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The use of psychosocial stress scales in preterm birth research

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Abstract

Psychosocial stress has been identified as a potential risk factor for preterm birth. However, an association has not consistently been found, and a consensus on the extent to which stress and preterm birth are linked is still lacking. A literature search was performed with a combination of keywords and MeSH terms to detect studies of psychosocial stress and preterm birth. Studies were included in the review if psychosocial stress was measured with a standardized, validated instrument and the outcomes included either preterm birth or low birth weight. Within the 138 studies that met inclusion criteria, 85 different instruments were used. Measures designed specifically for pregnancy were used infrequently, although scales were sometimes modified for the pregnant population. The many different measures used may be one factor that accounts for the inconsistent associations that have been observed.

Keywords

instrument; pregnancy; preterm birth; psychosocial stress; scale

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Introduction

Healthy People 2010 has set a goal of reducing preterm births in the United States from the 1998 baseline of 11.6% to 7.6%.¹ However, the number of preterm births has been steadily increasing. In 2006, 12.8% of all births, or about half a million newborns, were delivered at less than 37 weeks of gestation.² There are multiple known risk factors associated with preterm birth, although 50% of women who deliver prematurely have no clearly delineated risk factor.³ While socioeconomic status and psychosocial stress both have been associated with preterm birth, the specific biologic mechanisms linking these factors to preterm birth and to disparities in preterm birth remain unclear. Moreover, the associations themselves have not been consistently demonstrated.^{4,5}

Investigators, as far back at the 1940's, who have explored the association of psychosocial stress with perinatal outcomes^{6,7}, have used numerous measures to quantify the presence of stress. Initial studies defined stress in terms of major life events, such as the death of a loved one or a large-scale environmental disaster.^{8,9} However, assessing life events may not ascertain the stress that pregnant women are most exposed to given the low number of major acute life events that typically occur in pregnant women and the additional contribution that may exist from chronic stress. Indeed, in some studies, stressors more reflective of life course stress have been shown to have a greater association with pregnancy outcomes.^{10,11} Furthermore, a woman's experience in dealing with the aftermath of life stressors may be more relevant in determining her health status than any one particular stressful event.⁸ As a result, investigators have diversified their definition and measurement of psychosocial stress to include perceived stress, anxiety, depression, racism, lack of social support, coping mechanisms, job strain, acculturation stress, and domestic violence.^{5,6,8,12,13} Newer concepts include those that apply directly to pregnancy states, such as pregnancy-related anxiety and pregnancy intendedness.^{6,8,13}

As measures of stress have evolved, so have definitions of relevant pregnancy outcomes. Two literature reviews published in the 1990's noted that the majority of the studies concerned with stress and pregnancy outcomes consolidated a diverse spectrum of pregnancy and intrapartum events into one outcome variable: "complications in pregnancy."^{11,14} Additionally, early efforts at estimating maturity used low birth weight, or a birth weight less than 2,500 grams, as a proxy measure for preterm birth, given that gestational age was often inaccurately measured, particularly in the pre-ultrasound era.¹⁵ While low birth weight is associated with significant morbidity and mortality⁵, it has been identified as an imprecise gauge of prematurity because it encompasses both growth restricted and premature infants.^{9-11,15,16}

Despite many years of research, a clear consensus on the contribution of psychosocial stress to preterm birth is still lacking. One potential etiology for the inconsistent association that has been observed between stress and preterm birth is the extensive variability in the measures used for both psychosocial stress and pregnancy outcomes.^{10,11,17-20} The purpose of this paper is to characterize the spectrum of psychosocial stress scales utilized in the existing preterm birth literature.

Materials and Methods

Search Strategy

A literature search was performed with MEDLINE, PsycINFO, EMBASE and HAPI databases using a combination of keywords and MeSH terms, including "psychosocial stress," "maternal stress," "chronic stress," "life events," "self-reported stress," "anxiety," "depression," "domestic violence," "social support," "preterm birth," "premature birth," and

“low birth weight”. The literature search was performed by one researcher; however, if any questions arose regarding findings in individual articles, a second researcher reviewed the article and agreement was reached between the two researchers. Only articles published after 1970 were included in this assessment, given that studies conducted before that time are generally considered to be less rigorous in design.¹⁴ The most recent article included into this analysis is from January 2010. The references of retrieved articles were reviewed for additional publications that were not captured in the original search, and these articles were then retrieved as well. This process was iteratively continued until no additional publications that met criteria for inclusion were found.

Study Selection Criteria

Abstracts of articles that were obtained from the search were assessed for suitability based on two criteria: 1) the study measured the exposure variable of psychosocial stress with a scaled instrument; and 2) the outcome variable included preterm birth or low birth weight.

Studies were excluded if authors did not distinguish preterm birth or low birth weight from a larger category of adverse pregnancy outcomes when conducting their analyses. Studies evaluating the effect of psychosocial interventions on preterm birth or low birth weight delivery also did not meet criteria for inclusion. Additionally, if multiple papers were published from the same study, only one article was included in order to avoid over-counting the same instrument. Finally, only papers published in English were reviewed.

