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Psychosocial Functioning and the Cortisol Awakening Response: Meta-analysis, *P*-curve Analysis, and Evaluation of the Evidential Value in Existing Studies

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Abstract

Cortisol levels rise immediately after awakening and peak approximately 30-45 minutes thereafter. Psychosocial functioning influences this cortisol awakening response (CAR), but there is considerable heterogeneity in the literature. The current study used *p*-curve and metaanalysis on 709 findings from 212 studies to test the evidential value and estimate effect sizes of four sets of findings: those associating worse psychosocial functioning with higher or lower cortisol increase relative to the waking period (CARi) and to the output of the waking period (AUCw). All four sets of findings demonstrated evidential value. Psychosocial predictors explained 1%-3.6% of variance in CARi and AUCw responses. Based on these effect sizes, cross-sectional studies assessing CAR would need a minimum sample size of 617-783 to detect true effects with 80% power. Depression was linked to higher AUCw and posttraumatic stress to lower AUCw, whereas inconclusive results were obtained for predictor-specific effects on CARi. Suggestions for future CAR research are discussed.

The replication crisis in psychology has raised questions about the best methods to promote confidence in scientific findings. Some have suggested that “meta-analysis provides the best foundation for progress, even for messy applied questions” (Cumming, 2008, p. 292), because aggregating across studies reduces noise. Others have noted that publication bias and questionable research practices in individual studies can skew meta-analytic results (Simmons, Nelson, & Simonsohn, 2011), proposing additional ways to analyze the evidential value of a set of findings (Simonsohn, Nelson, & Simmons, 2014; van Aert, Wicherts, & van Assen, 2016). Research on relations between hormones and behavior can be particularly “messy” and vulnerable to inconsistency. The literature on psychosocial

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NOTE: * = included in the Chida & Steptoe (2009) meta-analysis; ** = added for current meta-analysis

functioning and the cortisol awakening response (CAR) has more than doubled in the last six years, but heterogeneity in published findings has partially obscured the nature and direction of these effects. The present study aims to assess the evidential value of the published literature linking psychosocial functioning to the CAR.

Cortisol is a steroid hormone involved in glucose regulation and metabolism that is frequently labeled a stress hormone because its levels change markedly in response to stressors (see Sapolsky, 2004 for a review). Cortisol levels rise steeply immediately after awakening in the morning and peak approximately 30-45 minutes thereafter; from there, they slowly decrease throughout the day. This early peak in cortisol is known as the CAR (Pruessner, 1997). The CAR is responsive to stress perception and anticipation of daily stressors, making it particularly interesting to psychologists (Fries, Dettenborn, & Kirschbaum, 2009).

A meta-analysis of 62 studies revealed considerable heterogeneity in findings linking psychosocial functioning to the CAR (Chida & Steptoe, 2009). For instance, CAR measures were negatively correlated with depression in one study (O'Donnell et al., 2008) but positively correlated in another (Mommersteeg et al., 2006). Heterogeneity in the literature linking psychosocial functioning to the CAR is the rule rather than the exception; in fact, in four of seven types of psychosocial predictors, studies showing both positive and negative associations exist (Chida & Steptoe, 2009). Heterogeneity may result from inconsistency in how the CAR is measured (Stadler et al., 2016) and from small sample sizes ($N < 100$) that are characteristic of the literature. With small sample sizes, observed effects may misestimate both the size and the direction of any true underlying effect (Gelman & Carlin, 2014). Misestimations of direction are unlikely to be detected because there are no norms for the CAR, making it impossible to tell whether CAR values represent hyporesponsiveness, normal responses, or hyperresponsiveness.

To further complicate matters, different researchers operationalize and measure the CAR differently. Most researchers quantify the dynamic increases that occur during the first waking hour (CARi). Others compute the area under the curve relative to the waking period (AUCw) to quantify total cortisol output, although this is not strictly a measure of CAR because it is influenced by cortisol levels prior to awakening and not entirely by dynamic increases in cortisol that happen post-wakening (Stadler et al., 2016). In studies in which both CARi and AUCw were measured, their relationships to measures of psychosocial functioning were not the same (e.g., Bhattacharyya et al., 2008; Chida & Steptoe, 2009; Ellenbogen et al., 2006; Mommersteeg et al., 2006; Sonnenschein et al., 2007; Whitehead et al., 2007), suggesting possible measure-dependent effects.

Yet another source of heterogeneity in the literature emerges from specific subytpes of psychosocial predictors having unique associations with the CAR. Chida and Steptoe (2009) described seven different types of psychosocial predictors: job stress, general life stress (non-work-related), depression, anxiety (including neuroticism and negative affect), fatigue/burnout/exhaustion, posttraumatic stress, and positive psychosocial traits. These different predictors may have different relationships with the CAR. For example, AUCw was positively related to general life stress but negatively related to posttraumatic stress (Chida &

Steptoe, 2009). Similarly, CARi was positively correlated with job stress and general life stress but negatively correlated with fatigue, burnout, or exhaustion and not reliably associated with positive affect. Meta-analytic findings, therefore, suggest that psychosocial predictors can be related to higher or lower CAR, depending on the nature of the predictor.

Meta-analysis is designed to aggregate across individual findings and extract the commonalities from the idiosyncrasies. The latest meta-analysis on psychosocial functioning and CAR was a step in the right direction (Chida & Steptoe, 2009). However, a potential problem with meta-analysis is the file drawer problem, where studies are "filed away" unpublished if they fail to find statistically significant relationships. When studies are statistically significant, they make their way into the literature. Over time, this practice artificially inflates Type I error and may make it appear that relationships exist when in reality they do not (Rosenthal et al., 1979). To the degree that a meta-analysis includes a disproportionate number of Type I errors, its results – although superior to individual findings – may nonetheless be biased.

New statistical tools allow researchers to test a set of findings for evidential value in less biased ways. Specifically, *p*-curve analysis is based on the mathematical principle that if the null hypothesis is true, the probability of a *p*-value falling within a range of possible values is the same for all bins of the same size (Simonsohn, Nelson, & Simmons, 2014a, 2014b, 2015). Thus, given that the null hypothesis is true (i.e., studies lack evidential value), the probability of *p* falling between .01 - .02 is equal to the probability of it falling between .02 - .03, .03 -.04, or .04 - .05. In this case, a curve of all the significant *p*-values within a set of findings (i.e., a *p*-curve) will be flat. However, if a set of findings contains evidential value, more significant *p*-values from that set will fall in the .01 - .02 and .02 - .03 bins than in the .03 - .04 and .04 - .05 bins, and the *p*-curve will be positively skewed. Thus, by assembling the *p*-values for any set of significant findings and calculating the slope of that line, evidential value can be determined (Simonsohn et al., 2014a, 2014b, 2015). Moreover, if one knows all the *p*-values from a set of findings, one can approximate the distribution used to obtain those *p*-values, resulting in an unbiased estimate of effect size (Simonsohn et al., 2014a). This point estimate can then be compared to a meta-analytic point estimate to assess for systematic bias in the literature.

The Current Study

Although the extant literature suggests that psychosocial functioning and the CAR are associated, the nature of these associations remains unclear. In some studies, psychosocial variables were related to higher CAR and in other studies, to lower CAR (Chida & Steptoe, 2009). Moreover, the relationship between psychosocial functioning and the CAR may not be the same for different measures of the CAR, and may not be consistent for all psychosocial predictors. The current study aims to clarify the following questions regarding the relationships between psychosocial functioning and the CAR by combining *p*-curve and meta-analytic techniques: First, do the sets of findings associating psychosocial functioning to higher or lower CAR differ in evidential value? Second, what is the effect size for each of these sets of findings? Third, is there evidence of systematic bias in the extant literature? A secondary aim of the study was to examine predictor-specific effects.

Methods

Data Sources and Study Selection

The current study updated the literature testing relationships between psychosocial functioning and the CAR. It included studies previously reviewed by Chida and Steptoe (2009) and added new findings from the past six years. Methods for updating the literature were based on those described by Chida and Steptoe (2009). Articles were identified using the search terms “cortisol” and “awakening” and “response” simultaneously (thus allowing the terms to be out of order) using the Endnote X7.2 (Thompson Reuters) software to search across the following databases: Medline, PsycINFO, Pubmed, and Web of Science. The search terms were allowed to appear in “Any field” for the Pubmed and PsycINFO databases, or in “Title/Keywords/Abstract” for Web of Science and Medline. Articles that were duplicates across these databases, published in foreign language journals, dissertations, conference abstracts, and letters to the editor were removed at a first pass. Reference sections of the identified articles were searched for other relevant articles. To avoid overlap with the previous meta-analysis, the search dates for the updated literature were restricted to articles published between October 1, 2008 and July 1, 2015. Inclusion criteria required articles to (1) be written in English, (2) be published in a peer-reviewed journal, (3) include at least one measure of psychosocial functioning, and (4) include at least one measure of the CAR. Articles were excluded if the population of interest had medical conditions/disorders known to influence cortisol, including pregnant or post-partum women, chronic pain disorders, circadian rhythm disorders, endocrine disorders, hormonal treatments, diabetes, cardiovascular disease, or other medical conditions. Biological predictors of the CAR (genetics or gene × environment interactions, family history of psychopathology, sleep patterns and disorders, chronotype), as well as intervention studies or effects of laboratory manipulations, were also excluded. Studies including participants with intellectual or developmental disabilities, dementia, or other cognitive impairments were excluded because there was insufficient research to synthesize these studies separately. Lastly, studies focusing on within-subject psychosocial changes were excluded because the current study focused on individual differences instead of intraindividual shifts, and there has recently been a thorough review on within-subject effects on the CAR (Law, Hucklebridge, Thorn, Evans, & Clow, 2013).

Where different articles reported on the same cohort (e.g., from large publicly available datasets), they were treated as multiple findings from the same study. In cases where articles met inclusion criteria but provided insufficient data for analysis, the corresponding authors were contacted. Of 32 authors contacted, 19 responded, and 17 provided additional data. In total, 159 articles met criteria for the updated literature review. These were combined with 54 articles from the Chida and Steptoe (2009) analysis. Thus, the current study included 709 findings from 212 articles. Figure 1 provides a flowchart of the included articles.

Data Abstraction

The following information was abstracted for each article added in the current study: title, author, publication year, sample size, psychosocial predictor measurement method, CAR formula used, test statistic, statistic pertaining to psychosocial functioning/CAR relationship,

and information to compute quality score (described below). Suitable formulas for CARi included the mean cortisol value post-awakening minus the wakening value (MINC), the absolute increase in cortisol as indexed by the maximum value minus the minimum value (AINC), the absolute cortisol values where the effect size was assessed through repeated-measures analysis (ACOR), the slope of the CAR curve (slope), or the ratio of cortisol values at wakening to 30 minutes post wakening (T0/T1 ratio). For AUCw, the overall volume of cortisol released during the waking period as indexed by the total area under the curve was used.

A quality score for each study was computed based on whether the studies controlled for each of the following: (1) age, (2) gender, (3) smoking status, (4) medications that influenced cortisol, (5) weekday versus weekend collection days (6) waking time, and (7) adherence to protocol. Moreover, (8) clear instructions for collection had to be provided to participants. A point was awarded for each of these eight criteria that was explicitly described in the article, leading to a total research quality score ranging from 0 to 8. Data abstraction for the articles in the current study was done by one of the first three authors (IB, CH, EH) and double-checked by another of these authors. A randomly selected subset of 15 articles were independently coded by all three authors, and there was high corroboration on the data that were extracted (>90% agreement on each variable). Discrepancies were settled by group discussions among authors. For articles published before 2009, data were drawn from the Chida and Steptoe (2009) meta-analysis (Table 1, pp. 268-272).

Data Analysis

To test for evidential value, *p*-curves were computed for the following four sets of associations: (1) worse psychosocial functioning with higher CARi, (2) worse psychosocial functioning with lower CARi, (3) worse psychosocial functioning with higher AUCw, and (4) worse psychosocial functioning with lower AUCw. A *p*-curve-derived estimate of effect size was computed from each of the four *p*-curves. Next, meta-analysis was used to estimate effects for these four categories, and these meta-analytic estimates were compared to the *p*-curve-derived estimate of effect size. Details for these procedures are discussed below.

***P*-curve analysis for evidential value—**To compute *p*-curves, directionality for all predictors was changed so that higher values reflected worse psychosocial functioning. *P*-curve analyses requires that all findings be independent of one another. If more than one significant relationship was reported from the same sample, or if samples were partially overlapping (i.e., females only in one effect, and males and females in another), the effect with the largest sample size was chosen for inclusion in the *p*-curve. *T*-values and degrees of freedom (n-2) from significant findings were entered into a publicly available *p*-curve calculator provided by Simonsohn and colleagues (2013; Version 4.05; http://www.p-curve.com/). To test for evidential value, the *p*-curve calculator estimated the probability of obtaining that *p*-value if the null were true. Flat curves (neither right nor left skewed) indicated that findings lacked evidential value or were underpowered to detect evidential value. These alternatives were differentiated by testing the set of findings against a null of 33% power as outlined by Simonsohn et al. (2014); if significant, findings could be assumed to lack evidential value; otherwise, evidential value could not be confirmed or denied.

***P*-curve analysis for estimates of effect size—**Using R syntax, significant *p*-values of a set of findings were used to estimate the effect size of those findings (see Simonsohn et al., 2014b for the syntax). *P*-curve-derived effect size estimates for each of the four sets of findings were computed. Only significant, findings could be assumed findings from independent samples were entered. Effect sizes were computed in Cohen's *d* and were then converted into *r* using the formula $r = d/\sqrt{(d^2 + 4)}$.

Meta-analysis—Methods described by Chida and Steptoe (2009) were followed to allow for the aggregation of their findings with findings retrieved for the current study. Meta-analytic estimate of effect sizes were transformed into the correlation coefficient *r*. When multiple estimates of the same correlation were provided, associations adjusted for covariates were included. Bivariate correlations were used when there was no covariate adjustment for analyses involving the CAR, or when there was insufficient information to extract an effect size from the covariate-adjusted analyses. Because variance of correlation coefficients depended strongly on sample size (Borenstein, Hedges, Higgins, & Rothstein, 2009), the *r* values derived from each study were transformed to Fisher's *z* and analyses were conducted on these values. The *z* values were later back-transformed into *r* values to facilitate interpretation of the meta-analytic findings.

The effect sizes were aggregated using the Comprehensive Meta-Analysis software version 2.2.064. Each random-effects model yielded an aggregate weighted effect size *r* ranging in value from -1.00 to 1.00, interpreted the same way as a correlation coefficient. Each *r* statistic was weighted before aggregation by multiplying its value by the inverse of its variance; this procedure enabled larger studies to contribute to effect size estimates to a greater extent than smaller ones. 95% confidence intervals were computed to assess whether aggregate effect sizes were statistically significant. A heterogeneity coefficient was used to determine whether the studies yielded consistent findings. Publication bias was assessed using Egger's unweighted regression asymmetry test, which tests the asymmetry of the funnel plot of effect sizes plotted by sample size (Egger, Smith, Schneider, & Minder, 1997).

Because several studies included multiple psychosocial predictors of the CAR, analyses were conducted by including all the effect sizes. To address concerns regarding the non-independence of effects drawn from the same sample, the same analyses were conducted again by selecting a single effect size at random from each study, and also by combining all the effect sizes from any study into a single average. Results did not differ with these approaches; thus, reported results include all effect sizes.

Analyses for predictor-specific effects—Chida and Steptoe (2009) described seven categories of psychosocial predictors that have been associated with the CAR: job stress, general life stress, depression, anxiety, fatigue/burnout/exhaustion, posttraumatic stress, and positive psychosocial traits. Because there were not enough significant *p*-values to compute independent *p*-curves by directionality and predictor type, *p*-values for both directions were entered simultaneously for each predictor. Thus, these *p*-curves tested whether there was evidential value for each predictor being associated with the CAR. Meta-analysis described the nature and directionality of the relationships.

Results

Study Characteristics and Quality

Table 1 reveals that studies were, on average, of medium to high quality, although quality scores varied considerably. The average number of sampling days was just over two days. The most frequently assessed psychosocial predictors were those assessing general life stress, depression, positive psychosocial traits, and anxiety/neuroticism/negative affect. Details for each of the studies are provided in Table 2.

