (SD = 7.4) Mean age (control) = 69.1y (SD = 5.4)	142	Caregiving	Case control	Hassles and Uplifts Scale Screen for Caregiver Burden Hamilton Depression Scale	10-item activity scale: freq per week, duration; dichotomized as active (at least 90 min of exercise per week) or inactive	In women with no hormone replacement therapy, controls had more exercise than caregivers. No difference for men. The relationship between psychological and physiological distress exists both cross-sectionally and over time.

Vitaliano, 1996b Psychology and Aging	Caregivers of spouses with Alzheimer's; Matched controls M + W Mean age (care givers) = 69.8y (SD = 8.0) Mean age (control) = 69.1y (SD = 5.6)	167	Caregiving	Case control	Dimensions of Stress – control scale Screen for Caregiver Burden Hamilton Depression Scale	10-item activity scale: freq per week, duration; dichotomized as active (at least 90 min of exercise per week) or inactive	Women controls exercise much more than women caregivers, thus women caregivers are at a greater risk for obesity. No difference for men.
Von Ah, 2004 Journal of Advanced Nursing	Convenience sample of undergraduate psychology students M + W Mean age = 19.7y (SD = 4.09)	161	Health behavior	Cross-sectional	PSS-10	BRFSS PA and nutrition items (13 items)	No relationship between stress and PA.
Vuori, 1994 Work & Stress	Population sample of adults M + W Age range = 31-44y	706	Health behavior	Cross-sectional	Occupational Stress Questionnaire	1 item, 5-point Likert scale	No relationship with job demands (r = -.02, .08). Correlation with job control (r = -.13, -.14; p < .05). Not significant in path analysis.
Wemme, 2005 Journal of Epidemiology and Community Health	Currently employed adults in Sweden M + W Mean age (M) = 41.99 (SD = .19) Mean age (W) = 42.15 (SD = .2)	7,169	Job strain	Cross-sectional	Karasek scale; daily stress level (1 item); economic stress (1 item)	Leisure PA: 1 item multiple choice question; respondents classified as low PA or not (binary)	Men more likely to be inactive were classified as having job strain (OR = 1.5, 95% CI = 1.1, 2.0), high daily stress (OR = 1.8, 95% CI = 1.5, 2.2), and in economic distress (OR = 2.3, 95% CI = 1.7, 3.0). Men more likely to be inactive were classified as having high daily stress (OR = 1.2, 95% CI = 1.0, 1.5), and in economic distress (OR = 1.6, 95% CI = 1.2, 2.2).
Wijndaele, 2007 Psychology of Sport and Exercise	Flemish adults M + W Age range = 18-75y	2,616	Stress and coping	Cross-sectional	PSS-10 Utrecht Coping List Symptom checklist (anxiety and depression)	Flemish Physical Activity Computerized Questionnaire	Sports participation but not other types of leisure time physical activity was significantly lower in the stressed cluster.

Wilcox, 2003 Journal of Gerontology	Southern, Rural, white and African American older adults W only Age range > 50y	102	Elderly PA	Cross-sectional	Single item inquiring about magnitude of stress in last two weeks (0 to 3) from NHIS survey, no validity data available	PA Scale for the elderly (PASE)	Stress correlated to more PA (r = .22). Stress explains model (β = .20, p = .06; non significant trend).
Wu, 2000 Journal of Aging & Health	White and blue-collar workers M + W Age range = 51-61y	6,433	Job stress/strain	Cross-sectional	Single item (1-4 scale)	Categorical frequency items for light and vigorous PA	Blue-collar workers reporting more stress were more likely engage in vigorous PA. White-collar workers experiencing more stress were less likely to report light PA. Job type/status
Yusuf, 1996 Archives Internal Medicine	Older Adults M + W Age range > 65y	7,801	Elderly LTPA	Cross-sectional	Single item: amount of stress experienced (in the last two weeks): none to moderate or a lot	Dichotomous: doing 1 or more activity at least 30 minutes 3 days a week (for the past two weeks)	M: Odds of exercising in last two weeks greater in people with “none to moderate stress” OR = 1.7 (95% CI = 1.2-2.4, adjusted for other variables). W: Odds of exercising in last two weeks greater in people with “none to moderate stress” OR = 1.3 (95% CI = 1.0-1.6 adjusted for other variables).
Zen, 2012 Health Psychology	Adults with CVD, 9% with PTSD M + W Mean age (PTSD) = 61y (SD = 11) Mean age (no PTSD) = 67y (SD = 11)	1,022	PSTD relation to poor health behaviors	Cross-sectional	Computerized Diagnostic Interview Schedule for DSM-IV	Five items: frequency, frequency of varying intensities of exercise, normative question about activity	PTSD was associated with significantly high rates of physical inactivity compared to others of their age and gender.
Zunker, 2008 Women & Health	African American adults at worksites W only Mean age = 44y	29	Barriers	Qualitative	Four nominal group technique sessions were held to gather input on job factors and daily life	Four nominal group technique sessions were held where they discussed barriers to PA	In response to physical activity, the primary themes included lack of time to exercise, stress of multiple family roles and responsibilities, and perceived physical barriers to physical activity. Furthermore, many women expressed their concerns over dealing with stress at work and managing their time efficiently. Several women typically responded to work-related stress by overeating, making poor food choices, and avoiding physical activity. Other co-workers and the workplace culture generally supported this stress response. For example, it was the social norm to go out for lunch at a nearby fast food restaurant that had few healthy menu options or to take the elevator at work, even though the building had only two floors.