Scale Selection Criteria

Many authors developed their own questions to assess psychosocial stress. However, only scales that had been previously validated and were explicitly referenced were included. Finally, if the scale validation studies were not written in English or were unavailable through a literature or internet search, the instrument could not be assessed in terms of its psychometric properties and, therefore, was excluded from this study.

Data Extraction

The data extracted from each article consisted of the study design; the names of the psychosocial instruments utilized; the number of times, the gestational ages when, and the method (self or via interviewer) by which the instruments were administered; the outcomes assessed; the presence of attempts to control for confounding, and the magnitude of association between psychosocial stress and a preterm or low birth weight delivery.

Analysis

A descriptive analysis of the included studies was conducted.²¹ To organize the data, we categorized the instruments into four domains of stress, namely external stressors, perceived stress, enhancers of stress, and buffers of stress, based on a construct that was previously published in the literature.¹⁹ Examples of external stressors are objective life events or daily hassles; perceived stress reflects subjective stress levels as well as perceptions of racial or gender discrimination; enhancers of stress encompass anxiety or depression; and buffers of stress cover a variety of social support systems and coping mechanisms.¹⁹ Within each domain of stress, subcategories of instruments measuring the same aspect of psychosocial stress were formed. Instruments that did not fit into any of the four domains were placed into an “other” category. The psychometric properties of each instrument and its frequency of use in the literature were also reported.

This study was exempt from IRB approval.

Results

Description of Studies

The literature search yielded 200 articles for abstract review. Of those, 136 papers met inclusion criteria for analysis. Many studies were excluded because of the lack of a validated instrument to measure the exposure ($n = 38$), with the next most common reason being the use of a composite outcome of “complications of pregnancy” ($n = 22$). Four manuscripts were judged to have duplicative information. Of note, both of Omer’s papers each included two separate studies, accounting for a total of 138 studies from 136 papers.^{22,23}

Table 1 outlines characteristics of the included studies. The majority was prospective cohort studies, and the studies were nearly split between those in which participants self-administered the instrument and those in which they were interviewed. Most of the questionnaires were administered one time. The studies were evenly split in terms of outcome measured. Lastly, nearly 90% of the analyses controlled for confounding factors.

Description of Psychosocial Stress Scales

A total of 85 instruments were used in the reviewed studies. The breakdown by domain is as follows: external stressors ($n=18$), perceived stress ($n=13$), enhancers of stress ($n=22$), buffers of stress ($n=22$), and other ($n=10$). For each psychosocial stress instrument, a description of the scale, its psychometric properties, and the number of studies in which it appears are presented in Tables 2 – 6.

Table 2 shows that external stressors measured by the instruments consisted of chronic, daily stressors, major life events, and domestic violence. Two scales, the Prenatal Social Environment Inventory and the Modified Life Events Inventory, were developed for surveying major life events in pregnant women, while one pregnancy-specific instrument, the Abuse Assessment Screen, was the most commonly used instrument for measuring the presence of domestic violence.

Table 3 illustrates the types of perceived stress that were evaluated, including subjective stressors, work strain, and racial discrimination. The most frequently used scales in this domain were the Cohen’s Perceived Stress Scale (PSS) ($n=18$), Karasek’s Job Content Questionnaire ($n=11$), and Krieger’s Experiences of Discrimination ($n=5$). Scales that have been validated in pregnant women, including Mamelle’s Occupational Fatigue Index, Prenatal Distress Questionnaire and Maternal Adjustment and Attitudes Scale, each appeared fewer than five times in this literature.

In Table 4, the questionnaires measuring enhancers of stress are listed. The Center for Epidemiological Studies Depression scale (CES-D) ($n=18$) and Spielberger State-Trait Anxiety Inventory (STAI) ($n=20$) both appeared more often than other instruments measuring depression and anxiety, respectively. There were another 12 scales, each administered infrequently, that provided composite measures of the mental health or mood states of respondents. Of all the scales measuring psychiatric correlates of stress, only the Edinburgh Postnatal Depression Scale (EPDS) was developed for pregnant/postpartum women.

Buffers of stress, as shown in Table 5, were evaluated with a wide variety of instruments. For example, social support was assessed with 11 different instruments that were each administered between one and three times in the literature. Self-esteem and mastery were two commonly evaluated buffers of stress, appearing six and five times, respectively. Only the Maternal Social Support Index and Support Behavior Inventory were developed specifically for use during pregnancy.

Finally, Table 6 displays the other psychosocial stress scales that did not clearly fit into one of the four domains above. Two scales were developed to measure psychosocial stress during pregnancy: the Prenatal Psychosocial Profile (n=6) and Abbreviated Scale for the Assessment of Psychosocial Status in Pregnancy (n=2). The rest of the scales in this category measured physical well-being, family cohesion, acculturation, and resources, and were used between one and three times each.

As illustrated in Tables 2 – 6, instruments with both validated and non-validated modifications were used in order to be administered to a pregnant population. The instruments with the most variations were Cohen's PSS, Spielberger's STAI, and General Health Questionnaire.

In addition, this study demonstrated that association between self-reported stress and pregnancy outcome has been inconsistent across studies even when the same scale is utilized. For example, 8 studies using Cohen's Perceived Stress Scale showed an association between perceived stress and preterm birth, while 9 studies using the same scale did not show such an association.