Findings Associating Worse Psychosocial Functioning with Higher CARi

P-curve analysis revealed that the findings associating worse psychosocial functioning with higher CARi had evidential value ($k = 37$; $p = .001$; see Figure 2a). The *p*-curve-derived estimate of effect size for this set of findings was $r = .08$. When using traditional meta-analytic techniques ($n = 273$), the overall effect size was $r = .09$, $CI = [0.08, 0.11]$, $p < .001$. Approximately 37% of the significant findings in this set involved general life stress, 15% depression, 14% anxiety/neuroticism/negative affect, 12% positive psychosocial traits, 11% job stress, 8% posttraumatic stress, and 3% fatigue/burnout/exhaustion.

Evidential Value of Findings Associating Worse Psychosocial Functioning to Lower CARi

P-curve analysis revealed that the findings associating worse psychosocial functioning with lower CARi also had evidential value ($k = 42$; $p < .001$; see Figure 2b). The *p*-curve-derived estimate of effect size for this set of findings was $r = .09$. When using traditional meta-analytic techniques ($n = 275$), the overall effect size was $r = .12$, $CI = [0.10, 0.15]$, $p < .001$. Approximately 33% of the significant findings in this set involved general life stress, 23% positive psychosocial traits, 17% depression, 9% anxiety/neuroticism/negative affect, 7% posttraumatic stress, 6% fatigue/burnout/exhaustion, and 5% job stress.

Findings Associating Worse Psychosocial Functioning with Higher AUCw

Similar to CARi findings, *p*-curve analysis revealed that the findings associating worse psychosocial functioning with higher AUCw had evidential value ($k = 19$; $p = .008$; see Figure 2c). The *p*-curve-derived estimate of effect size for this set of findings was $r = .09$. When using traditional meta-analytic techniques ($n = 120$), the overall effect size was $r = .08$, $CI = [0.07, 0.10]$, $p < .001$. Approximately 24% of the significant findings in this set involved depression, 19% general life stress, 17% positive psychosocial traits, 16% anxiety/neuroticism/negative affect, 12% job stress, 7% fatigue/burnout/exhaustion, and 5% posttraumatic stress.

Findings Associating Worse Psychosocial Functioning with Lower AUCw

Finally, *p*-curve analysis revealed that the findings associating worse psychosocial functioning with lower AUCw had evidential value ($k = 19$; $p = .006$; see Figure 2d). The *p*-curve-derived estimate of effect size for this set of findings was $r = .19$. When using traditional meta-analytic techniques ($n = 87$), the overall effect size was $r = .10$, $CI = [0.08, 0.13]$, $p < .001$. Approximately 22% of the significant findings in this set involved general

life stress, 18% positive psychosocial traits, 16% anxiety/neuroticism/negative affect, 14% posttraumatic stress, 11% job stress, 10% depression, and 9% fatigue/burnout/exhaustion.

Predictor-Specific Effects

P-curves and meta-analyses were conducted to describe the evidential value and directionality of the relationships among specific psychosocial predictors and CARi. Results from *p*-curve and meta-analysis did not corroborate. Results from *p*-curve analysis suggest stronger evidential value for findings associating general life stress, depression, and posttraumatic stress with CARi. However, using meta-analytic estimates, the fatigue/burnout/exhaustion predictors were most strongly associated with a lower CARi ($r = .09$, $p = .003$; Table 2), although there was a trend-level indication of publication bias (Egger's test: $p = .07$). Meta-analyses did not find significant results for any other predictor, but *p*-curve analyses could not conclude that evidential value for these other predictors was lacking; it may be that true effects exist but that the current study was underpowered to detect them. Table 3 and Figure 3 present *p*-curve and meta-analytic results of the seven predictors and CARi.

With regard to AUCw, both *p*-curve and meta-analysis results revealed that depression predictors had evidential value and were linked to greater AUCw output ($r = .07$, $p < .001$, Table 4). Posttraumatic stress predictors also contained evidential value and were associated with lower AUCw output ($r = .08$, $p = .03$, Table 4). There was no evidence of publication bias for the meta-analysis regarding depression predictors (Egger' test: $p = .56$), however, there was a trend suggesting publication bias for studies reporting associations of posttraumatic stress (Egger's test: $p = .06$). *P*-curve analyses were not able to establish lack of evidential value for any of the seven predictors, again leaving open the possibility that true effects exist but that the current study was underpowered to detect them. Figure 3 reveals forest plots for the predictor-specific associations with both CARi and AUCw.

Quality of the Study as a Potential Source of Variance

Analysis of variance (ANOVA) was conducted to test if different sets of findings differed in study quality. There was no difference in mean study quality among those findings associating worse psychosocial functioning to higher CARi ($M = 6.00$, $SD = 1.70$), lower CARi ($M = 6.08$, $SD = 1.73$), higher AUCw ($M = 6.14$, $SD = 1.49$), or lower AUCw ($M = 6.38$, $SD = 1.20$), $F(3,203) = 0.25$, $p = .83$. Additionally, neither of the seven predictor types significantly differed from each other in study quality, $F(6, 693) = 0.87$, $p = .52$.

Discussion

Psychosocial predictors are thought to influence the CAR, but describing the nature of these associations has proven difficult because of heterogeneity in the literature. This heterogeneity is partially the result of methodological and operationalization inconsistencies across studies and potential measure-dependent and/or predictor-specific associations (Chida & Steptoe, 2009; Stadler et al., 2016). Meta-analysis has attempted to clarify the nature of the relationships between psychosocial predictors and the CAR, but meta-analyses can be biased by Type 1 error. *P*-curve analysis tests whether a set of findings in the published

literature contains evidential value (Simonsohn et al., 2014a, 2014b, 2015), making *p*-curves an ideal complement to meta-analysis. Together, *p*-curves and meta-analysis can describe the evidential value of a set of findings and provide an estimate of the effect size of those findings.

The present study aimed to combine *p*-curve and meta-analytic techniques to answer four questions in the literature of psychosocial predictors and the CAR: first, did findings associating psychosocial functioning to higher or lower CAR differ in evidential value? Second, what was the effect size for these sets of findings? Third, was there any evidence for systematic bias in the literature? Fourth, did some psychosocial predictors demonstrate greater evidential value than others?

Evidential Value of Findings Associating Psychosocial Predictors to the CAR

The co-existence of positive and negative association between psychosocial predictors and the CAR could be explained in one of three potential ways: 1) there is no true relationship, and both the positive and negative associations are spurious; 2) there is either a positive or negative relationship between psychosocial predictors and the CAR, and the other direction is spurious; or 3) there are true positive and negative associations between psychosocial predictors and the CAR, and neither set is spurious. The current study independently examined the evidential value of four sets of findings: those associating worse psychosocial functioning to higher or lower CARi, and those associating worse psychosocial functioning to higher or lower AUCw. Results revealed that all four sets of findings demonstrated significant evidential value (scenario 3 above). Although seemingly contradictory, these results suggest that there are likely important moderators that explain *which* predictors are associated with *what* measures, and *for whom*. In other endocrinological outcomes like diurnal cortisol, stressor-dependent factors like the duration, intensity, and appraisal of the stressor are known to moderate biological responses (e.g., Armario, Marti, Molina, De Pable, & Valdes, 1996; Burke, Dacis, Otte, & Mohrn, 2005; Segerstom & Miller, 2004), and they likely play a role in the CAR as well. Unfortunately, the current study was underpowered to detect such individual difference- or stressor-dependent effects: there are not enough findings in the extant literature, nor is there a theoretical framework for making predictions about moderation. Analysis revealed that study quality among different CAR measures and different predictor types was similar, suggesting that the methodological inconsistencies are not systematically biasing the literature in any predictable way. Future work aimed at identifying moderators of the psychosocial functioning and CAR relationship is essential, as the current lack of empirically-supported theory in this area represents perhaps the greatest shortcoming in the CAR literature.

Effect Sizes of Findings Associating Psychosocial Predictors to the CAR, and Implications for Power Analysis

Despite all four sets of findings demonstrating significant evidential value, the estimate of *p*-curve-derived effect sizes across the four sets was not equivalent. Effect sizes for each of the four sets of findings were calculated in two ways: using *p*-curve-derived estimates and using traditional meta-analytic techniques. Corroboration of these two methods was high. The associations between psychosocial predictors and CARi were small, with psychosocial

predictors explaining approximately 1% of variance in CARi (r = .08 for higher CARi and .11 for lower CARi using p-curve-derived estimate, r = .09 and .12 for meta-analytic estimates, respectively). These small effects were similar to those reported by Chida and Steptoe (2009), with r's ranging from -.065 to .069 depending on the specific predictor.

For findings examining total cortisol output, those associating worse psychosocial functioning to greater AUCw has a similar effect size (r = .09 from the p-curve-derived estimate and .08 from the meta-analytic estimate). However, findings associating worse psychosocial functioning to lower AUCw had a larger effect, with approximately 3.6% of variance being accounted for (r = .19 from the p-curve-derived estimate and .10 from the meta-analytic estimate). To the extent that the p-curve-derived estimate can be considered a less biased measure for gauging effect size, this finding suggests that total cortisol output during the waking period is more heavily affected by psychosocial predictors than is the dynamic increase that occurs after awakening. It may be that worse psychosocial functioning over time blunts the overall output of the CAR system while keeping the dynamic component intact. If indeed the CARi represents an adaptive response to stressors, this may be the most adaptive pattern for those high in psychosocial stress: it would allow them to maintain dynamic flexibility in the CAR system without having chronically high levels of cortisol output overall. Nevertheless, this explanation remains speculative and remains to be tested with future research.

One implication of these estimates is that regardless of CAR measure, future studies should be powered to detect small effects (r = .10). Using two publicly-available power calculators (GPower and the UCSF Clinical and Translation Science Institute Sample Size Calculator [http://www.sample-size.net/correlation-sample-size/]), a cross-sectional study would need a minimum sample size of 617-783 to detect true effects with 80% power. In the current study, approximately 11% of the studies had at least this sample size; approximately 58% had a sample size less than 100, and 28% had a sample size less than 50. Although obtaining over 600 people for a study may seem unfeasible or prohibitively expensive, there are also substantial costs to running underpowered studies. On one hand, underpowered studies may fail to find significant effects when in reality they exist; in those instances, the resources spent for that study are lost and Type II error appears in the literature or, more likely, contribute to the file drawer problem. On the other hand, correlations obtained with small sample sizes are unstable and can result in Type I error. As a result, running underpowered studies can significantly contribute to the current replicability crisis in psychology; running adequately powered studies presents a costly but feasible and scientifically rigorous solution. Thus, future work with larger samples is needed to help clarify the relationships between psychosocial predictors and the CAR.

The small effect sizes also beg the question of clinical significance: are these effects meaningful in the real world? Prentice and Miller (1992) argue that small effects are impressive when the dependent variable is not expected to be easily influenced by the independent variable. The fact that psychosocial events - even those that are imagined, anticipated, or long-passed - can produce reliable shifts in a physiological system associated with energy mobilization is meaningful. It suggests that the CAR may promote adaptive physiological responses to complex social stimuli, and may have implications for when,

how, and why the CAR evolved (for a review of the functions of the CAR, see Fries, Dettenborn, & Kirschbaum, 2009). Moreover, small effects of psychosocial variables on other endocrinological and immunological outcomes are found in the literature, yet these lines of study remain active because psychosocial stressors are common enough that even small effects, if they occur frequently enough and for long enough, can produce a sizeable impact on physiology. For example, diurnal cortisol levels demonstrate small to moderate correlations with depression (r = .18; Burke et al., 2005) and chronic stress (Miller, Chen, and Zhou, 2007), and these relationships depend on a number of measurement, appraisal, and contextual variables (Miller, Chen, and Zhou, 2007). Likewise, some enumerative measures of immune functioning like monocyte counts, T-lymphocyte counts, and granulocyte counts have small to moderate correlations (r's < .10) with acute time-limited stress and chronic stress, although correlations are larger for other measueres of immunity like immunoglobulin and cytokine levels (r's between .10 and .30; Segerstrom & Miller, 2004). Thus, in the greater context of psychoneuroendocrinological research, the CAR may not be the most sensitive biological marker for chronic stress, but still sensitive enough that continuing to study the relationships is a worthwhile endeavor.

Future studies investigating the CAR and psychosocial functioning should sample the CAR over more days. The modal number of sampling days in the studies reviewed was one (range = 1 to 9). As is true for other diurnal cortisol parameters (Segerstrom et al., 2014), the amount of variance in the CAR that generalizes beyond the day on which it was collected is small (36-60% for AUC [baseline, 30, 45, and 60 minutes]; 15-37% for increase; Hellhammer et al., 2007.) As a consequence, reliable measurement of the CAR can require sampling over up to 6 days (Hellhammer et al., 2007). Notably, there were too few studies with a sufficient number of days to compare the *p*-curves of those with theoretically insufficient and sufficient sampling frames for reliability, and almost none of the studies reported the empirical reliability of their CAR measurement. Future research on the CAR should be evaluated in light of the reliability of cortisol measurement, particularly because unreliable measurement can yield estimates of relationships that are incorrect in both magnitude (e.g., an estimate is either larger or smaller than the true underlying relationship) and sign (e.g., a positive estimate is obtained when the true underlying relationship is negative) (Gelman & Carlin, 2014). When effect sizes are small, reliable measurement is also important to maintain statistical power (Kanyongo, Brook, Kyei-Blankson, & Gocmen, 2007).

Testing for Systematic Bias in the Literature

Systematic bias in the literature occurs when there are publishing practices that make some findings (i.e., significant findings) more likely to make their way into the published literature than others. Because *p*-curve calculations use only published significant effects, comparing estimates of effect sizes between *p*-curves and standard meta-analysis can highlight systematic bias. As discussed above, the only discrepancy betweet *p*-curve-derived estimates and meta-analytic estimates was in the set associating worse psychosocial functioning to lower AUCw. However, the directionality of the discrepancy suggests that the published literature is systematically *underestimating* the true effects (i.e., the *p*-curve estimate is larger than the meta-analysis estimate). It should be noted that this set had a relatively small

number of independent, statistically significant findings ($k = 19$). Future work should examine associations of psychosocial predictors and AUCw using large samples so that more precise estimates of these associations can be calculated. Aside from this notable exception, the high corroboration between *p*-curve and meta-analytic estimates suggests a lack of systematic bias in the literature. This is corroborated by the fact that Egger's test of publication bias in the meta-analytic estimates were nonsignificant for both CARi and AUCw.

A second cause of systematic bias is introduced by researchers who engage in questionable research practices (QRPs; Simmons et al., 2011). One particularly common QRP is *p*-hacking, where researchers perform unplanned post-hoc analyses to reduce the *p*-value of a hypothesized relationship to below the .05 cutoff. Examples of *p*-hacking include adding covariates atheoretically, selectively removing outliers, or performing analyses on a subset of the population, among other strategies. In most cases, researchers will *p*-hack until the *p*-value falls to just under .05. If a set of findings contains a substantial number of *p*-hacked findings, the *p*-curve for that set of findings will contain more *p*-values in the .04 - .05 bin than any other bin, and will be right-skewed.

A visual analysis of the four sets of *p*-curves in the current study reveals that they were all left-skewed (see Firgure 2), suggesting that *p*-hacking is not biasing the CAR literature. Thus, despite the recent controversies surrounding questionable research practices in psychology and other disciplines, evidence from this study suggests that the associations of psychosocial functioning and the CAR represent true effects with evidential value. This is particularly refreshing news because the potential for researchers to engage in *p*-hacking and other questionable research practices is high in CAR research, as there are a number of design decisions, analytical techniques, and ambiguities with operational definitions which can be modified *post-hoc*. Adherence to guidelines (Stadler et al., 2016) will ensure that the field continues moving in the current direction of honest, reliable science.

Predictor-Specific Effects

A secondary aim of the current study was to examine whether specific categories of psychosocial predictors were associated with CARi or AUCw. Of the seven categories previously defined by Chida and Steptoe (2009), it was found that only fatigue/burnout/exhaustion was negatively correlated with CARi. This corroborates meta-analytic results from Chida and Steptoe (2009). It may be that fatigue takes a physiological toll on the body's ability to respond dynamically. Alternatively, under conditions of fatigue, the body may attempt to conserve resources in anticipation of anticipated challenges (Evans, Boggero, & Segerstrom, 2016). The other six categories had nonsignificant effects. However, *p*-curve analysis testing against evidential value were non-significant in all cases, suggesting that the extant literature is underpowered to detect effects if they exist.