[a] The study by Ho et al. (2002) is both retrospective and prospective and is included in Table 2.

BMI = body mass index, **BRFSS** = Behavioral Risk Factor Surveillance System, **CDC** = Center for Disease Control, **CES-D** = Center for Epidemiological Studies-Depression**,** **CI** = confidence interval, **CHD** = Coronary Heart Disease, **CVD** = Cardiovascular Disease, **DSM-IV** = Diagnostic and Statistical Manual, fourth edition, **DUR** = duration, **ES** = effect size, **FIW** = family interference with work, **FREQ** = frequency, **GHQ** = general health questionnaire, **HPLP** = Health Promoting Lifestyle Profile, **IES** = Impact of Event Scale, **LTPA** = leisure time physical activity, **M** = men, **METS =** metabolic equivalents, **MVPA** = moderate to vigorous physical activity, **NAIA** = National Association of Intercollegiate Athletics, **NCAA** = National Collegiate Athletic Association, **NHIS** = National Health Interview Survey, **OR**= odds ratio, **PA**= physical activity, **POMS** = profile of mood state, **PSI** = Parent Stress Index, **PSS** = Perceived Stress Scale, **PTSD**= Post Traumatic Stress Disorder, **Q** = questionnaire, **QR** = Quality Assessment Rating (1-9 scale; see text), **SCID =** Structured Clinical Interview for DSM Disorders, **SD** = standard deviation, **SE** = standard error, **SEM** = structural equation modeling, **W**= women, **WIF** = work interference with family

Appendix 3. Summary of studies exploring relationships between stress and indices of physical activity (PA) and exercise [a]

	n	Inverse association [b]		No association [c]		Positive association [d]	
		n	%	n	%	n	%
Gender							
Men	2	1	50.0	0	0.0	1	50.0
Women	14	9	64.3	4	28.6	2	14.3
Both genders	39	32	82.1	4	10.3	7	17.9
Total	55	42	76.4	8	14.5	10	18.2
Age[e]							
< 17y	3	2	66.7	1	33.3	0	0.0
18 - 29y	12	8	66.7	2	16.7	3	25.0
30 - 49y	19	13	68.4	3	15.8	3	15.8
> 50y	10	8	80.0	2	20.0	0	0.0
All adult ages	10	10	100.0	0	0.0	4	40.0
Total	54	41	75.9	8	14.8	10	18.5
Clinical population status							
Healthy	47	36	76.6	7	14.9	8	17.0
Clinical	8	6	75.0	1	12.5	2	25.0
Total	55	42	76.4	8	14.5	10	18.2
Subject Pool							
Employees	19	14	73.7	2	10.5	5	26.3
All others	36	28	77.8	6	16.7	5	13.9
Total	55	42	76.4	8	14.5	10	18.2
Sample Size							
Small (n < 100)	22	15	68.2	6	27.3	2	9.1
Large (n >100)	33	27	81.8	2	6.1	8	24.2
Total	55	42	76.4	8	14.5	10	18.2
Study Quality							

< 7		20	12	60.0	5	25.0	4	20.0
> 7		35	30	85.7	3	8.6	6	17.1
	Total	55	42	76.4	8	14.5	10	18.2

[a] Some studies provide evidence of multiple associations between stress and indices of PA resulting in support for more than one direction of the association, which explains why totals may exceed 100.0%.
[b] Studies demonstrating at least one inverse relationship between indicators of stress and PA.
[c] Studies demonstrating no relationships between indicators of stress and PA.
[d] Studies demonstrating at least one positive relationship between indicators of stress and PA.
[e] Hooper et al., 1995, did not report age.