Comment

This review demonstrates the broad range of measures used to assess psychosocial stress in the preterm birth and low birth weight literature. Our results highlight the diversity of instruments that have been utilized to capture the various domains of stress. Indeed, this study underestimates the actual diversity that exists, as only studies with validated instruments underwent full review. In addition to the 136 manuscripts evaluated, another 38 studied psychosocial stress with non-validated tools. Furthermore, some results from each of the 136 papers were excluded as well, given that even within these studies, non-validated instruments were present.^{24–26} The use of these instruments is problematic as it is difficult to ascertain whether the measurement tool has strong construct (the measure correlates with the theoretical model of stress) and content (reflects all dimensions of the stress variable) validity.

Even when limited to validated instruments, this analysis demonstrates that a considerable number of tools has been used to measure psychosocial stress. A total of 85 instruments were included in this analysis, many of which measured the same psychosocial variables. For example, 12 different instruments were used to measure major life events, which is all the more notable given the evidence that pregnancy outcomes may be related more with chronic stress.²⁷ There also appears to be a lack of consensus on which instrument to use for measuring social support. In this study, 11 instruments assessed social support, all of which were used only between one and three times.

Notably, we observed that numerous researchers modified the questionnaires to tailor the items to a pregnant population or to shorten the survey.^{19,25,28} Few of these investigators provided validity data to support the use of the modified versions.^{29–31} In addition to survey modifications, questionnaires were administered to pregnant women without assessing their psychometric properties in this population. The results from instruments developed in non-pregnant populations may not reliably reflect the underlying measurement construct when derived from pregnant populations. For example, changes in sleep habits or fatigue, which may be used to assess for depression in non-pregnant individuals, may reflect nothing more than the typical physiologic changes of pregnancy. Although new instruments for pregnancy-specific life events, anxiety, depression, social support have been developed and validated they are far less utilized. The only pregnancy-specific instrument that was used

more often than other similar scales was the Abuse Assessment Screen. Again, it is unclear what effect this measurement variation may have on study results.

Another finding of note is that the majority of the studies had prospective cohort designs and over half of the participants were assessed in the prenatal period. The results of studies with retrospective designs may be markedly affected due to recall bias.^{7,10,20} For example, adverse pregnancy outcomes influence the number of life events that respondents recall, and can also alter the affective state of women.¹⁴

In contrast, only 41 of the 138 (29.7%) studies used repeated sampling over time. Psychosocial stress varies throughout pregnancy, and one assessment may not adequately capture the dimensions and burden of stress that a woman experiences during the perinatal phase. Glynn found that anxiety and perceived stress measured at any one assessment did not predict preterm delivery. Rather, an increase in anxiety and perceived stress levels throughout pregnancy was significantly associated with preterm delivery.³² The inconsistent use of psychosocial stress measurement over time may partly account for the discrepancy in associations between psychosocial stress and birth outcomes.¹³

In addition, many studies focused on the stressors that occurred in the relatively short window of time between conception and delivery, such as the week or month prior to survey administration. This method may neither fully capture the daily stress that women face nor the chronic toll of long-standing stress.³³

A limitation of this analysis is that we could not assess the relationship between specific instruments and characteristics of the study populations in terms of adverse pregnancy outcomes. Differences in respondents, especially with regards to ethnicity, may account for the inconsistencies of associations in the literature. For example, according to Table 2, it appears that white women with more negative major life events are at higher risk for preterm delivery. In contrast, as seen in Table 5, African American women with less partner support are more likely to deliver preterm. African American race has been recognized as a risk factor for adverse pregnancy outcomes^{3,34}, and recent research has been attempted to evaluate whether this disparity is related to differences in stress. Because most papers did not stratify results for different racial and ethnic populations, our analysis only evaluated the potential association through the review of specific instruments, such as those measuring perceived racism and acculturation.

Preterm birth poses a major public health problem. Because known risk factors only are present in approximately half of preterm births³⁵, researchers have sought other potential etiologies of preterm delivery. Although psychosocial stress is a potential risk factor for preterm delivery and has been repeatedly investigated, its role in adverse pregnancy outcomes remains equivocal. The present study, which is a comprehensive review of the spectrum of psychosocial stress measures used in preterm birth research, complements previous reviews on perinatal stress and pregnancy outcomes^{7,9,11,14} and offers a critical assessment of the range of standardized instruments of psychosocial stress. Although it is clear that in order to move the investigation of chronic maternal stress and preterm birth forward optimal measures of chronic maternal stress must be identified, it is also clear from our review that the work done so far does not allow the determination of the best or most valid stress indicators to use in the research or clinical setting. Hopefully, further research will be devoted to the development of reliable measurement tools for use in pregnancy. Such an approach may allow for both a better understanding of the relationship between stress and adverse pregnancy outcomes and for the development of targeted interventions to decrease psychosocial stress and thereby preterm birth.