AUCw was positively associated with depression but negatively associated with PTSD. As with CARi, the other associations were not statistically significant, but *p*-curves could not rule out the possibility that they contain evidential value. Despite not being statistically significant, the direction of the correlations revealed that job stress and anxiety/neuroticism/negative affect were positively correlated with CARi and AUCw, whereas general life stress

and positive psychosocial traits were negatively correlated with CARi and AUCw. These trends highlight the possibility that future-oriented predictors like anxiety and job stress, where there is an anticipation of future negative events, may be associated with increased CAR, but this observation is speculative and should be corroborated by future research.

Limitations

The current study is not without limitations. First, the articles and findings reported in the current study were all from the published literature; poster abstracts, conference proceedings, and unpublished data were not included. The *p*-curves could test for the presence of systematic bias in the literature. A full examination of the true, unbiased estimates of CAR in published and unpublished findings was beyond the scope or aims of the study. Nevertheless, the inclusion of only published studies should be taken into consideration when interpreting the findings; it may be that the true CAR effects are smaller than those reported in the current study. A second limitation is that the study only tested bivariate correlations among psychosocial predictors and levels of CARi and AUCw, but other more dynamic measures of the CAR are possible. For example, some have argued that the flexibility of the CAR rather than its magnitude is more strongly linked to psychosocial predictors (Mikolajczak et al., 2010). A third limitation is that the current study only examined linear effects, despite some studies describing quadratic effects (Gustafsson et al., 2010). A fourth limitation is that alternate conceptualizations of psychosocial predictors besides the seven categories reported are possible. Some of the seven categories are theoretically ambiguous and frequently co-occur in the real world (e.g., depression and anxiety). Nevertheless, solid theoretical scaffolding exists for the seven categories, and in an attempt to build upon the scaffolding, the same categories were retained. A fifth limitation is that the time window of psycholosocial predictors was not assessed. Questionnaires that ask about lifetime history of depressive symptoms, for example, may have different relations to the CAR than those that ask about depressive symptoms in the last two weeks, or even in the last 24 hours. Theoretical advances in predicting the time window that would be most meaningfully related to the CAR remains an important area for future research; it is possible that these associations will be predictor-specific. Finally, a limitation of the current study is that it used strict inclusion criteria of healthy participants and as such, results cannot generalize to medically compromised populations.

Despite these limitations, the study has several significant strengths. First, it provides a concrete example of how *p*-curves and meta-analysis can complement each other to shed light on situations where there appears to be a “tale of two literatures.” Second, the current study presents the most complete analysis of the literature on psychosocial functioning and CAR to date – a literature that has more than doubled within the last six years and will probably continue to expand. Third, the current study provides specific goals for future research in the area of theory development, and provides concrete recommendations for the power of future studies. It addresses concrete strategies that could help to increase the replicability of CAR findings.

Conclusion

In conclusion, psychosocial functioning is known to influence the CAR. The current study found that the largest evidential value existed for findings associating worse psychosocial functioning with lower AUCw. Findings associating depression, posttraumatic stress, anxiety, and fatigue demonstrated evidential value, and evidential value could not be ruled out for other psychosical predictors. Moving forward, theoretical developments regarding why some predictors but not others are associated with some measures of CAR but not others remains an important question – perhaps *the* most important question. To answer this question, more adequately powered, methodologically rigorous studies are needed. Recently published guidelines provide concrete and clear recommendations for researchers (Stadler et al., 2016), and results from the current study suggest that large samples are needed to minimize the likelihood that Type I and II error rates make their way into the literature. Nevertheless, the current study finds reliable evidence that psychosocial functioning influence the CAR, and provides the most thorough estimate of effect sizes by predictor and CAR measure to date. Future exploration of these associations may lead to meaningful insights regarding the effects of psychosocial functioning on human stress physiology.

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Highlights

- Psychosocial predictors explained 1%-3.6% of variance in CAR responses
- Depression was linked to higher AUCw and posttraumatic stress to lower AUCw
- Inconclusive results were obtained for predictor-specific effects on CARi
- Cross-sectional studies of CAR need Ns of 617-783 to detect effects with 80% power
- There were no indications of questionable research practices biasing the CAR literature

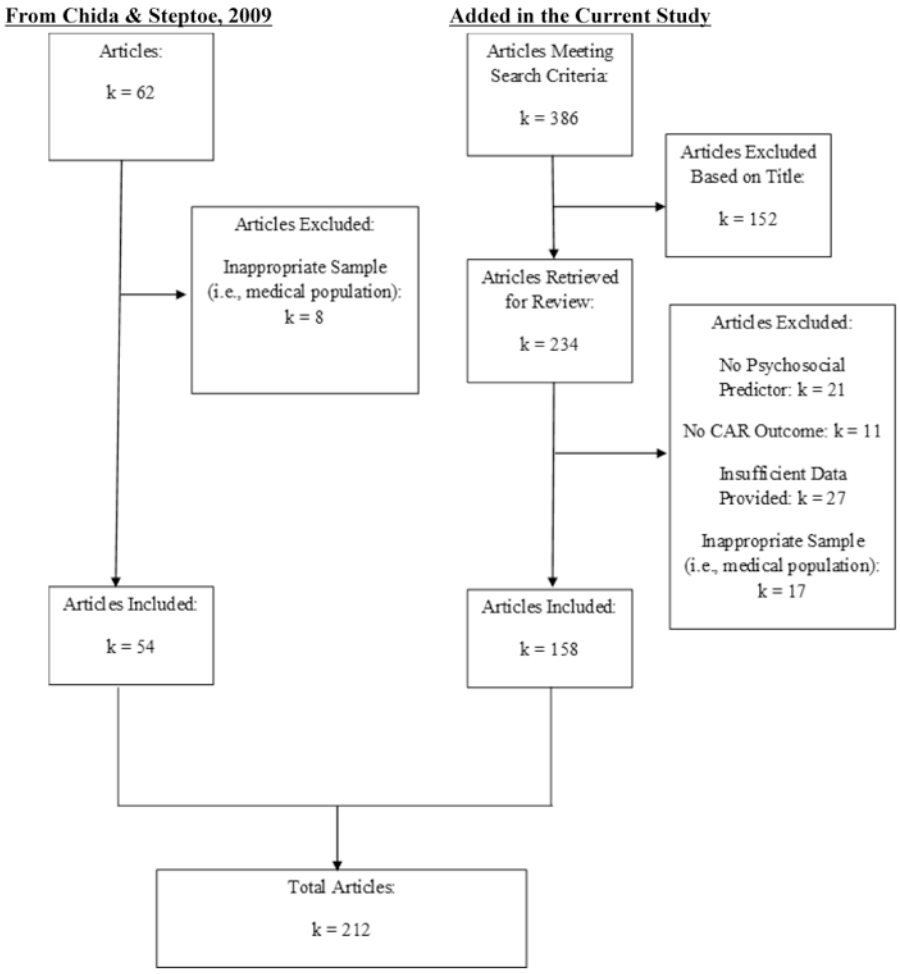
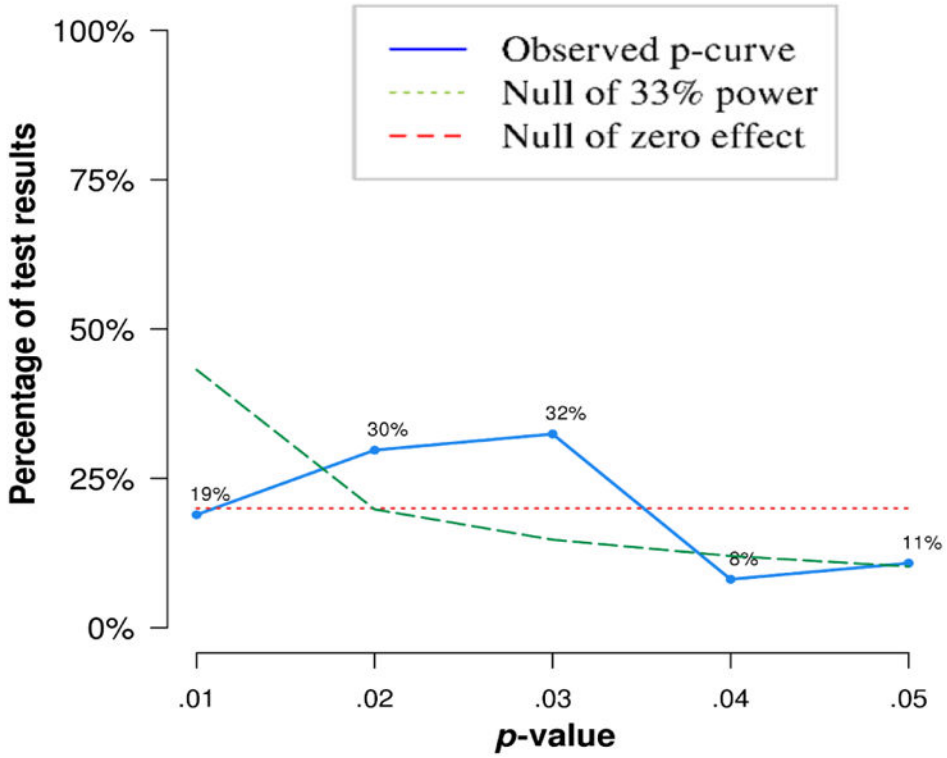


Figure 1. Flow Chart of Articles Included in Study

a)



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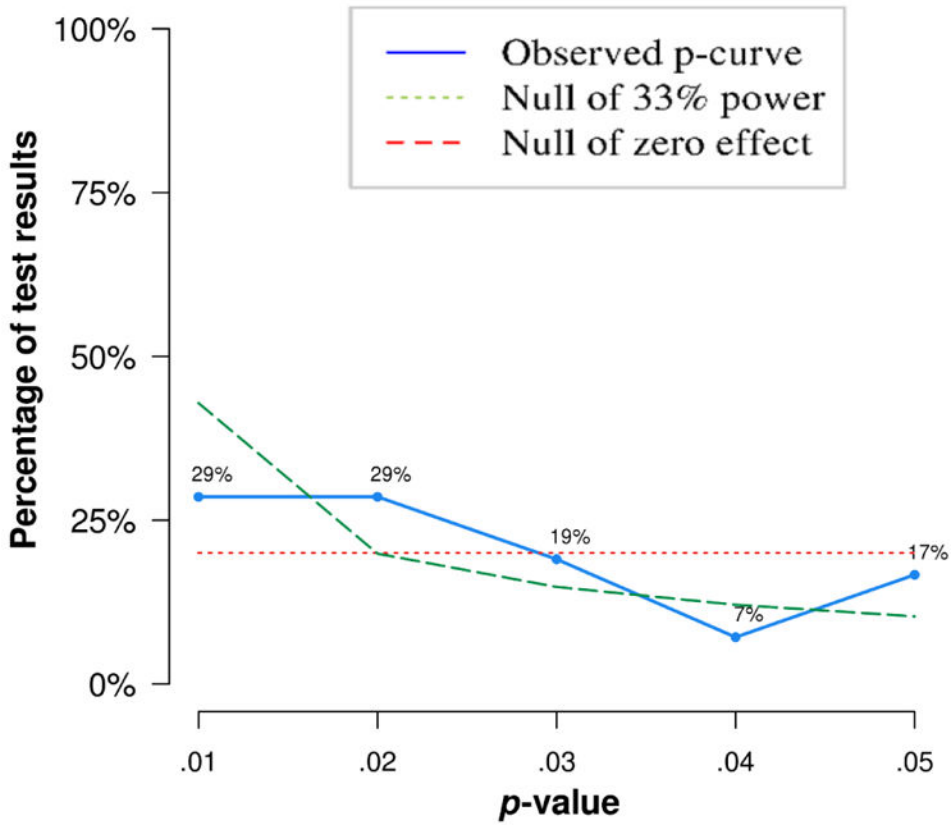

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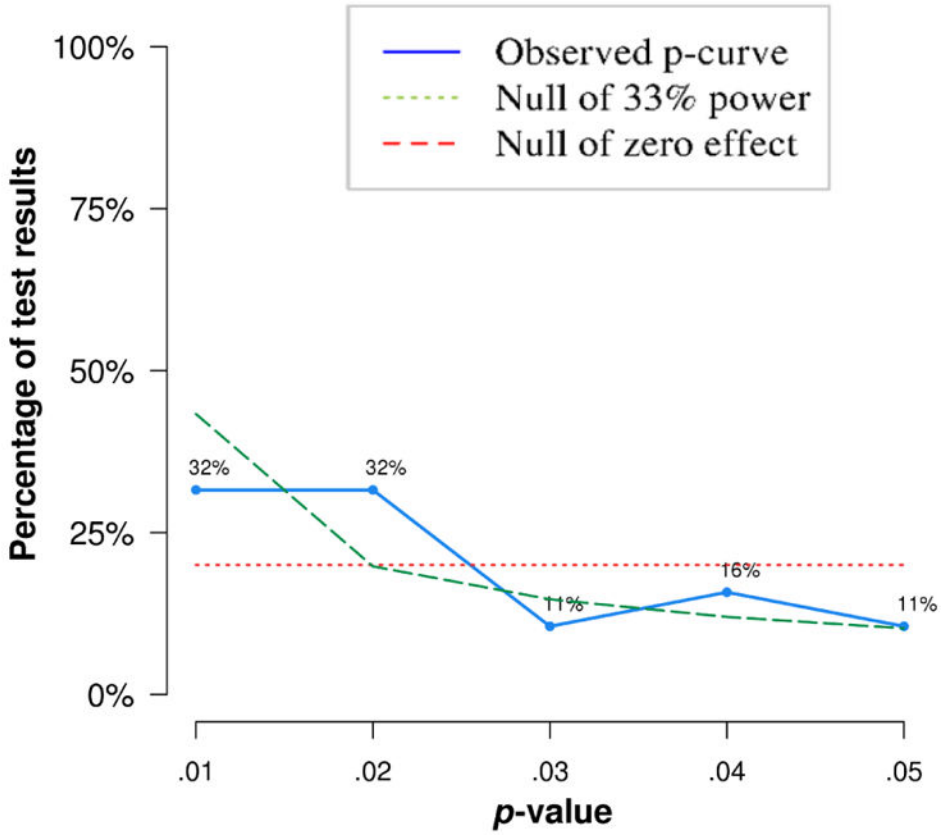

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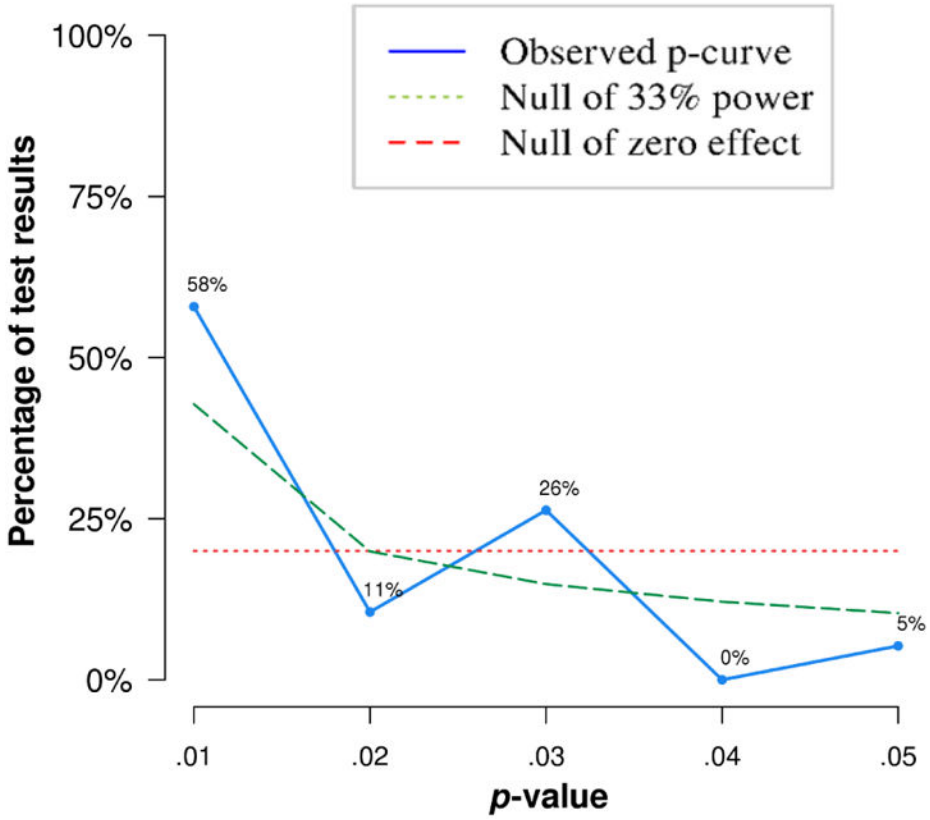

Figure 2. P-curves of Findings Relating the CAR to Psychosocial Functioning

Worse psychosocial functioning with higher CARi

Worse psychosocial functioning with lower CARi

W orse psychosocial functioning with higher AUCw

Worse psychosocial functioning with lower AUCw

Notes: To compute *p*-curves, directionality for all predictors was changed so that higher values reflected worse psychosocial functioning. To test for evidential value, the *p*-curve calculator compares observed *p*-values to p-values that would be obtained if the null were true (i.e., a null hypothesis of zero effect, as shown with the red line). The blue line shows the observed *p*-curve from significant *p*-values. If studies contain evidential value, the blue line will be right-skewed. Flat blue lines (neither right nor left skewed) indicate that findings lack evidential value or are underpowered to detect evidential value. These alternatives are differentiated by testing the set of findings against a null of 33%, shown in the green line. For detailed explanation of *p*-curves, see Simonsohn et al., 2014.

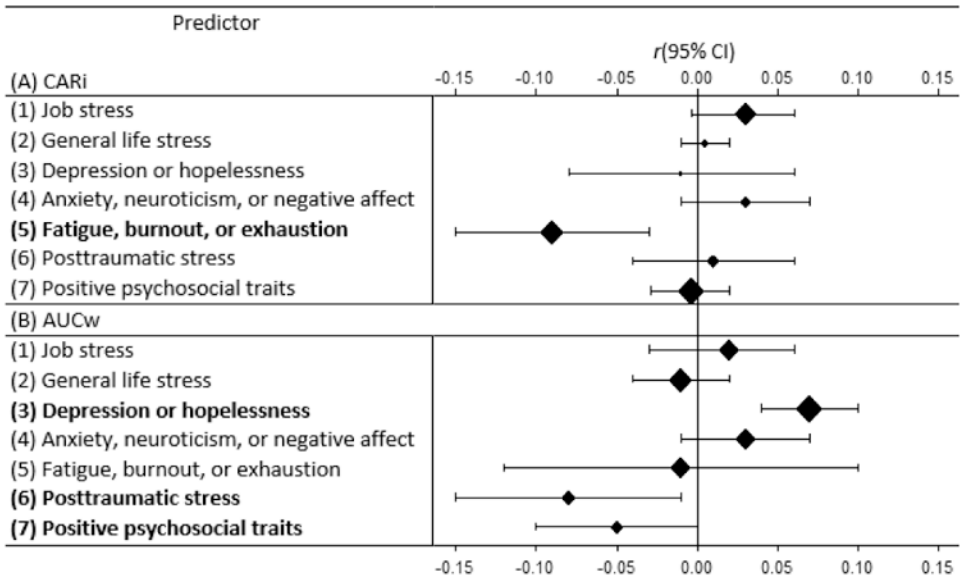

Figure 3. Combined Effect Sizes by Predictor Type

Notes: Forest plot displays predictor-specific associations with both CARi and AUCw. For each association, the aggregate effect size *r* is shown with its 95% confidence interval. Solid diamonds represent the aggregate effects in relation to zero and the size of the diamonds is proportional to the variance of the combined effect size from the random-effects meta-analysis. Aggregate effects that are significantly different from zero (CIs do not overlap with zero) are highlighted in bold font in the left column.

Table 1
Descriptive Statistics of Findings in Meta-Analysis

Number of Articles	212
Number of Findings	709
Number of Independent Findings	186
Mean Sample Size of Studies	244.95 (*SD*: 520.68; Med: 74; Range: 11 – 4,364)
Mean Number of Days Sampled	2.04 (*SD*: 1.31; Med: 2; Range: 1 – 9)
Mean Quality Score of Studies	6.08 (*SD*: 1.64; Med: 6; Range: 1 – 8)
Total Number of Findings for each Predictor Type	
Job Stress	64
General Life Stress	221
Depression	118
Anxiety/Neuroticism/Negative Affect	91
Fatigue/Burnout/Exhaustion	37
Posttraumatic Stress	56
Positive Psychosocial Traits	122

Table 2

Effect Size and Study Details of all Findings included in the Meta-Analysis

No	Author	Year	Outcome[TYPE*]	N	r	Measure[±]
1a	*Adam*	*2006*	*Depression*[DE]	*52*	*.01*	*AINC*
1b	*Adam*	*2006*	*Trait anger*[AX]	*52*	*.21*	*AINC*
1c	*Adam*	*2006*	*Trait anxiety*[AX]	*52*	*-.10*	*AINC*
Figfig	*Adam et al*	*2006*	*Fatigue*[FA]	*156*	*-.06*	*AINC*
2b	*Adam et al*	*2006*	*Loneliness*[GL]	*156*	*.14*	*AINC*
2c	*Adam et al*	*2006*	*Loss of control*[GL]	*156*	*.17*	*AINC*
2d	*Adam et al*	*2006*	*Low liveliness/energy*[DE]	*156*	*.00*	*AINC*
2e	*Adam et al*	*2006*	*Sadness*[DE]	*156*	*.13*	*AINC*
2f	*Adam et al*	*2006*	*Tense/angry*[GL]	*156*	*.01*	*AINC*
2g	***Adam et al***	***2006***	***Threat***[GL]	***156***	***.19***	***AINC***
3a	*Alderling et al*	*2006*	*Job stress (females)*[JS]	*169*	*.00*	*AINC*
3b	*Alderling et al*	*2006*	*Job stress (males)*[JS]	*87*	*.00*	*AINC*
4	**Aubry et al**	**2010**	**Remitted depression**[DE]	**90**	**.27**	**AINC**
5a	Baes et al	2014	Childhood trauma and depression[DE]	23	-.14	AUCg
5b	Baes et al	2014	Depression[DE]	30	-.19	AUCg
6a	***Barnett et al***	***2005***	***Poor marital quality***[GL]	***75***	***.24***	***AINC***
6b	***Barnett et al***	***2005***	***Poor marital quality***[GL]	***75***	***.23***	***AUCg***
7	***Bhagwagar et al***	***2003***	***Past depression***[DE]	***62***	***.32***	***AUCg***
8	*Bhagwagar et al*	*2005*	*Depression*[DE]	*60*	*.28*	*AUCg*
9a	Bogg et al	2015	Conscientiousness[PO]	960	-.02	AINC
9b	Bogg et al	2015	Neuroticism[AX]	960	.00	AINC
10a	Bosch et al	2009	Cognitive-affective symptoms (females)[DE]	795	.00	AUCi
10b	**Bosch et al**	**2009**	**Cognitive-affective symptoms (males)**[DE]	**785**	**-.08**	**AUCi**
10c	Bosch et al	2009	Somatic symptoms (females)[DE]	795	-.03	AUCi
10d	**Bosch et al**	**2009**	**Somatic symptoms (males)**[DE]	**785**	**.09**	**AUCi**

No	Author	Year	Outcome[TYPE*]	N	r	Measure[±]
10e	Bosch et al	2009	Depressive symptoms[DE]	1580	-.01	AUCi
11	Bouma et al	2009	Depressed mood[DE]	568	-.05	AINC
12a	Camfield et al	2013	Perceived stress[GL]	138	-.14	AUCi
12b	**Camfield et al**	**2013**	**High stress (vs low stress)[GL]**	**94**	**.22**	**AUCi**
13	*Chan et al*	*2007*	*Neuroticism[AX]*	*65*	*-.09*	*AUCg*
14	Chui et al	2014	Cumulative depressive symptoms[DE]	50	-.18	AINC
15	**Clingerman et al**	**2013**	**Work stress[JS]**	**28**	**.42**	**AINC**
16	Cropley et al	2015	Work-related rumination[JS]	108	-.19	AINC
17a	**Daubenmier et al**	**2014**	**Anxiety[AX]**	**43**	**.35**	**AINC**
17b	Daubenmier et al	2014	Negative affect[AX]	43	.35	AINC
17c	Daubenmier et al	2014	Perceived stress[GL]	43	.44	AINC
17d	Daubenmier et al	2014	Rumination[AX]	43	.42	AINC
18a	Dedovic et al	2010	High-risk subclinical depression[DE]	36	-.43	AUCi
18b	**Dedovic et al**	**2010**	**Subclinical depression[DE]**	**50**	**-.30**	**AUCi**
19a	***De Kloet et al***	***2007***	***PTSD symptoms[PT]***	***47***	***-.37***	***AUCi***
19b	***De Kloet et al***	***2007***	***PTSD symptoms[PT]***	***47***	***-.49***	***AUCg***
20	***De Vente et al***	***2003***	***Burnout[FA]***	***45***	***-.34***	***ACOR***
21	***De Vugt et al***	***2005***	***Caregiver stress[GL]***	***98***	***-.21***	***AINC***
22a	Diaz et al	2013	Competition stress (day 1)[GL]	11	.06	AUCi
22b	Diaz et al	2013	Competition stress (day 1)[GL]	11	.10	AUCg
22c	Diaz et al	2013	Negative mood (day 1)[AX]	11	-.55	AUCi
22d	Diaz et al	2013	Negative mood (day 1)[AX]	11	-.59	AUCg
22e	Diaz et al	2013	Competition stress (day 2)[GL]	9	.24	AUCi
22f	Diaz et al	2013	Competition stress (day 2)[GL]	9	.34	AUCg
22g	**Diaz et al**	**2013**	**Negative mood (day 2)[AX]**	**11**	**-.70**	**AUCi**
22h	**Diaz et al**	**2013**	**Negative mood (day 2)[AX]**	**11**	**-.90**	**AUCg**
23a	Dienes et al	2013	At-risk for depression (vs. control)[DE]	42	-.06	AINC

No	Author	Year	Outcome[TYPE*]	N	r	Measure[±]
23b	Dienes et al	2013	Depressed status (vs. control)[DE]	37	.17	AINC
24a	Dietrich et al	2013	Aggression (mean scales)[GL]	361	.07	AUCi
24b	Dietrich et al	2013	Aggression (mean scales)[GL]	361	.00	AUCg
24c	Dietrich et al	2013	Aggression[GL]	357	.03	AUCi
24d	Dietrich et al	2013	Aggression[GL]	1580	.01	AUCg
24e	Dietrich et al	2013	Proactive aggression[GL]	361	.00	AUCi
24f	Dietrich et al	2013	Reactive aggression[GL]	361	.09	AUCi
24g	Dietrich et al	2013	Delinquent behavior[GL]	235	.00	AUCi
24h	Dietrich et al	2013	Delinquent behavior[GL]	1578	-.04	AUCg
24i	Dietrich et al	2013	Anxiety[AX]	364	.01	AUCi
24j	Dietrich et al	2013	Anxiety[AX]	364	.02	AUCg
24k	Dietrich et al	2013	Depression[DE]	361	.07	AUCg
24l	Dietrich et al	2013	Depression[DE]	361	.12	AUCi
24m	Dietrich et al	2013	Anxious/depressed[DE]	789	-.02	AUCi
24n	Dietrich et al	2013	Anxious/depressed[DE]	1582	.04	AUCg
25a	Doane et al	2010	Interpersonal stress[GL]	108	-.04	AINC
25b	Doane et al	2010	Trait loneliness[GL]	108	-.08	AINC
26a	Doane et al	2011	Depression[DE]	735	-.01	AINC
26b	Doane et al	2011	Negative emotionality[AX]	735	.01	AINC
27	Doane et al	2015	Childhood trauma[PT]	82	.13	AUCi
28a	Donoho et al	2011	Cumulative stress[GL]	23	.00	AINC
28b	Donoho et al	2011	Family stress[GL]	23	-.03	AINC
28c	Donoho et al	2011	Peer stress[GL]	23	.00	AINC
28d	Donoho et al	2011	Personal stress[GL]	23	-.04	AINC
28e	Donoho et al	2011	School stress[GL]	23	.13	AINC
29a	Drake et al	2015	Concurrent coping efficacy[PO]	70	.04	AINC
29b	Drake et al	2015	Concurrent loneliness[GL]	70	-.09	AINC
29c	Drake et al	2015	Past coping efficacy[PO]	70	.19	AINC

No	Author	Year	Outcome[TYPE] *	N	r	Measure ±
29d	Drake et al	2015	Past loneliness[GL]	70	-.07	AINC
30a	**Duan et al**	**2013**	**Anxiety[AX]**	**63**	**-.30**	**AINC**
30b	Duan et al	2013	Anxiety[AX]	63	.04	AUCg
30c	Duan et al	2013	Perceived stress[GL]	63	-.30	AINC
30d	Duan et al	2013	Perceived stress[GL]	63	-.05	AUCg
30e	Duan et al	2013	Test anxiety (vs. control)[AX]	63	-.35	AINC
30f	Duan et al	2013	Test anxiety (vs. control)[AX]	63	-.07	AUCg
31a	*Ebrecht et al*	*2004*	*Loneliness[GL]*	*24*	*.00*	*AUCg*
31b	*Ebrecht et al*	*2004*	*Optimism[PO]*	*24*	*.00*	*AUCg*
31c	*Ebrecht et al*	*2004*	*Perceived stress[GL]*	*24*	*.00*	*AUCg*
31d	*Ebrecht et al*	*2004*	*Poor social support[GL]*	*24*	*.00*	*AUCg*
31e	*Ebrecht et al*	*2004*	*Self-esteem[PO]*	*24*	*.00*	*AUCg*
32a	*Edwards et al*	*2003*	*Perceived stress[GL]*	*26*	*.37*	*AUCg*
32b	*Edwards et al*	*2003*	*Perceived stress[GL]*	*26*	*.00*	*MINC*
33	*Eek et al*	*2006*	*Perceived stress[GL]*	*381*	*.00*	*AINC*
34a	*Ellenbogen et al*	*2006*	*Daily hassles[GL]*	*57*	*.02*	*AINC*
34b	*Ellenbogen et al*	*2006*	*Daily hassles[GL]*	*57*	*.14*	*AUCg*
34c	*Ellenbogen et al*	*2006*	*Depression[DE]*	*57*	*-.02*	*AINC*
34d	*Ellenbogen et al*	*2006*	*Depression[DE]*	*57*	*.09*	*AUCg*
34e	*Ellenbogen et al*	*2006*	*Internalizing[DE]*	*57*	*.08*	*AINC*
34f	*Ellenbogen et al*	*2006*	*Internalizing[DE]*	*57*	*.05*	*AUCg*
34g	*Ellenbogen et al*	*2006*	*Major life events[GL]*	*57*	*-.09*	*AINC*
34h	*Ellenbogen et al*	*2006*	*Major life events[GL]*	*57*	*-.11*	*AUCg*
34i	*Ellenbogen et al*	*2006*	*Negative affect[AX]*	*57*	*.07*	*AINC*
34j	*Ellenbogen et al*	*2006*	*Negative affect[AX]*	*57*	*.10*	*AUCg*
34k	*Ellenbogen et al*	*2006*	*Positive affect[PO]*	*57*	*.05*	*AINC*
34l	*Ellenbogen et al*	*2006*	*Positive affect[PO]*	*57*	*.17*	*AUCg*
34m	*Ellenbogen et al*	*2006*	*Social problems[GL]*	*57*	*.16*	*AINC*