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Table 1

Characteristics of studies examining psychosocial stress and pregnancy outcomes (N= 138)

Variable	%
Study design	
Cohort	
Prospective cohort	73.9
Retrospective cohort	2.2
Case control	15.9
Cross sectional	8.0
Method of data collection	
Interview	52.2
Self	38.4
Interview and self	7.2
Unknown	2.2
Number of times of survey administration	
One	
First trimester	1.4
Second trimester	18.8
Third trimester	8.0
Labor and delivery	2.2
Postpartum	23.9
Unknown	15.9
Two	14.5
Three	8.7
Four	5.8
Six	0.7
Main outcome measured	
Preterm birth or gestational age	29.7
Low birth weight or birth weight	30.4
Both gestational age and birth weight	39.9
Controlled for potential confounding variables	
Yes	86.2
No	13.8

Table 2

Psychosocial scales measuring external stressors

Name and description of scale	Psychometric properties	No. of studies	Associated with decrease in gestational age or PTB	Not associated with decrease in gestational age or PTB	Associated with decrease in birth weight or LBW	Not associated with decrease in birth weight or LBW
<i>DAILY CHRONIC STRESSORS</i>						
Daily Hassles Scale (Kanner, 1981) 117 items with 8 subscales of future security, time pressures, work, household responsibilities, health, inner concerns, financial responsibilities and neighborhood/environment, within past month; scores include frequency of hassles and intensity, calculated by cumulative severity/frequency	<ul style="list-style-type: none"> In community sample of middle-aged adults: <ul style="list-style-type: none"> Test-retest reliability over months on average for frequency (0.79) and intensity (0.48) Hassles frequency has significant positive correlation with negative affect score ($r=0.22$), with life events ($r=0.21$), and with psychological symptoms on Hopkins Symptom Checklist (HSCL) ($r=0.60$) Hassles frequency is more powerful predictor of HSCL score than life events³⁶ 	5		Modified version ²⁵ 37*, 38, 39	Health subscale ($p=0.03$) ³⁸ Inner concerns subscale ($p=0.03$) ³⁸ Financial responsibility subscale ($p=0.02$) ³⁸	37*, 39, 40
Everyday Problems Checklist (EPCL; Vingerhoets, 1994) 114 items about daily stressors, including family life, living and working conditions, physical appearance, transactions, and business, in the past 2 months. Scores include 1) frequency, 2) mean severity score, 3) product of two scores (total score)	<ul style="list-style-type: none"> In Dutch studies: <ul style="list-style-type: none"> Test-retest reliability over 1 week for frequency (0.87), severity (0.76), and total score (0.85) Validity- EPCL scores correlate positively with distress, and EPCL scores directly influence subjective health complaints, immune activity and cardiovascular function^{41,42} 	2			109 item version, ($p<0.01$) ⁴¹	10
<i>MAJOR LIFE EVENTS</i>						
Life Experiences Survey (LES; Sarason, 1978) 57 item checklist of life events in past year; events rated as positive or negative and perceived impact of event; score summed as positive change, negative change, and total change	<ul style="list-style-type: none"> In college students: <ul style="list-style-type: none"> Test-retest reliability for positive change score (0.53), negative change score (0.88), total change score (0.64) Validity- total and negative change scores correlate positively with Spielberger's STAI, positive score not correlated 	6	White women with high stress, RR 1.8 (1.2–2.8) ⁴⁴ White women with few positive life events ($p<0.01$) ⁴⁵ Modified 39 item, RR 1.6 (1.1–2.3) ⁴⁶	Modified 39 item ¹⁹ 17, 47		45

Name and description of scale	Psychometric properties	No. of studies	Associated with decrease in gestational age or PTB	Not associated with decrease in gestational age or PTB	Associated with decrease in birth weight or LBW	Not associated with decrease in birth weight or LBW
Social Readjustment Rating Scale (SRRS; Holmes and Rahe, 1967) The SRRS is an adaptation of the Schedule of Recent Events (SRE) with associated magnitude weightings for intensity and length of time necessary to accommodate the life event for each of 43 life events. Scores include item frequency and life change score (sum of item frequency times item weighting).	<ul style="list-style-type: none"> Negative change score correlates with Beck Depression Inventory, total and positive scores not correlated⁴⁵ 	7	27 item version: white women with high number of life events in 1 st and 2 nd trimesters (p=0.04) ⁵⁰ For events in prior 2.5 years through pregnancy (p<0.01) ⁵¹	For events in prior 6 months ⁵² For events in prior 2 years through pregnancy ⁵³	11 item version: white women with high cumulative stress (p<0.01) ²⁸ Modified version (p<0.05) ³⁷ Money related stressors (p<0.001) ⁵⁴	For events in prior 6 months ⁵²
Interview for Recent Life Events (IRLE; Paykel, 1969) Modified from Holmes and Rahe's SRRS, IRLE has 64 events organized into 10 categories of work, education, finance, health, bereavement, migration, cohabitation, legal, family and social relationships and marriage. For each event, respondent reports month of occurrence, independence of event from psychiatric illness, and objective negative impact.	<ul style="list-style-type: none"> Inter-rater reliability for specific event occurrence, month, independence, and objective negative impact (0.76–0.95) Validity demonstrated by ability of instrument to differentiate patient and control groups in terms of number, timing, and qualities of events⁵⁵ 	3		56, 57		56–58
Life Events Inventory (LEI; Cochrane, 1973) Modified from Holmes and Rahe's SRRS, 35 item check list with additional 16 items for those who were ever married and 4 items for those who were never married	<ul style="list-style-type: none"> In psychiatric patients, psychiatrists, and university students: <ul style="list-style-type: none"> The amount of "turmoil, disturbance and upheaval" of each item was scored on scale from 1–100 with marriage as comparison score of 50. Coefficient of concordance for all 3 groups (0.89).⁵⁹ 	1		60		60
Modified Life Events Inventory (Newton, 1979) Modified from Cochrane's LEI, 59 item checklist of events validated in pregnant women	<ul style="list-style-type: none"> In pregnant women: <ul style="list-style-type: none"> 2 groups of pregnant women at different hospitals scored each item according to the amount of "worry, disruption, or upheaval" on scale of 1–100. Scores >60 were considered major life events. Women in both 	6	More major life events (p<0.02) ⁶¹ More objective life events (p=0.001) ⁶²	Case control study ²³ Prospective cohort study ²³ 2 items regarding physical violence ⁶³ 27 item version ⁶⁴	More objective life events (p=0.004) ⁶²	2 items regarding physical violence ⁶³