No	Author	Year	Outcome^{TYPE*}	N	r	Measure$^{\pm}$
34n	*Ellenbogen et al*	*2006*	*Social problems*^{GL}	*57*	*.07*	*AUCg*
34o	*Ellenbogen et al*	*2006*	*State anxiety*^{AX}	*57*	*.02*	*AINC*
34p	*Ellenbogen et al*	*2006*	*State anxiety*^{AX}	*57*	*-.07*	*AUCg*
35a	Ellenbogen et al	2009	Parental functioning^{PO}	43	-.13	AUCi
35b	Ellenbogen et al	2009	Parental control^{PO}	43	-.22	AUCi
35c	Ellenbogen et al	2009	Parental neuroticism^{AX}	43	.03	AUCi
35d	**Ellenbogen et al**	**2009**	**Parental structure**^{PO}	**43**	**-.35**	**AUCi**
35e	Ellenbogen et al	2009	Parental support^{PO}	43	-.07	AUCi
36a	*Eller et al*	*2006*	*Job stress (low control), males*^{JS}	*28*	*.00*	*AINC*
36b	*Eller et al*	*2006*	*Job stress (high demand), males*^{JS}	*28*	*-.02*	*AINC*
36c	*Eller et al*	*2006*	*Job stress (ERI model), males*^{JS}	*28*	*.00*	*AINC*
36d	*Eller et al*	*2006*	*Job stress (over-commitment), males*^{JS}	*28*	*.03*	*AINC*
36e	*Eller et al*	*2006*	*Time pressure, males*^{JS}	*28*	*.00*	*AINC*
36f	*Eller et al*	*2006*	*Job stress (low control), females*^{JS}	*47*	*.01*	*AINC*
36g	*Eller et al*	*2006*	*Job stress (high demand), females*^{JS}	*52*	*.00*	*AINC*
36h	*Eller et al*	*2006*	*Job stress (ERI model), females*^{JS}	*53*	*.15*	*AINC*
36i	*Eller et al*	*2006*	*Job stress (over-commitment), females*^{JS}	*50*	*.00*	*AINC*
36j	***Eller et al***	***2006***	***Time pressure, females***^{JS}	***55***	***.31***	***AINC***
37a	Eller et al	2011	Job control^{PO}	70	.05	AINC
37b	Eller et al	2011	Job demands^{JS}	70	.04	AINC
37c	Eller et al	2011	Job effort^{JS}	70	.06	AINC
37d	Eller et al	2011	Job effort-reward imbalance^{JS}	70	-.04	AINC
37e	Eller et al	2011	Job reward^{PO}	70	-.04	AINC
37f	Eller et al	2011	Job strain^{JS}	70	.01	AINC
37g	Eller et al	2011	Life events (past year)^{GL}	70	-.02	AINC
38a	Endrighi et al	2011	Depression^{DE}	422	.01	AINC
38	Endrighi et al	2011	Optimism^{PO}	422	-.11	AINC
39a	Engert et al	2011	Anxiety symptoms^{AX}	58	.28	AINC

No	Author	Year	Outcome[TYPE]*	N	r	Measure[±]
39b	**Engert et al**	**2011**	**Depressive symptoms[DE]**	**58**	**.33**	**AINC**
39c	Engert et al	2011	Low early-life parental care[GL]	58	.34	AINC
39d	Engert et al	2011	Self-esteem[PO]	58	-.24	AINC
40a	**Fairchild et al**	**2008**	**Adolescent-onset CD (vs. control)[GL]**	**116**	**-.27**	**AUCi**
40b	**Fairchild et al**	**2008**	**Early-Onset CD (vs. control)[GL]**	**134**	**-.33**	**AUCi**
41a	**Fekedulegn et al**	**2012**	**Percent of hours on midnight shift[JS]**	**65**	**-.32**	**AUCg**
41b	Fekedulegn et al	2012	Percent of hours on midnight shift[JS]	65	-.04	AUCi
42	Franz et al	2013	Childhood disadvantage[GL]	727	.06	AINC
43a	Freitag et al	2009	ADHD (vs. control)[GL]	121	.20	MINC
43b	Freitag et al	2009	ADHD + CD (vs. control)[GL]	91	.11	MINC
43c	Freitag et al	2009	ADHD + ODD (vs. control)[GL]	118	.20	MINC
43d	Freitag et al	2009	ADHD with anxiety (vs. control)[GL]	106	.17	MINC
43e	**Freitag et al**	**2009**	**ADHD without anxiety (vs. control)[GL]**	**155**	**.20**	**MINC**
44a	Garcia-Banda et al	2014	Neuroticism[AX]	118	.04	AINC
44b	Garcia-Banda et al	2014	Neuroticism[AX]	118	.02	AUCg
45a	Gartland et al	2014	Daily negative affect[AX]	64	.00	AUCi
45b	Gartland et al	2014	Daily positive affect[PO]	64	.00	AUCi
45c	Gartland et al	2014	Hassle appraisal[GL]	64	.00	AUCi
46a	Gonzalez-bono et al	2011	Caregiver burden[GL]	38	.00	AINC
46b	**Gonzalez-bono et al**	**2011**	**Caregiving[GL]**	**70**	**-.27**	**AINC**
46c	Gonzalez-bono et al	2011	Psychopathology of care recipient[GL]	38	-.50	AINC
46d	Gonzalez-bono et al	2011	Schizophrenia symptoms of care recipient[GL]	38	-.35	AINC
47a	Gonzalez-Cabrera et al	2014	Perceived stress[GL]	36	.01	AINC
47b	Gonzalez-Cabrera et al	2014	State anxiety[AX]	36	.24	AINC
47c	Gonzalez-Cabrera et al	2014	Trait anxiety[AX]	36	.28	AINC
48a	**Gostisha et al**	**2014**	**Callous-unemotional traits[GL]**	**50**	**.28**	**Slope**
48b	Gostisha et al	2014	Psychopathy symptoms[GL]	50	.37	Slope

No	Author	Year	Outcome[TYPE]*	N	r	Measure±
48c	Gostisha et al	2014	Stress exposure[GL]	50	.35	Slope
49	Grant et al	2009	Social isolation[GL]	145	.20	AINC
50a	*Greaves-Lord et al*	*2007*	*Current anxiety[AX]*	*376*	*.00*	*AUCg*
50b	***Greaves-Lord et al***	***2007***	***Persistent anxiety[GL]***	***354***	***.13***	***AUCg***
51a	*Grossi et al*	*2005*	*Burnout, males[FA]*	*29*	*.00*	*MINC*
51b	*Grossi et al*	*2005*	*Burnout, males[FA]*	*29*	*.00*	*AUCg*
51c	*Grossi et al*	*2005*	*Burnout, females[FA]*	*35*	*.00*	*MINC*
51d	*Grossi et al*	*2005*	*Burnout, females[FA]*	*35*	*.26*	*AUCg*
52	**Gustafsson et al**	**2010**	**Acumulated life adversity[GL]**	**130**	**.31**	**AINC**
53	**Gustafsson et al**	**2012**	**Cumulation of temporary employment[JS]**	**755**	**.08**	**AINC**
54	Hansen et al	2011	Bullying[GL]	1717	-.03	30min
55a	*Harris et al*	*2007*	*Job stress (DC model)[JS]*	*44*	*.17*	*AUCi*
55b	*Harris et al*	*2007*	*Job stress (ERI model)[JS]*	*39*	*-.11*	*AUCi*
55c	*Harris et al*	*2007*	*Poor social support[GL]*	*42*	*.27*	*AUCi*
55d	*Harris et al*	*2007*	*Vitality[PO]*	*42*	*-.32*	*AUCi*
55e	*Harris et al*	*2007*	*Well-being[PO]*	*42*	*-.19*	*AUCi*
56a	Hartman et al	2013	Externalizing (checklist)[GL]	211	.03	AUCi
56b	Hartman et al	2013	Externalizing (checklist)[GL]	211	.00	AUCg
56c	Hartman et al	2013	Externalizing (self-report)[GL]	211	.01	AUCi
56d	Hartman et al	2013	Externalizing (self-report)[GL]	211	-.09	AUCg
56e	Hartman et al	2013	Internalizing (checklist)[DE]	211	-.03	AUCi
56f	Hartman et al	2013	Internalizing (checklist)[DE]	211	.03	AUCg
56g	Hartman et al	2013	Internalizing (self-report)[DE]	211	.10	AUCi
56h	Hartman et al	2013	Internalizing (self-report)[DE]	211	.13	AUCg
56i	Hartman et al	2013	Internalizing × Externalizing (checklist)[DE]	211	.02	AUCi
56j	Hartman et al	2013	Internalizing × Externalizing (checklist)[DE]	211	.07	AUCg
56k	Hartman et al	2013	Internalizing × Externalizing (self-report)[DE]	211	.03	AUCi

No	Author	Year	Outcome[TYPE]*	N	r	Measure[±]
56l	Hartman et al	2013	Internalizing × Externalizing (self-report)[DE]	211	.17	AUCg
57a	Hartwig et al	2013	Alexithymia (high vs. low)[GL]	78	-.34	AUCi
57b	**Hartwig et al**	**2013**	**Alexithymia[GL]**	**78**	**-.29**	**AUCi**
58a	**Heaney et al**	**2010**	**Anxiety[AX]**	**24**	**.46**	**AINC**
58b	Heaney et al	2010	Depression[DE]	24	.59	AINC
59	**Heim et al**	**2009**	**Fatigue[FA]**	**237**	**-.17**	**AUCg**
60a	**Hek et al**	**2013**	**Anxiety disorder (vs. control)[AX]**	**1788**	**-.05**	**AINC**
60b	Hek et al	2013	Anxiety disorder (vs. control)[AX]	1788	-.04	AUCg
61a	Hibel et al	2014	Job strain[JS]	56	.05	AINC
61b	Hibel et al	2014	Parenting stress[GL]	56	.06	AINC
62a	Hicks et al	2011	Attachment anxiety[AX]	39	.14	AINC
62b	Hicks et al	2011	Attachment avoidance[GL]	39	-.15	AINC
62c	**Hicks et al**	**2011**	**Daily conflict[GL]**	**39**	**-.37**	**AINC**
62d	Hicks et al	2011	Morning negative affect[AX]	39	-.06	AINC
62e	Hicks et al	2011	Night negative affect[GL]	39	.21	AINC
63a	Hill et al	2013	Agreeableness[PO]	92	-.08	AUCi
63b	Hill et al	2013	Agreeableness[PO]	92	-.03	AUCg
63c	Hill et al	2013	Conscientiousness[PO]	92	-.16	AUCi
63d	Hill et al	2013	Conscientiousness[PO]	92	.03	AUCg
63e	Hill et al	2013	Extraversion[PO]	92	.13	AUCi
63f	**Hill et al**	**2013**	**Extraversion[PO]**	**92**	**.24**	**AUCg**
63g	Hill et al	2013	Neuroticism[AX]	92	-.03	AUCi
63h	Hill et al	2013	Neuroticism[AX]	92	-.11	AUCg
63i	Hill et al	2013	Openness[PO]	92	.08	AUCi
63j	Hill et al	2013	Openness[PO]	92	.06	AUCg
64a	Holleman et al	2012	Decision latitude[JS]	1048	-.05	AUCi
64b	Holleman et al	2012	Decision lattitude[JS]	1048	-.05	AUCg

No	Author	Year	Outcome[TYPE]*	N	r	Measure[±]
64c	Holleman et al	2012	Job demands[JS]	1048	-.03	AUCi
64d	Holleman et al	2012	Job demands[JS]	1048	.02	AUCg
64e	Holleman et al	2012	Job insecurity[JS]	1048	.03	AUCi
64f	Holleman et al	2012	Job insecurity[JS]	1048	.00	AUCg
64g	Holleman et al	2012	Job strain[JS]	1048	-.01	AUCi
64h	Holleman et al	2012	Job strain[JS]	1048	.01	AUCg
64i	Holleman et al	2012	Negative life events[GL]	1680	-.02	AUCi
64j	Holleman et al	2012	Negative life events[GL]	1680	.02	AUCg
64k	Holleman et al	2012	Social support[PO]	1048	.01	AUCi
64l	Holleman et al	2012	Social support[PO]	1048	.03	AUCg
64m	Holleman et al	2012	Physical abuse[PT]	1680	-.02	AUCi
64n	Holleman et al	2012	Physical abuse[PT]	1680	-.01	AUCg
64o	Holleman et al	2012	Emotional abuse[PT]	1680	.01	AUCi
64p	**Holleman et al**	**2012**	**Emotional abuse[PT]**	**1680**	**.04**	**AUCg**
64q	Holleman et al	2012	Sexual abuse[PT]	1680	-.01	AUCi
64r	Holleman et al	2012	Sexual abuse[PT]	1680	.00	AUCg
64s	Holleman et al	2012	Trauma index[PT]	1680	.00	AUCi
64t	Holleman et al	2012	Trauma index[PT]	1680	.02	AUCg
65a	Hoyt et al	2015	High-arousal negative affect[PO]	315	.00	ACOR
65b	Hoyt et al	2015	High-arousal positive affect[PO]	315	-.05	ACOR
65c	Hoyt et al	2015	Low-arousal negative affect[PO]	315	.01	ACOR
65d	Hoyt et al	2015	Low-arousal positive affect[PO]	315	.04	ACOR
66a	Imeraj et al	2012	ADHD + ODD (vs. controls)[GL]	66	.05	AINC
66b	Imeraj et al	2012	ADHD only (vs. controls)[GL]	66	-.16	AINC
67	Isaksson et al	2013	ADHD[GL]	308	-.04	AINC
68a	**Isaksson et al**	**2015**	**ADHD[GL]**	**185**	**-.16**	**AINC**
68b	Isaksson et al	2015	Perceived stress[GL]	185	.00	AINC
69a	*Izawa et al*	*2007*	*Writing graduation thesis[GL]*	*12*	*.00*	*AUCi*

No	Author	Year	Outcome[TYPE]*	N	r	Measure±
69b	*Izawa et al*	*2007*	*Writing graduation thesis*[GL]	*12*	*.50*	*AUCg*
70a	Jabben et al	2011	Bipolar depression[DE]	1571	-.75	AUCi
70b	Jabben et al	2011	Bipolar depression[DE]	1571	.14	AUCg
70c	**Jabben et al**	**2011**	**Unipolar depression**[DE]	**1571**	**-.68**	**AUCi**
70d	Jabben et al	2011	Unipolar depression[DE]	1571	.09	AUCg
71	Jarcho et al	2013	Depression[DE]	49	-.04	AINC
72	**Jobin et al**	**2014**	**Perceived stress and pessimism**[GL]	**135**	**.22**	**AINC**
73a	*Johnson et al*	*2008*	*Abuse chronicity*[PT]	*52*	*-.21*	*AUCi*
73b	*Johnson et al*	*2008*	*Abuse chronicity*[PT]	*52*	*-.26*	*AUCg*
73c	*Johnson et al*	*2008*	*Depression*[DE]	*52*	*.28*	*AUCi*
73d	*Johnson et al*	*2008*	*Depression*[DE]	*52*	*.08*	*AUCg*
73e	*Johnson et al*	*2008*	*Posttraumatic stress disorder symptoms*[PT]	*52*	*.34*	*AUCi*
73f	***Johnson et al***	***2008***	***Posttraumatic stress disorder symptoms***[PT]	***52***	***.31***	***AUCg***
74a	Johnson et al	2014	Affective empathy[PO]	57	.26	AINC
74b	Johnson et al	2014	Blame externalization[GL]	57	-.26	AINC
74c	Johnson et al	2014	Carefree nonplanfulness[GL]	57	-.24	AINC
74d	Johnson et al	2014	Cognitive empathy[PO]	57	.05	AINC
74e	Johnson et al	2014	Coldheartedness[GL]	57	.00	AINC
74f	Johnson et al	2014	Fearlessness[GL]	57	.00	AINC
74g	Johnson et al	2014	Impulsive nonconformity[GL]	57	.00	AINC
74h	Johnson et al	2014	Machavellian egocentricity[GL]	57	-.26	AINC
74i	Johnson et al	2014	Proactive physical aggression[GL]	57	.00	AINC
74j	Johnson et al	2014	Proactive relational aggression[GL]	57	.00	AINC
74k	Johnson et al	2014	Prosocial behavior[PO]	57	.26	AINC
74l	Johnson et al	2014	Psychopathy (total score)[GL]	57	.00	AINC
74m	Johnson et al	2014	Reactive physical aggression[GL]	57	-.26	AINC
74n	Johnson et al	2014	Reactive relational aggression[GL]	57	.00	AINC