Name and description of scale	Psychometric properties	No. of studies	Associated with decrease in gestational age or PTB	Not associated with decrease in gestational age or PTB	Associated with decrease in birth weight or LBW	Not associated with decrease in birth weight or LBW
Life Events Checklist (Johnson, 1980) 46 item checklist of life events related to child and adolescent life stress within past year; positive and negative life change scores derived from sum of positive or negative impact of event ratings	groups produced an identical list of 28 major life events. ⁶¹					
	<p>In youth aged 10–17:</p> <ul style="list-style-type: none"> • Test-retest reliability after 2 weeks for positive (0.69) and negative life change score (0.72) • Inter-rater reliability between children and their mothers for positive (0.48) and negative life change score (0.60) • Validity-negative life change scores correlate with reports of personal and physical health problems • Negative life change scores correlate with depression, anxiety, and external locus of control while positive life change scores correlate with internal locus of control⁶⁵ 	2				66, 67
Psychiatric Epidemiology Research Interview Life Events Scale (PERI-LE; Dohrenwend, 1978) 102 events related to school, work, love and marriage, children, family, residence, crime and legal matters, finances, social activities, and health	<p>In adults living in New York City:</p> <ul style="list-style-type: none"> • The severity of 101 events was rated in relation to marriage; the severity of 60 events were “consensual” or agreed upon, 22 were “status dependent”, and 19 were “noisy” or indeterminate⁶⁸ 	3			Stressful life events during pregnancy (p=0.001) ⁶⁹	26, 70
Life Events and Difficulties Schedule (LEDS; Brown, 1978) Semi-structured interview about the severity of events and difficulties in the areas of health, role changes, leisure, employment, housing, money, crises, forecasts, marriage, interactions with parents, and resources in the last 12 months	<p>In female psychiatric and healthy women:</p> <ul style="list-style-type: none"> • Inter-rater reliability (>0.90) • Validity- patients and their relatives had 81% agreement about the occurrence and onset of the same stressful event • Patients reported more life events than healthy women • In terms of recall, there was little fall-off of events reported throughout year⁷¹ 	2	(p<0.001) ⁷²	21 item version ⁷³		
Life Events Questionnaire (LEQ; Norbeck, 1984)	In female nursing students and mothers:	2		75, 76		75

Name and description of scale	Psychometric properties	No. of studies	Associated with decrease in gestational age or PTB	Not associated with decrease in gestational age or PTB	Associated with decrease in birth weight or LBW	Not associated with decrease in birth weight or LBW
82 item checklist of events designed for female adults of child-bearing age; life events pertain to health, work, school, residence, love and marriage, family and close friends, parenting, personal and social, financial, and crime and legal matters; scores include negative events, positive events, and total events scores	<ul style="list-style-type: none"> • Test-retest reliability over 1 week (0.78–0.83) • Validity- LEQ negative events score highly correlated with total negative moods on Profile of Mood States scale (POMS) ($r=0.34$) while LEQ positive events score correlated with vigor-activity mood from POMS • LES negative events score highly correlated with Brief Symptom Inventory summary scores for psychiatric symptoms ($r=0.30-0.39$)⁷⁴ 					
Prenatal Social Environment Inventory Scale (PSEI; Orr, 1992) 41 item checklist of chronic life stressors and major stressful events that pregnant women have experienced in the past 12 months	<p>In pregnant women:</p> <ul style="list-style-type: none"> • Internal consistency (0.80) • Test-retest reliability over 30 days (0.73) • Validity- PSEI significantly and positively correlates with CES-D ($p=0.001$)⁷⁷ 	4	6 item anxiety subscale, medium anxiety RR 1.5 (1.1–2.1) and high anxiety RR 2.1 (1.5–3.0) ¹⁹ 6 item anxiety subscale, African American women with high anxiety RR 2.0 (1.3–3.2) and white women with high anxiety RR 1.6 (1.1–2.3) ⁴⁴ 6 item anxiety subscale, score of 5 of 6 OR 1.70 (1.01–2.87) and score of 6 of 6 OR 2.73 (1.03–7.27) ⁷⁸		African American women with high stressors ($p=0.05$) ⁷⁹	
Family Inventory of Life Events (FILE; McCubbin, 1982) 71 items measure stressful events for the family in previous 12 months; 17 item subscale for intra-family strain and 54 items for strains in marriage, pregnancy, work, finances, health, legal matters, home transitions, and losses	<p>In families and students:</p> <ul style="list-style-type: none"> • Internal consistency of total scale (0.79–0.81), intra-family subscale (0.71–0.73) and all other subscales (0.09–0.71) • Test-retest reliability after 5 weeks for total scale (0.80) and intra-family subscale (0.73) 	1				81

Name and description of scale	Psychometric properties	No. of studies	Associated with decrease in gestational age or PTB	Not associated with decrease in gestational age or PTB	Associated with decrease in birth weight or LBW	Not associated with decrease in birth weight or LBW
	<ul style="list-style-type: none"> Validity- FILE scores correlated with pulmonary functioning of children with cystic fibrosis; significant correlations between total or intra-family scores with other measures of cohesion, conflict, and family organization⁸⁰ 					
Trauma History Questionnaire (THQ; Green, 1996) 24 items about lifetime history of exposure to traumatic events in the areas of crime, disaster, and unwanted physical/sexual violence	<p>In psychiatric outpatients with severe mental illness:</p> <ul style="list-style-type: none"> Test-retest reliability over 2 weeks (0.76) Criterion-related validity demonstrated by significant positive correlations with symptoms of posttraumatic stress⁸² 	1				83
VIOLENCE AND ABUSE						
Abuse assessment screen (AAS; Parker, 1991) 5 items identify victims of domestic violence and measures the frequency, severity, and sites of injury due to abuse	<p>In pregnant women:</p> <ul style="list-style-type: none"> Internal consistency reliability (0.83–1.0) Concurrent validity when compared to the Index of Spouse Abuse (ISA- P=0.355; ISA-NP=0.297), Conflict Tactics Scale (severe violence subscale=0.278), and Danger Assessment Screen (0.358) (all p<0.01) Respondents who scored positive for abuse on AAS had higher score on ISA, DAS, and CTS (except verbal reasoning subscale) (p<0.001)⁸⁴ 	19	Modified version, RR 1.7(1.1–2.6) ⁸⁵ Teenagers, OR 3.5 (1.1–10.8) ⁸⁶ OR 2.8 (1.3–5.9) (p=0.01) ⁸⁷ RR 2.5(1.4–4.1) ⁸⁸ OR 1.6 (1.1–2.3) ⁸⁹ OR 3.1 (2.0–4.9) ⁹⁰	25, 91–94 3 item version ^{95, 96}	Modified version, RR 2.0(1.4–3.1) ⁸⁵ OR 5.0 (1.3–19.1) (p=0.02) ⁸⁷ RR 2.5 (1.4–4.5) ⁸⁸ OR 1.8 (1.3–2.5) ⁸⁹ 3 item version (p<0.05) ⁹⁷ RR 3.8 (2.9–5.0) ⁹⁸ RR 1.5 (1.1–2.2) ⁹⁹ OR 4.0 (1.7–9.3) ¹⁰⁰ OR 2.4 (1.1–5.6) ¹⁰¹	40, 93, 94
Conflict Tactics Scale (CTS; Straus, 1979) 19 items measuring method of dealing with conflict within families; 3 subscales of reasoning, verbal aggression, and violence	<p>In national sample of couples:</p> <ul style="list-style-type: none"> Internal consistency of reasoning (0.76), verbal aggression (0.88), and violence (0.88) Concurrent validity- sociology students reported similar incidence rates of violence by each parent when compared with each spouse's report of violence 	5		10 item version ^{103, 104}	Modified version, OR 10.2 (1.4–73.9) (p=0.015) ¹⁰⁵	10 item version ^{103, 104} Violence subscale ^{106, 107}

Name and description of scale	Psychometric properties	No. of studies	Associated with decrease in gestational age or PTB	Not associated with decrease in gestational age or PTB	Associated with decrease in birth weight or LBW	Not associated with decrease in birth weight or LBW
Index of Spouse Abuse (ISA; Hudson, 1981) 30 items measure severity of physical (ISA-P) and non-physical abuse (ISA-NP) by partner	<ul style="list-style-type: none"> Content validity- each item on violence subscale describes an act of actual physical force Construct validity- high level of violence when power structure is unequal between partners¹⁰² 	1				
HITS scale (Sherin, 1998) 4 items ask if respondent has been physically hurt, insulted, threatened, or screamed at	<p>In college/graduate students:</p> <ul style="list-style-type: none"> Internal consistency reliability (ISA-P=0.90; ISA-NP=0.91) Construct validity- ISA discriminated between clinically abused and non abused groups better than other clinical scales not related to abuse (ISA-P=0.73; ISA-NP=0.80)¹⁰⁸ <p>In family practice office pt:</p> <ul style="list-style-type: none"> Internal consistency reliability (0.80) Concurrent validity with CTS (total score=0.85; physical abuse=0.82, verbal abuse=0.81) Construct validity- HITS score higher for victimized vs non-victimized ($p<0.0005$)¹⁰⁹ 	1			Verbal abuse ($p=0.002$) ¹¹⁰	

* In Wadhwa's paper, the score from the Hopkins Symptom Checklist was combined with the scores from the Daily Hassles Scale and Cohen's Perceived Stress Scale to create a composite measure of "perceived stress" for analysis.