No	Author	Year	Outcome^TYPE*	N	r	Measure±
74o	**Johnson et al**	**2014**	**Social potency**[PO]	**57**	**.34**	**AINC**
74p	Johnson et al	2014	Stress immunity[PO]	57	.00	AINC
75a	***Kallen et al***	***2008***	***Anxiety, females***[AX]	***46***	***.29***	***AINC***
75b	*Kallen et al*	*2008*	*Anxiety, males*[AX]	*53*	*.00*	*AINC*
76a	Kaplow et al	2013	Anxiety after parental loss[AX]	38	-.29	AINC
76b	**Kaplow et al**	**2013**	**Avoidant coping after parental loss**[GL]	**38**	**-.37**	**MINC**
76c	Kaplow et al	2013	Depression after parental loss[DE]	38	-.24	AUCi
76d	Kaplow et al	2013	Maladaptive grief after parental loss[DE]	38	-.16	AINC
76e	Kaplow et al	2013	Parental maladaptive grief[DE]	38	-.21	AUCi
76f	Kaplow et al	2013	PTSD after parental loss[PT]	38	-.26	AINC
77	Karhula et al	2015	Job strain[JS]	95	-.20	AINC
78a	**Keeshin et al**	**2014**	**PTSD symptoms**[PT]	**24**	**-.41**	**AINC**
78b	Keeshin et al	2014	Sexual abuse[PT]	36	.03	AINC
79a	Kim et al	2015	Physical victimization, males[PT]	122	.06	ACOR
79b	Kim et al	2015	Physical victimization, females[PT]	122	-.04	ACOR
79c	Kim et al	2015	Psychological victimization, males[PT]	122	.01	ACOR
79d	Kim et al	2015	Psychological victimization, females[PT]	122	.01	ACOR
79e	Kim et al	2015	Relationship satisfaction, males[PO]	122	.00	ACOR
79f	Kim et al	2015	Relationship satisfaction, females[PO]	122	.00	ACOR
80	Klaassens et al	2009	Trauma[PT]	20	-.02	AUCg
81a	Klaassens et al	2010	Work trauma[PT]	882	-.01	AUCi
81b	**Klaassens et al**	**2010**	**Work trauma**[PT]	**62**	**-.26**	**AUCg**
82a	Klein et al	2012	Cognitive intrusions[AX]	38	-.06	AUCg
82b	**Klein et al**	**2012**	**Job-stress**[JS]	**38**	**.35**	**AUCg**
82c	Klein et al	2012	Mental distance from work[JS]	38	-.08	AUCg
83a	Klein et al	2014	Care-related stressors[GL]	158	-.03	Slope
83b	Klein et al	2014	Duration of care[GL]	158	-.01	Slope
83c	Klein et al	2014	Noncare-related stressors[GL]	158	.02	Slope

No	Author	Year	Outcome[TYPE]*	N	r	Measure±
83d	Klein et al	2014	Positive events[PO]	158	.05	Slope
84a	*Kliewer et al*	*2006*	*Internalizing[DE]*	*78*	*.00*	*ACOR*
84b	*Kliewer et al*	*2006*	*Major life events[GL]*	*78*	*.05*	*ACOR*
84c	*Kliewer et al*	*2006*	*Peer victimization[GL]*	*78*	*-.10*	*ACOR*
84d	*Kliewer et al*	*2006*	*Witnessed violence, males[PT]*	*45*	*.00*	*ACOR*
84e	*Kliewer et al*	*2006*	*Witnessed violence, females[PT]*	*33*	*-.09*	*ACOR*
85	**Knack et al**	**2011**	**Peer victimization[GL]**	**107**	**-.20**	**Slope**
86	Kuehl et al	2015	Major depressive disorder[DE]	85	-.08	AUCg
87	Kuehner et al	2011	Neuroticism[AX]	66	-.12	AUCi
88a	Kuhlman et al	2015	Current depression[DE]	121	.04	AINC
88b	Kuhlman et al	2015	Emotional abuse[PT]	121	.17	AINC
88c	Kuhlman et al	2015	Non-intentional trauma[PT]	121	.16	AINC
88d	Kuhlman et al	2015	Physical abuse[PT]	121	.10	AINC
89	Kumari et al	2009	Fatigue[FA]	4364	-.01	AINC
90	**Kumari et al**	**2013**	**Maternal separation[GL]**	**3712**	**.04**	**AINC**
91a	Lac et al	2012	Anxiety and depression[DE]	69	.17	AUCi
91b	Lac et al	2012	Anxiety[AX]	69	.23	AUCi
91c	Lac et al	2012	Bullied at work[GL]	69	-.11	AUCi
91d	Lac et al	2012	Depression[DE]	69	.06	AUCi
91e	Lac et al	2012	Stress[GL]	69	.08	AUCi
92a	Laceulle et al	2014	Assertiveness[PO]	343	.01	AINC
92b	Laceulle et al	2014	Excitement seeking[GL]	343	-.03	AINC
92c	Laceulle et al	2014	Hostility[GL]	343	.03	AINC
92d	Laceulle et al	2014	Impulsiveness[GL]	343	-.01	AINC
92e	**Laceulle et al**	**2014**	**Self-discipline[GL]**	**343**	**-.11**	**AINC**
92f	Laceulle et al	2014	Vulnerability[GL]	343	.02	AINC
93a	*Lai et al*	*2005*	*Negative affect[AX]*	*80*	*.00*	*AUCg*
93b	***Lai et al***	***2005***	***Optimism[PO]***	***80***	***-.31***	***AUCg***

No	Author	Year	Outcome[TYPE]*	N	r	Measure±
93c	*Lai et al*	*2005*	*Positive affect*[PO]	*80*	*.00*	*AUCg*
94a	Lai et al	2010	Humor[PO]	45	-.02	AUCi
94b	**Lai et al**	**2010**	**Humor**[PO]	**45**	**-.32**	**AUCg**
94c	Lai et al	2010	Self-esteem[PO]	45	.20	AUCi
94d	Lai et al	2010	Self-esteem[PO]	45	.06	AUCg
95a	Lai et al	2012	Social network cultivation[PO]	78	.22	ACOR
95b	Lai et al	2012	Social network emotional support[PO]	78	.02	ACOR
95c	Lai et al	2012	Social network size[PO]	78	.02	ACOR
96a	Lamers et al	2013	Atypical depression[DE]	665	.08	AUCi
96b	**Lamers et al**	**2013**	**Atypical depression**[DE]	**665**	**-.09**	**AUCg**
96c	Lamers et al	2013	Melancholic depression[DE]	654	.09	AUCi
96d	Lamers et al	2013	Melancholic depression[DE]	654	.16	AUCg
97a	*Langelaan et al*	*2006*	*Burnout*[FA]	*45*	*.00*	*AUCi*
97b	*Langelaan et al*	*2006*	*Work engagement*[PO]	*51*	*.00*	*AUCi*
98a	Laudenslager et al	2009	PTSD symptoms[PT]	42	-.12	AINC
98b	Laudenslager et al	2009	PTSD symptoms[PT]	17	.07	AINC
99a	Lederbogen et al	2010	Depressive symptoms[DE]	718	.04	AINC
99b	Lederbogen et al	2010	Social support[GL]	718	-.04	AINC
99c	Lederbogen et al	2010	Subjective health (mental symptoms)[GL]	718	.05	AINC
99d	Lederbogen et al	2010	Subjective health (physical symptoms)[GL]	718	.02	AINC
100a	Leggett et al	2014	Anger[GL]	164	.00	Slope
100b	**Leggett et al**	**2014**	**Depressive mood**[DE]	**164**	**-.20**	**Slope**
101	Liao et al	2012	Job strain[JS]	1988	.01	AINC
102a	**Lindholm et al**	**2012**	**Severe stress**[PT]	**131**	**.19**	**T1/T0**
102b	Lindholm et al	2012	Shift work[JS]	131	.45	T1/T0
103	Lovell et al	2011	Perceived stress[GL]	32	-.16	AINC
104a	Lovell et al	2012	Social support appraisal[PO]	45	.17	AINC
104b	Lovell et al	2012	Social support belonging[PO]	45	.20	AINC

No	Author	Year	Outcome^{TYPE*}	N	r	Measure$^{\pm}$
104c	**Lovell et al**	**2012**	**Social support self-esteem[PO]**	**45**	**.35**	**AINC**
104d	Lovell et al	2012	Social support tangible[PO]	45	.11	AINC
105a	Lovell et al	2015	Anxiety[AX]	18	-.13	AINC
105b	Lovell et al	2015	Caregiving for child with autism or ADHD[GL]	57	-.03	AINC
105c	Lovell et al	2015	Depression[DE]	18	-.07	AINC
105d	Lovell et al	2015	Perceived stress[GL]	18	-.40	AINC
106a	**Lu et al**	**2013**	**Childhood trauma[PT]**	**48**	**.34**	**AINC**
106b	**Lu et al**	**2013**	**Childhood trauma[PT]**	**48**	**.32**	**AUCg**
107	**Madsen et al**	**2012**	**Neuroticism[AX]**	**48**	**.31**	**AINC**
108a	Maina et al	2009	Job strain (group 1)[JS]	68	.00	AUCg
108b	Maina et al	2009	Job strain (group 2)[JS]	36	.32	AUCg
108c	Maina et al	2009	Job effort (group 1)[JS]	68	.00	AUCg
108d	Maina et al	2009	Job effort (group 2)[JS]	36	-.32	AUCg
108e	Maina et al	2009	Job reward (group 1)[PO]	68	.23	AUCg
108f	Maina et al	2009	Job reward (group 2)[PO]	36	.00	AUCg
108g	Maina et al	2009	Job effort-reward imbalance (group 1)[JS]	68	-.23	AUCg
108h	Maina et al	2009	Job effort-reward imbalance (group 2)[JS]	36	.00	AUCg
109a	Maina, Palmas et al	2009	Decision latitude at work[PO]	36	.00	AUCi
109b	Maina, Palmas et al	2009	Decision latitude at work[PO]	36	.00	AUCg
109c	Maina, Palmas et al	2009	Psychological demands at work[JS]	36	.00	AUCi
109d	Maina, Palmas et al	2009	Psychological demands at work[JS]	36	.00	AUCg
110a	Mangold et al	2010	High trauma exposure (vs moderate)[GL]	59	-.13	AINC
110b	**Mangold et al**	**2010**	**Moderate/high trauma exposure (vs. low)[GL]**	**59**	**-.42**	**AINC**
111a	Mangold et al	2011	Depressive symptomatology[DE]	55	-.32	AINC
111b	Mangold et al	2011	Emotional abuse[PT]	55	-.28	AINC

No	Author	Year	Outcome[TYPE*]	N	r	Measure[±]
111c	Mangold et al	2011	General traumas[PT]	55	-.34	AINC
111d	Mangold et al	2011	Physical abuse[PT]	55	-.25	AINC
111e	Mangold et al	2011	Sexual abuse[PT]	55	-.23	AINC
112	Mangold et al	2012	High acculturation and neuroticism[AX]	30	-.52	ACOR
113	**Marchand et al**	**2014**	**Burnout[FA]**	**401**	**-.13**	**AINC**
114a	Marsman et al	2012	Perceived parental rejection[GL]	1594	-.03	AUCi
114b	Marsman et al	2012	Perceived parental rejection[GL]	1594	-.04	AUCg
114c	Marsman et al	2012	Perceived parental warmth[PO]	1594	-.03	AUCi
114d	**Marsman et al**	**2012**	**Perceived parental warmth[PO]**	**1594**	**-.08**	**AUCg**
115	***Meinlschmidt et al***	***2005***	***Early loss event[PT]***	***95***	***-.29***	***AINC***
116a	**Mello et al**	**2015**	**Physical punishment[PT]**	**113**	**-.24**	**AUCg**
116b	**Mello et al**	**2015**	**Working on the streets[JS]**	**113**	**.22**	**AUCg**
117a	**Merwin et al**	**2015**	**Parental hostility[GL]**	**149**	**-.26**	**AUCi**
117b	Merwin et al	2015	Parental hostility[GL]	149	-.13	AUCg
118a	**Mikolajczak et al**	**2010**	**Happiness[PO]**	**41**	**-.38**	**Slope**
118b	Mikolajczak et al	2010	Neuroticism[AX]	41	.53	Slope
118c	**Mikolajczak et al**	**2010**	**Perceived stress[GL]**	**41**	**-.55**	**Slope**
119a	*Mommersteeg et al*	*2006*	*Depression[DE]*	*34*	*.04*	*AUCi*
119b	*Mommersteeg et al*	*2006*	*Depression[DE]*	*34*	*-.10*	*AUCg*
119c	*Mommersteeg et al*	*2006*	*Depression + burnout[DE]*	*73*	*.10*	*AUCi*
119d	*Mommersteeg et al*	*2006*	*Depression + burnout [DE]*	*73*	*.10*	*AUCg*
119e	*Mommersteeg et al*	*2006*	*Exhaustion[FA]*	*34*	*-.14*	*AUCi*
119f	*Mommersteeg et al*	*2006*	*Exhaustion[FA]*	*34*	*-.09*	*AUCg*
119g	*Mommersteeg et al*	*2006*	*Exhaustion + burnout[FA]*	*73*	*-.05*	*AUCi*
119h	*Mommersteeg et al*	*2006*	*Exhaustion + burnout[FA]*	*73*	*-.02*	*AUCg*
119i	*Mommersteeg et al*	*2006*	*Neuroticism[AX]*	*34*	*.04*	*AUCi*
119j	*Mommersteeg et al*	*2006*	*Neuroticism[AX]*	*34*	*-.14*	*AUCg*

No	Author	Year	Outcome[TYPE]*	N	r	Measure±
119k	*Mommersteeg et al*	*2006*	*Neuroticism + burnout*[AX]	*72*	*-.12*	*AUCi*
119l	*Mommersteeg et al*	*2006*	*Neuroticism + burnout*[AX]	*72*	*-.07*	*AUCg*
120a	Mossink et al	2015	Current-day negative affect[AX]	55	-.03	AINC
120b	Mossink et al	2015	Current-day negative memory bias[AX]	55	-.23	AINC
120c	Mossink et al	2015	Current-day positive affect[PO]	55	.07	AINC
120d	Mossink et al	2015	Prior-day negative affect[AX]	55	.21	AINC
120e	Mossink et al	2015	Prior-day negative memory bias[GL]	55	.04	AINC
120f	Mossink et al	2015	Prior-day positive affect[PO]	55	-.16	AINC
120g	Mossink et al	2015	Prior-day sadness[DE]	55	.29	AINC
121	**Moya-Albiol et al**	**2010**	**Burnout**[FA]	**64**	**-.60**	**AINC**
122	**Nagy et al**	**2015**	**Nightmares**[GL]	**188**	**-.19**	**AUCg**
123a	Nelemans et al	2014	Depression[DE]	184	.16	AUCg
123b	Nelemans et al	2014	Generalized anxiety disorder[AX]	184	.08	AUCg
123c	Nelemans et al	2014	Panic disorder[AX]	184	.13	AUCg
123d	Nelemans et al	2014	Separation anxiety disorder[AX]	184	.19	AUCg
123e	Nelemans et al	2014	Social anxiety disorder[AX]	184	.04	AUCg
124	Neu et al	2014	Life stress[GL]	52	-.16	AINC
125	***Neylan et al***	***2005***	***PTSD symptoms***[PT]	***30***	***-.51***	***AUCg***
126	*Nicolson et al*	*2000*	*Exhaustion*[FA]	*59*	*.11*	*AINC*
127	*O'Donnell et al*	*2008*	*Depression*[DE]	*542*	*-.03*	*AINC*
128a	**O'Connor et al**	**2009**	**Educational attainment**[PO]	**118**	**.21**	**AUCi**
128b	**O'Connor et al**	**2009**	**Perceived stress**[GL]	**118**	**-.22**	**AUCi**
129a	Okamura et al	2011	Loneliness, weekends[GL]	90	.20	AINC
129b	Okamura et al	2011	Loneliness, workdays[GL]	90	.00	AINC
130a	Olsson et al	2010	Burnout (fatigue group)[FA]	36	.14	AUCg
130b	Olsson et al	2010	Burnout (controls)[FA]	16	.07	AUCg
130c	Olsson et al	2010	Depressive symptoms (fatigue group)[DE]	36	.08	AUCg
130d	Olsson et al	2010	Depressive symptoms (controls)[DE]	16	-.10	AUCg

No	Author	Year	Outcome^{TYPE*}	N	r	Measure$^{\pm}$
130e	**Olsson et al**	**2010**	**Stress-related fatigue**[FA]	**55**	**.35**	**AUCg**
131	Ong et al	2011	Spousal loss[GL]	44	.09	AINC
132a	Oosterholt et al	2015	Clinical burnout[FA]	62	-.12	AINC
132b	**Oosterholt et al**	**2015**	**Clinical burnout**[FA]	**62**	**-.30**	**AUCg**
132c	Oosterholt et al	2015	Non-clinical burnout[FA]	59	-.16	AINC
132d	Oosterholt et al	2015	Non-clinical burnout[FA]	59	-.29	AUCg
133	**Oskis et al**	**2011**	**Anxious attachment**[AX]	**60**	**-.39**	**MINC**
134a	Oskis et al	2015	Active emotional support from mother[PO]	55	-.20	AINC
134b	Oskis et al	2015	Anger[GL]	55	-.05	AINC
134c	Oskis et al	2015	Confiding in mother[PO]	55	-.16	AINC
134d	Oskis et al	2015	Constraints on closeness[PT]	55	.08	AINC
134e	Oskis et al	2015	Fear of rejection[GL]	55	-.37	AINC
134f	Oskis et al	2015	Fear of separation[GL]	55	-.26	AINC
134g	Oskis et al	2015	High desire for company[GL]	55	-.20	AINC
134h	Oskis et al	2015	Mistrust[GL]	55	.23	AINC
135	Osterberg et al	2009	Burnout[FA]	221	.02	AINC
136a	Peng et al	2014	Dysfunctional attitudes[GL]	109	.09	AINC
136b	Peng et al	2014	Depression[DE]	109	-.10	AINC
136c	Peng et al	2014	Childhood neglect (vs control)[PT]	51	.18	AINC
136d	**Peng et al**	**2014**	**Childhood neglect (continuous)**[PT]	**109**	**.26**	**AINC**
136e	Peng et al	2014	Depression + child neglect (vs. control)[DE]	57	.35	AUCi
136f	**Peng et al**	**2014**	**Depression w/o child neglect (vs. control)**[DE]	**59**	**-.34**	**AINC**
137a	Pinna et al	2014	Chronicity of abuse[PT]	104	.09	AUCi
137b	**Pinna et al**	**2014**	**Chronicity of abuse**[PT]	**104**	**-.26**	**AUCg**
137c	Pinna et al	2014	Comorbid PTSD and depression[DE]	67	.02	AUCi
137d	Pinna et al	2014	Comorbid PTSD and depression[DE]	67	.32	AUCg
137e	Pinna et al	2014	Depression[DE]	104	.65	AUCi

No	Author	Year	Outcome[TYPE]*	N	r	Measure±
137f	Pinna et al	2014	Depression[DE]	104	.07	AUCg
137g	**Pinna et al**	**2014**	**PTSD[PT]**	**104**	**.60**	**AUCi**
137h	**Pinna et al**	**2014**	**PTSD[PT]**	**104**	**.29**	**AUCg**
138a	Platje et al	2013	Aggression[GL]	425	.10	AUCi
138b	Platje et al	2013	Aggression[GL]	425	.04	AUCg
138c	**Platje et al**	**2013**	**Rule breaking[GL]**	**425**	**.12**	**AUCi**
138d	**Platje et al**	**2013**	**Rule breaking[GL]**	**425**	**.10**	**AUCg**
139a	*Polk et al*	*2005*	*State negative affect[AX]*	*301*	*-.04*	*AINC*
139b	*Polk et al*	*2005*	*State positive affect[PO]*	*298*	*-.02*	*AINC*
139c	***Polk et al***	***2005***	***Trait negative affect, males[AX]***	***143***	***.27***	***AINC***
139d	*Polk et al*	*2005*	*Trait negative affect, females[AX]*	*158*	*-.08*	*AINC*
139e	*Polk et al*	*2005*	*Trait positive affect[PO]*	*298*	*-.08*	*AINC*
140	***Portella et al***	***2005***	***Neuroticism[AX]***	***30***	***.38***	***AUCi***
141	*Pruesnner et al*	*1999*	*Perceived stress[GL]*	*66*	*.07*	*ACOR*
142a	*Pruessner et al*	*2003*	*Chronic stress[AX]*	*39*	*.31*	*AUCg*
142b	*Pruessner et al*	*2003*	*Depressive symptoms[DE]*	*39*	*.30*	*AUCg*
143a	Quevedo et al	2012	Adolescent negative life events[GL]	159	.00	ACOR
143b	**Quevedo et al**	**2012**	**Adverse early-life rearing[GL]**	**159**	**-.20**	**ACOR**
143c	Quevedo et al	2012	Family negative life events[GL]	159	-.15	ACOR
144a	***Quirin et al***	***2008***	***Attachment anxiety[AX]***	***48***	***-.40***	***AINC***
144b	*Quirin et al*	*2008*	*Self-esteem[GL]*	*48*	*-.21*	*AINC*
144c	*Quirin et al*	*2008*	*Social stress[GL]*	*48*	*.22*	*AINC*
145a	Rademaker et al	2009	Cooperativeness[PO]	107	.07	MINC
145b	Rademaker et al	2009	Cooperativeness[PO]	107	-.18	AUCg
145c	Rademaker et al	2009	Harm avoidance[GL]	107	.22	MINC
145d	**Rademaker et al**	**2009**	**Harm avoidance[GL]**	**107**	**.24**	AUCg
145e	Rademaker et al	2009	Novelty seeking[PO]	107	.08	MINC

No	Author	Year	Outcome^{TYPE*}	N	r	Measure$^{\pm}$
145f	Rademaker et al	2009	Novelty seeking^{GL}	107	.04	AUCg
145g	Rademaker et al	2009	Persistence^{PO}	107	.05	MINC
145h	Rademaker et al	2009	Persistence^{PO}	107	-.11	AUCg
145i	Rademaker et al	2009	Reward dependence^{GL}	107	.15	MINC
145j	Rademaker et al	2009	Reward dependence^{GL}	107	-.05	AUCg
145k	**Rademaker et al**	**2009**	**Self-directedness^{PO}**	**107**	**.30**	**MINC**
145l	Rademaker et al	2009	Self-directedness^{PO}	107	.10	AUCg
145m	Rademaker et al	2009	Self-transcendence^{PO}	107	.05	MINC
145n	Rademaker et al	2009	Self-transcendence^{PO}	107	.05	AUCg
146a	Rane et al	2012	Caregiver burden^{GL}	33	.19	AUCi
146b	Rane et al	2012	Caregiver distress^{GL}	**33**	-.06	AUCi
146c	Rane et al	2012	Caregiver stress^{GL}	**58**	.00	AUCi
146d	**Rane et al**	**2012**	**Caregiving^{GL}**	**58**	-.29	AUGg
147a	Ranjit etal	2009	High cynical hostility (vs. low) ^{GL}	936	-.01	AINC
147b	Ranjit etal	2009	High cynical hostility (vs. mid) ^{GL}	936	.00	AINC
147c	Ranjit etal	2009	Mid cynical hostility (vs. low) ^{GL}	936	-.01	AINC
148a	**Rhebergen et al**	**2015**	**Depression diagnosis^{DE}**	**363**	-.12	AUCi
148b	Rhebergen et al	2015	Depression diagnosis^{DE}	363	.05	AUCg
149a	Rickenbach et al	2014	Daily stress^{GL}	**73**	-.01	AINC
149b	Rickenbach et al	2014	Depressed affect^{DE}	**73**	-.11	AINC
149c	Rickenbach et al	2014	Functional health^{po}	**73**	.07	AINC
149d	Rickenbach et al	2014	Life stressors^{GL}	**73**	.10	AINC
150	*Roberts et al*	*2004*	*Chronic fatigue^{FA}*	*91*	*-.20*	*AUCi*
151a	***Rohleder et al***	***2004***	***PTSD symptoms^{PT}***	***25***	***-.58***	***AUCg***
151b	***Rohleder et al***	***2004***	***PTSD symptoms^{PT}***	***25***	***-.40***	***MINC***
152a	Ruhe et al	2015	Depression^{DE}	*111*	-.02	AINC
152b	Ruhe et al	2015	Depression^{DE}	*111*	-.08	AUCg

No	Author	Year	Outcome[TYPE*]	N	r	Measure[±]
153	**Ruiz-Robledillo et al**	**2013**	**Caregiving for offspring with Asperger[GL]**	**107**	**.21**	AUCi
154a	**Ruiz-Robledillo et al**	**2014**	**Caregiver burden (non-supported)[GL]**	**12**	**-.59**	**AUCi**
154b	Ruiz-Robledillo et al	2014	Caregiver burden (supported)[GL]	12	.61	AUCi
154c	**Ruiz-Robledillo et al**	**2014**	**Institutional support[GL]**	**36**	**.42**	**AUCi**
155a	Ruiz-Robledillo et al	2014	Resilience[PO]	67	-.06	AUCi
155b	**Ruiz-Robledillo et al**	**2014**	**Resilience[PO]**	**67**	**-.57**	**AUCg**
156a	Ruiz-Robledillo & Moya	2014	Caregiving burden[GL]	68	.11	AUCi
156b	Ruiz-Robledillo & Moya	2014	General mental health[PO]	68	.23	AUCg
156c	Ruiz-Robledillo & Moya	2014	Emotional intelligence attention[PO]	68	-.09	AUCi
156d	Ruiz-Robledillo & Moya	2014	Emotional intelligence attention[PO]	68	.04	AUCg
156e	Ruiz-Robledillo & Moya	2014	Emotional intelligence clarity[PO]	68	-.21	AUCi
156f	Ruiz-Robledillo & Moya	2014	Emotional intelligence clarity[PO]	68	-.50	AUCg
156g	Ruiz-Robledillo & Moya	2014	Emotional intelligence repair[PO]	68	.02	AUCi
156h	Ruiz-Robledillo & Moya	2014	Emotional intelligence repair[PO]	68	-.32	AUCg
157a	Saridjan et al	2014	Externalizing[GL]	296	-.01	AINC
157b	Saridjan et al	2014	Internalizing[DE]	295	-.07	AINC
158a	***Schlotz et al***	***2004***	***Chronic worry[AX]***	***219***	***.16***	***MINC***
158b	*Schlotz et al*	*2004*	*Job stress[JS]*	*219*	*.16*	*MINC*
159	***Schulz et al***	***1998***	***Job stress[JS]***	***85***	***.29***	***ACOR***
160a	Shibuya et al	2014	Anxiety[AX]	18	.42	AINC
160b	Shibuya et al	2014	Confusion[GL]	18	.57	AINC
160c	Shibuya et al	2014	Depression[DE]	18	.47	AINC
160d	Shibuya et al	2014	Fatigue[FA]	18	.48	AINC
161a	*Sjögren et al*	*2006*	*Depression[DE]*	*257*	*-.06*	*AINC*
161b	*Sjögren et al*	*2006*	*Exhaustion[FA]*	*257*	*-.01*	*AINC*
161c	*Sjögren et al*	*2006*	*Hopelessness[DE]*	*257*	*-.05*	*AINC*
161d	*Sjögren et al*	*2006*	*Job stress[JS]*	*257*	*-.06*	*AINC*

No	Author	Year	Outcome[TYPE*]	N	r	Measure[±]
161e	*Sjögren et al*	*2006*	*Poor social support*[GL]	*257*	*-.04*	*AINC*
161f	*Sjögren et al*	*2006*	*Self-esteem*[PO]	*257*	*.08*	*AINC*
161g	*Sjögren et al*	*2006*	*Well-being*[PO]	*257*	*.06*	*AINC*
162	Sjodin et al	2012	Noise annoyance at work[JS]	101	-.19	AINC
163	Sjors et al	2012	Burnout[FA]	241	-.04	AINC
164a	Sjors et al	2014	Work stress[JS]	180	-.01	AUCi
164b	Sjors et al	2014	Work stress[JS]	180	-.02	AUCg
164c	Sjors et al	2014	Overall stress[GL]	180	-.14	AUCi
164d	Sjors et al	2014	Overall stress[GL]	180	-.13	AUCg
164e	Sjors et al	2014	Home stress[GL]	180	-.12	AUCi
164f	**Sjors et al**	**2014**	**Home stress**[GL]	**180**	**-.20**	**AUCg**
164g	Sjors et al	2014	Home stress, males[GL]	86	.00	AUCg
164h	Sjors et al	2014	Home stress, females[GL]	94	-.23	AUCg
165	**Sjors et al**	**2015**	**Exhaustion** [FA]	**220**	**-.15**	**AINC**
166a	Sladek et al	2015	Daily social connection[PO]	71	.13	AINC
166b	Sladek et al	2015	Depressive symptoms[DE]	71	-.17	AINC
166c	Sladek et al	2015	Loneliness[GL]	71	-.23	AINC
167a	*Smeets et al*	*2007*	*Continuous sexual abuse memory*[PT]	*15*	*.00*	*AUCi*
167b	*Smeets et al*	*2007*	*Recovered sexual abuse memory*[PT]	*16*	*.00*	*AUCi*
167c	*Smeets et al*	*2007*	*Repressed sexual abuse memory*[PT]	*17*	*.00*	*AUCi*
168a	Smyth et al	2015	Trait well-being[PO]	44	-.19	AUCg
168b	Smyth et al	2015	Trait well-being[PO]	44	-.07	MINC
169a	*Sonnenschein et al*	*2007*	*General exhaustion*[FA]	*42*	*-.13*	*AUCi*
169b	*Sonnenschein et al*	*2007*	*General exhaustion*[FA]	*42*	*.06*	*AUCg*
169c	***Sonnenschein et al***	***2007***	***State exhaustion***[FA]	***42***	***-.37***	***AUCi***
169d	*Sonnenschein et al*	*2007*	*State exhaustion*[FA]	*42*	*-.27*	*AUCg*
170a	Stafford et al	2013	Divorced status <3 years[GL]	2229	.00	AINC
170b	Stafford et al	2013	Divorced status >3 years[GL]	2229	-.04	AINC

No	Author	Year	Outcome[TYPE*]	N	r	Measure[±]
170c	Stafford et al	2013	Long-term living alone[GL]	2229	.00	AINC
170d	Stafford et al	2013	Newly living alone[GL]	2229	.00	AINC
170e	Stafford et al	2013	Reduction in social network[GL]	2229	.00	AINC
170f	Stafford et al	2013	Single, never married status[GL]	2229	.00	AINC
170g	Stafford et al	2013	Small social network[GL]	2229	.00	AINC
170h	Stafford et al	2013	Widowed <3 years[GL]	2229	.00	AINC
170i	Stafford et al	2013	Widowed >3 years[GL]	2229	.04	AINC
171a	Stalder et al	2011	Difficulties in emotion regulation[GL]	43	.22	AUCi
171b	Stalder et al	2011	Perceived stress[GL]	43	.29	AUCi
172	Stawski et al	2013	Frequent daily stressors[GL]	1694	-.05	AUCg
173	**Steinheuser et al**	**2014**	**Urban upbringing[GL]**	**116**	**-.18**	**ACOR**
174a	***Steptoe et al***	***2004***	***Job stress (over-commitment), males[JS]***	***83***	***.23***	***AINC***
174b	*Steptoe et al*	*2004*	*Job stress (over-committment), males[JS]*	*83*	*.12*	*AUCg*
174c	*Steptoe et al*	*2004*	*Job stress (over-committment), females[JS]*	*81*	*.12*	*AINC*
174d	*Steptoe et al*	*2004*	*Job stress (over-committment), females[JS]*	*81*	*.05*	*AUCg*
175a	*Steptoe, Owen, et al*	*2004*	*Loneliness[GL]*	*163*	*.13*	*AINC*
175b	*Steptoe, Owen, et al*	*2004*	*Loneliness[GL]*	*163*	*.14*	*AUCg*
176a	*Steptoe et al*	*2005*	*Chronic economic stress, males[AX]*	*88*	*.18*	*AINC*
176b	***Steptoe et al***	***2005***	***Chronic economic stress, males[AX]***	***88***	***.27***	***AUCg***
176c	*Steptoe et al*	*2005*	*Chronic economic stress, females[AX]*	*72*	*.00*	*AINC*
176d	***Steptoe et al***	***2005***	***Chronic economic stress, females[AX]***	***72***	***.28***	***AUCg***
177a	*Steptoe et al*	*2007*	*State happiness[PO]*	*73*	*-.20*	*AUCi*
177b	***Steptoe et al***	***2007***	***State happiness[PO]***	***73***	***-.36***	***AUCg***
178	***Stetler et al***	***2005***	***Depression[DE]***	***69***	***-.47***	***AUCg***
179a	Strahler et al	2010	Somatic trait anxiety[AX]	17	-.04	AUCg
179b	Strahler et al	2010	Trait worry[AX]	17	-.15	AUCg
180	Tang et al	2014	Shyness[GL]	24	-.29	ACOR