Table 3

Psychosocial stress scales measuring perceived stress

Name and description of scale	Psychometric properties	No. of papers	Associated with decrease in gestational age or PTB	Not associated with decrease in gestational age or PTB	Associated with decrease in birth weight or LBW	Not associated with decrease in birth weight or LBW
<i>SUBJECTIVE STRESSORS</i>						
Perceived Stress Scale (PSS; Cohen, 1983) 14 items measure degree to which lives are unpredictable, uncontrollable, and overloading in the last month	<p>In college students and community group enrolled in smoking-cessation program:</p> <ul style="list-style-type: none"> Internal consistency reliability (0.84–0.86) Test-retest reliability over 2 days (0.85) and over 6 weeks (0.55) Validity demonstrated by significant positive correlation between higher PSS scores and subjective rating of life events Predictive validity- compared to number of life events, PSS scores were a better predictor of depressive and physical symptoms, utilization of health services, and social anxiety¹¹¹ 	18	<p>5 item version (p<0.03)^{18*}</p> <p>8 item version (p<0.05)³¹</p> <p>12 item version, OR 2.8 (1.3–5.9) (p<0.01)³²</p> <p>4 item version for Aboriginal Canadian women OR 7.6 (1.1–50.9)⁹¹</p> <p>(p=0.04)¹¹²</p> <p>4 item version OR 1.5 (1.1–1.9)¹³</p> <p>10 item version (p<0.0004)¹⁴</p> <p>8 item version (p<0.05)¹⁵</p>	<p>“Short form”²⁵</p> <p>4 item version²⁹</p> <p>14 item version^{37, 116}</p> <p>12 item version¹¹⁷</p> <p>8 item version^{115, 118}</p> <p>10 item version^{30, 120}</p> <p>14 item version¹²¹</p>	<p>5 item version (p<0.01)^{18*}</p>	<p>4 item version²⁹</p> <p>14 item version^{37, 116}</p> <p>12 item version¹¹⁷</p> <p>8 item version^{115, 118}</p> <p>10 item version^{30, 120}</p> <p>14 item version¹²¹</p>
Impact of Event Scale (IES; Horowitz, 1979) 15 items measure psychological impact of a variety of traumas in the past 7 days, 2 subscales of intrusion and avoidance	<p>In adult psychotherapy patients, physical therapy and medical students:</p> <ul style="list-style-type: none"> Internal consistency for intrusion (0.78) and avoidance (0.82) Split-half reliability (0.86) Test-retest reliability after 1 week for total scale (0.87), intrusion (0.89) and avoidance (0.79) Validity- After time and psychotherapy treatment, patients' scores on IES improved, reflecting the scale's sensitivity to change Psychotherapy patients had higher IES scores than medical students, which shows scale's ability to discriminate between groups with different traumas¹²² 	1		<p>5 item version of intrusion subscale¹¹⁸</p>	<p>5 item version of intrusion subscale (p<0.01)¹¹⁸</p>	
Subjective Stress Scale (Schar, 1973)	<p>In German male factory workers:</p> <ul style="list-style-type: none"> Item inter-correlations range from 0.38–0.54 	2		45	<p>In women with BMI<22 (p=0.009)²⁴</p>	45

Name and description of scale	Psychometric properties	No. of papers	Associated with decrease in gestational age or PTB	Not associated with decrease in gestational age or PTB	Associated with decrease in birth weight or LBW	Not associated with decrease in birth weight or LBW
4 statements regarding perceived stress with daily activities	<ul style="list-style-type: none"> Subjective stress scale correlates with other psychosocial measures of work satisfaction, social stress and neuroticism Subjective stress scale scores correlate with personal and familial cardiovascular disease¹²³ 					
WORK STRAIN						
Job Content Questionnaire (JCQ; Karasek, 1985) 49 items measure job characteristics using subscales of decision latitude, psychological demands, social support, physical demands, and job insecurity; job strain, defined as high psychological demands and low decision latitude, leads to psychological strain	<p>In multiple international study populations:</p> <ul style="list-style-type: none"> Internal consistency (0.58–0.86) Predictive validity- multiple studies show that JCQ scores predict chronic disease states, such as cardiovascular disease, mental strain, and occupation injury¹²⁵ 	11		24, 126–131 “Abbreviated version” ¹²⁵ 14 item version ¹³²	12 item version, OR 1.8 (1.0–3.3) ¹²⁶ High strain job associated with birth weight difference of 190 grams, 95% CI= 48–333 grams ¹³³ (p<0.01) ¹³⁴	129–131
Occupational Fatigue Index (Mamelle, 1984) 5 items regarding posture, work on industrial machine, physical exertion, mental stress, and environment	<p>In pregnant women:</p> <ul style="list-style-type: none"> Internal consistency reliability not applicable Validity demonstrated by ability to predict negative pregnancy outcomes⁷⁶ 	4	4 item version, OR 1.4 (1.1–1.9) (p<0.02) ¹³⁵ Score ≥3 (p<0.05) ¹³⁶	76, 127		
Effort-Reward Imbalance Questionnaire (ERI-Q; Siegrist, 1996) 23 items determine chronic stress resulting from imbalance between high effort and low rewards using subscales measuring effort, reward, and over-commitment	<p>In working adults from 5 European studies:</p> <ul style="list-style-type: none"> Internal consistency of effort (0.61–0.78), reward (0.70–0.88), and over- commitment (0.64–0.82) Content validity- Those with high effort-reward ratios and high over- commitment report poor self-rated health Factorial analysis showed that constructs were consistent across all populations¹³⁷ 	1		24		
RACIAL DISCRIMINATION						
Experiences of Discrimination (EOD; Krieger, 1990) Based on prior instrument used in the Coronary Artery Risk Development in Young Adults (CARDIA) study; 7 or 9 item instrument includes questions about response to unfair treatment and	<p>In working class white, African American, and Latino adults:</p> <ul style="list-style-type: none"> Internal consistency (0.74–0.87) Test-retest reliability after 2–4 weeks (0.69–0.72) 	5	In African American women, RR 1.8 (1.1–2.9) ¹⁴⁴ ≥3 experiences of discrimination, OR 3.1 (1.3–7.2) ¹³⁹	19, 117	≥3 experiences of discrimination, OR 2.6 (1.2–5.3) ¹⁴⁰ (p<0.01) ¹¹⁷	139