No	Author	Year	Outcome[TYPE]*	N	r	Measure[±]
181a	*terWolbeek et al*	*2007*	*Fatigue*[FA]	*132*	*.00*	*AINC*
181b	*terWolbeek et al*	*2007*	*Fatigue*[FA]	*132*	*.00*	*AUCg*
182a	*Therrien et al*	*2007*	*Depression, males*[DE]	*50*	*-.17*	*AINC*
182b	*Therrien et al*	*2007*	*Depression, females*[DE]	*28*	*-.22*	*AINC*
182c	*Therrien et al*	*2007*	*Trait anxiety, males*[AX]	*50*	*-.22*	*AINC*
182d	***Therrien et al***	***2007***	***Trait anxiety, females***[AX]	***28***	***-.42***	***AINC***
183	Thomas et al	2012	Caregiving[GL]	45	-.21	AINC
184	Thorn et al	2011	Seasonal affective disorder[DE]	52	-.25	ACOR
185a	Tomiyama et al	2014	Weight stigma consciousness[GL]	42	.23	AINC
185b	Tomiyama et al	2014	Weight stigma frequency[GL]	41	.30	AINC
186	*Tops et al*	*2008*	*Depressive mood*[DE]	*194*	*.14*	*AUCi*
187	**Tu et al**	**2013**	**Depression**[DE]	**121**	**-.18**	**Slope**
188	Ulrike et al	2013	Depression[DE]	131	.08	ACOR
189a	Vammen et al	2014	Depressive symptoms (2009 sample)[DE]	474	-.06	MINC
189b	Vammen et al	2014	Depressive symptoms (2007 sample)[DE]	376	-.06	MINC
189c	Vammen et al	2014	Clinical depression (2009 sample)[DE]	297	-.06	MINC
189d	Vammen et al	2014	Clinical depression (2007 sample)[DE]	214	-.07	MINC
190a	van Liempt et al	2013	Trauma with PTSD[PT]	24	-.15	AUCg
190b	van Liempt et al	2013	Trauma without PTSD[GL]	29	.24	AUCg
191a	van Santen et al	2011	Agreeableness[PO]	337	.04	AUCi
191b	van Santen et al	2011	Agreeableness[PO]	337	.00	AUCg
191c	van Santen et al	2011	Anxiety sensitivity[AX]	337	.07	AUCi
191d	van Santen et al	2011	Anxiety sensitivity[AX]	337	.04	AUCg
191e	van Santen et al	2011	Conscientiousness[PO]	337	-.08	AUCi
191f	van Santen et al	2011	Conscientiousness[PO]	337	-.02	AUCg
191g	van Santen et al	2011	Extraversion[PO]	337	-.09	AUCi
191h	van Santen et al	2011	Extraversion[PO]	337	-.01	AUCg
191i	van Santen et al	2011	Mastery[PO]	337	-.10	AUCi

No	Author	Year	Outcome^{TYPE}*	N	r	Measure$^{\pm}$
191j	van Santen et al	2011	Mastery^{PO}	337	.01	AUCg
191k	van Santen et al	2011	Neuroticism^{AX}	337	.07	AUCi
191l	van Santen et al	2011	Neuroticism^{AX}	337	.08	AUCg
191m	van Santen et al	2011	Openness to experience^{PO}	337	-.06	AUCi
191n	van Santen et al	2011	Openness to experience^{PO}	337	-.04	AUCg
192a	Vargas et al	2014	Anticipatory stress^{GL}	58	.34	AINC
192b	Vargas et al	2014	Previous day stress^{GL}	58	-.17	AINC
193a	**Veen et al**	**2011**	**Depression^{DE}**	**118**	**.27**	**AINC**
193b	Veen et al	2011	Depression^{DE}	118	.09	AUCg
193c	Veen et al	2011	Anxiety^{AX}	118	.06	AINC
193d	Veen et al	2011	Anxiety^{AX}	118	.03	AUCg
193e	Veen et al	2011	Comorbid depression & anxiety^{DE}	118	.04	AINC
193f	Veen et al	2011	Comorbid depression & anxiety^{DE}	118	.10	AUCg
194a	von Polier et al	2013	Callous unemotionality^{GL}	75	-.13	AUCg
194b	**von Polier et al**	**2013**	**Hyperactivity^{GL}**	**75**	**-.26**	**AUCg**
195a	Vreeburg et al	2009	Current MDD (vs. control)^{DE}	1009	.04	AUCi
195b	Vreeburg et al	2009	Current MDD (vs. control)^{DE}	1009	.11	AUCg
195c	**Vreeburg et al**	**2009**	**Remitted MDD (vs. control)^{DE}**	**887**	**.09**	**AUCi**
195d	Vreeburg et al	2009	Remitted MDD (vs. control)^{DE}	887	.09	AUCg
196a	Vreeburg, Zitman, et al	2010	Current anxiety disorder^{AX}	1116	.05	AUCi
196b	Vreeburg, Zitman, et al	2010	Current anxiety disorder^{AX}	1116	.09	AUCg
196c	Vreeburg, Zitman, et al	2010	Remitted anxiety disorder^{AX}	653	.03	AUCi
196d	Vreeburg, Zitman, et al	2010	Remitted anxiety disorder^{AX}	653	.05	AUCg
197a	Vreeburg et al	2010	Diagnosed parental depression history^{DE}	256	.13	AUCi
197b	Vreeburg et al	2010	Diagnosed parental depression history^{DE}	256	.15	AUCg

No	Author	Year	Outcome^{TYPE}*	N	r	Measure$^{\pm}$
197c	Vreeburg et al	2010	Self-reported parental depression history^{DE}	303	.05	AUCi
197d	Vreeburg et al	2010	Self-reported parental depression history^{DE}	303	.01	AUCg
198	*Wahbeh et al*	*2008*	*Caregiver stress^{GL}*	*30*	*.31*	*AINC*
199	Wahbeh et al	2013	PTSD (vs. control)^{PT}	71	-.12	AINC
200	**Walker et al**	**2011**	**Trait anxiety^{AX}**	**40**	**-.35**	**AUCg**
201a	Wardenaar et al	2011	Anhedonic depression^{DE}	1029	.02	AUCi
201b	Wardenaar et al	2011	Anhedonic depression^{DE}	1029	.02	AUCg
201c	Wardenaar et al	2011	Anxious arousal^{AX}	1029	.02	AUCi
201d	Wardenaar et al	2011	Anxious arousal^{AX}	1029	.02	AUCg
201e	Wardenaar et al	2011	General distress^{GL}	1029	.04	AUCi
201f	Wardenaar et al	2011	General distress^{GL}	1029	.04	AUCg
202a	*Weekes et al*	*2008*	*Examination stress, males^{GL}*	*31*	*.00*	*ACOR*
202b	***Weekes et al***	***2008***	***Examination stress, females^{GL}***	***35***	***.51***	***ACOR***
203	Weik et al	2010	Exam stress^{GL}	24	-.19	AINC
204	***Wessa et al***	***2006***	***PTSD symptoms^{PT}***	***63***	***-.38***	***AUCg***
205a	Wilcox et al	2014	Depression^{DE}	460	.00	AUCi
205b	Wilcox et al	2014	Quality of life^{PO}	460	.00	AUCi
206a	Williams et al	2013	Family functioning (aff. involvement), mom^{PO}	27	.00	Slope
206b	Williams et al	2013	Family functioning (aff. involvement), child^{PO}	27	.00	Slope
206c	Williams et al	2013	Family functioning (aff. responses), mom^{PO}	27	.00	Slope
206d	Williams et al	2013	Family functioning (aff. responses), child^{PO}	27	.00	Slope
206e	Williams et al	2013	Family functioning (behavior control), mom^{GL}	27	.00	Slope
206f	Williams et al	2013	Family functioning (behavior control), child^{GL}	27	.00	Slope

No	Author	Year	Outcome^{TYPE}*	N	r	Measure±
206g	Williams et al	2013	Family functioning (communication), child^{PO}	27	.00	Slope
206h	Williams et al	2013	Family functioning (communication), mom^{PO}	27	.49	Slope
206i	Williams et al	2013	Family functioning (problem solving), mom^{PO}	27	.00	Slope
206j	Williams et al	2013	Family functioning (problem solving), child^{PO}	27	.00	Slope
206k	Williams et al	2013	Family functioning (roles), mom^{PO}	27	.00	Slope
206l	Williams et al	2013	Family functioning (roles), child^{PO}	27	.41	Slope
207a	Wirth et al	2011	Depressive symptoms^{DE}	123	.09	AUCi
207b	Wirth et al	2011	Depressive symptoms^{DE}	123	.01	AUCg
207c	Wirth et al	2011	Shift work^{JS}	123	.05	AUCi
207d	Wirth et al	2011	Shift work^{JS}	123	-.07	AUCg
208a	Wolfram et al	2013	Burnout^{FA}	21	.31	AUCg
208b	Wolfram et al	2013	Depersonalization^{JS}	21	.40	AUCg
208c	Wolfram et al	2013	Effort-reward imbalance^{JS}	21	.31	AUCg
208d	Wolfram et al	2013	Emotional exhaustion^{FA}	21	.22	AUCg
208e	Wolfram et al	2013	Lack of accomplishment^{JS}	21	.15	AUCg
208f	Wolfram et al	2013	Over-committment^{JS}	21	.02	AUCg
209a	*Wright et al*	*2005*	*Financial strain*^{GL}	*76*	*.17*	*AINC*
209b	*Wright et al*	*2005*	*Financial strain*^{GL}	*76*	*.13*	*AUCg*
210a	*Wüst et al*	*2000*	*Chronic worry*^{AX}	*102*	*.17*	*ACOR*
210b	*Wüst et al*	*2000*	*Job stress (overload)*^{JS}	*102*	*.00*	*ACOR*
210c	*Wüst et al*	*2000*	*Job stress (discontent)*^{JS}	*102*	*.00*	*ACOR*
210d	*Wüst et al*	*2000*	*Lack of social recognition*^{GL}	*102*	*.22*	*ACOR*
210e	***Wüst et al***	***2000***	***Social stress***^{GL}	***102***	***.21***	***ACOR***
210f	*Wüst et al*	*2000*	*Self-efficacy*^{PO}	*104*	*-.19*	*MINC*
210g	*Wüst et al*	*2000*	*Self-efficacy*^{PO}	*104*	*-.06*	*AUCg*
210h	*Wüst et al*	*2000*	*Self-esteem*^{PO}	*104*	*-.16*	*MINC*

No	Author	Year	Outcome[TYPE]*	N	r	Measure±
210i	*Wüst et al*	*2000*	*Self-esteem[PO]*	*104*	*-.01*	*AUCg*
211a	Zeiders et al	2012	Acculturation[PO]	100	.15	AINC
211b	Zeiders et al	2012	Daily life stress[GL]	100	.12	AINC
211c	Zeiders et al	2012	MDD symptoms[DE]	100	.04	AINC
211d	Zeiders et al	2012	Family income[PO]	100	.07	AINC
211e	Zeiders et al	2012	Life stressors[GL]	100	.13	AINC
211f	Zeiders et al	2012	Perceived discrimination[GL]	100	.13	AINC
212	Zoccola et al	2011	Trait perseverative cognition[AX]	119	.03	AINC

Notes: Italicized findings indicate that they were drawn from the Chida & Steptoe (2009) meta-analysis. Bolded findings indicate that they were included in p-curves for their respective sets.

Abbreviations: N = sample size, r = correlation; ADHD = Attention deficit hyperactivity disorder; CD = conduct disorder; DC = demand/control; ERI = effort/reward imbalance; MDD = major depressive disorder; ODD = oppositional defiant disorder; PTSD = posttraumatic stress disorder

*Abbreviations for outcome type superscripts JS = job stress, GL = general life stress; DE = depression; AX = anxiety/neuroticism/negative affect, FA = fatigue/burnout/exhaustion, PT = posttraumatic stress, and PO = positive psychosocial traits

±Abbreviations for measure: CARi was assessed using the following methods: Absolute increase of cortisol during the waking period (AINC), area of cortisol increase under the curve (AUCi), the mean value of cortisol values post-awakening minus wakening value (MINC), absolute value post-awakening evaluated by repeated analysis of variables (ACOR), slope of cortisol increase (slope), and ratio of cortisol at time 1 divided by cortisol at time 0 (T1/T0). AUCw was assessed using the following methods: area under the curve relative to ground (AUCg) and 30-minute absolute cortisol value (30min).

Table 3

P-curve Estimates and Mean Effect Sizes by Predictor Type for CARi.

	P-curve			*Meta-Analysis*				
Predictor Type	***k***	***Evidential Value Present?***	***Evidential Value Absent?±***	***k***	***r***	***CI***	***p***	***Heterogeneity p***
(1) Job stress	6	No, *p*=.06	No, *p*=.73	41	.03	-0.004 to 0.07	.08	<.001
(2) General life stress	*35*	*Yes, p=.005*	-	*181*	*.005*	*-0.01 to 0.02*	*.57*	*<.001*
(3) Depression or hopelessness	18	Yes, p=.26	No, p=.88	*81*	*-.01*	*-0.08 to 0.06*	*.79*	*<.001*
(4) Anxiety, neuroticism, or negative affect	16	No, *p*=.09	No, *p*=.63	59	.03	-0.01 to 0.07	.13	<.001
(5) Fatigue, burnout, or exhaustion	**6**	**No, *p*=.21**	**No, *p*=.71**	**22**	**-.09**	**-0.15 to -0.03**	**.003**	**<.001**
(6) Posttraumatic stress	*11*	*Yes, p=.003*	-	*39*	*.01*	*-0.04 to 0.06*	*.63*	*<.001*
(7) Positive psychosocial traits	10	No, *p*=.68	No, *p*=.84	88	-.004	-0.029 to 0.02	.75	.001

Notes:

± Test against evidential value is only reported if no evidential value is present

Aggregate effect sizes that are significantly different from zero are highlighted in bold.

P-Curves that indicate evidential value are italicized

Table 4

P-curve Estimates and Mean effect sizes by predictor type for AUCw.

	P-curve			*Meta-Analysis*				
Predictor Type	***k***	***Evidential Value Present?***	***Evidential Value Absent?*±**	***k***	***r***	***CI***	***p***	***Heterogeneity p***
(1) Job stress	3	No, *p*=.56	No, *p*=.32	23	.02	-0.03 to 0.06	.44	.023
(2) General life stress	8	No, *p*=.64	No, *p*=.10	40	-.01	-0.04 to 0.02	.51	<.001
(3) Depression or hopelessness	***8***	***Yes, p<.001***	-	***37***	***.07***	***0.04 to 0.10***	***<.001***	***<.001***
(4) Anxiety, neuroticism, or negative affect	**6**	**Yes, *p*=.02**	-	32	.03	-0.01 to 0.07	.15	<.001
(5) Fatigue, burnout, or exhaustion	4	No, *p*=.45	No, *p*=.57	15	-.01	-0.12 to 0.10	.82	.01
(6) Posttraumatic stress	***11***	***Yes, p=.002***	-	***17***	***-.08***	***-0.15 to -0.01***	***.03***	***<.001***
(7) Positive psychosocial traits	*6*	*Yes, p<.001*	-	*34*	*-.05*	*-0.10 to 0.00*	*.05*	*<.001*

Notes:

±Test against evidential value is only reported if no evidential value is present;

Aggregate effect sizes that are significantly different from zero are highlighted in bold.
P-Curves that indicate evidential value are italicized