Name and description of scale	Psychometric properties	No. of papers	Associated with decrease in gestational age or PTB	Not associated with decrease in gestational age or PTB	Associated with decrease in birth weight or LBW	Not associated with decrease in birth weight or LBW
situations in which subjects experiences discrimination	<ul style="list-style-type: none"> Validity- EOD scores correlate with other measures of discrimination ($r=0.79$) EOD scores are associated with psychological distress, and not associated with social desirability¹³⁸ 					
Perceived Racism Scale (McNeilly, 1996) 51 items measure African-Americans' perceptions of racism from white Americans in terms of the frequency of exposure, the emotional responses, behavioral coping mechanisms, and the situation in which racism is encountered	<p>In African American students and community residents:</p> <ul style="list-style-type: none"> Internal reliability (0.87– 0.96) Test-retest reliability after 2 weeks for frequency of exposure (0.71–0.80) and emotional and coping responses (0.50–0.78)¹⁴¹ 	1				140
Everyday Discrimination Scale (EDS; Forman, 1997) 9 items measure the presence, frequency, and source of chronic and routine experiences of discrimination	<p>In African American high school students:</p> <ul style="list-style-type: none"> Internal consistency (0.87) Split-half reliability (0.83) Criterion-related validity- EDS scores have a significant positive correlation with externalizing ($r=0.34$) and internalizing ($r=0.39$) symptoms, which were significantly more common in persons who reported discrimination compared to those who did not¹⁴² 	1			Discrimination due to age ($p=0.04$) and physical disability ($p<0.001$) ⁸³	
Perceptions of Racism Scale (PRS; Green, 1996) 20 items measure perception of racism in terms of feelings of racism, experience of racist actions, and racist thoughts in African American women	<p>In pregnant African American women:</p> <ul style="list-style-type: none"> Internal consistency (0.91) Content validity- scale items were critiqued by experts Concurrent validity- positive relationship between stress and perceived racism ($p<0.01$)¹⁴³ 	1		39		39
OTHER SCALES						
Prenatal Distress Questionnaire (PDQ; Yali, 1999) 12 items assessing the worries and concerns that a woman has about different aspects of pregnancy, including physical and emotional	<p>In pregnant women:</p> <ul style="list-style-type: none"> Internal consistency (0.81) Validity- Items were developed from descriptive studies of women's concerns during pregnancy 	3		($p<0.008$) ²⁹	30, 112	30

Name and description of scale	Psychometric properties	No. of papers	Associated with decrease in gestational age or PTB	Not associated with decrease in gestational age or PTB	Associated with decrease in birth weight or LBW	Not associated with decrease in birth weight or LBW
symptoms, relationships, body image, and mothering ability	<ul style="list-style-type: none"> • PDQ measures similar constructs as other prenatal stress scales • PDQ scores only moderately correlate with non-specific, global distress, suggesting a difference between global and pregnancy-specific distress¹⁴⁴ 					
Maternal Adjustment and Maternal Attitudes (MAMA; Kumar, 1984) 60 items with 5 subscales measuring mother's perceptions of her body, somatic symptoms, marital relationship, attitudes to sex, and attitudes to the pregnancy and the baby, in the past month	<p>In pregnant women:</p> <ul style="list-style-type: none"> • Split-half reliability (0.58–0.82) • Test-retest reliability over 1 week (0.81–0.95) • Criterion-related validity- interviews about somatic symptoms, marital relationship, attitudes to sex, and attitudes to baby were comparable with corresponding MAMA subscale¹⁴⁵ 	1				26
Marital Strain Scale (Pearlin, 1978) 14 items measure chronic stress from a woman's partner in terms of non-acceptance by spouse, non reciprocity, and frustration of role expectations	<p>In parents:</p> <ul style="list-style-type: none"> • Reliability (0.89) • Pearlin's Marital Strain scale correlates with Dohrenwend's marital functioning scale ($r=0.83$), indicating a lack of discriminant validity¹⁴⁶ 	1			25	

* In Lobel's paper, Cohen's Perceived Stress Scale, Spielberger's State Anxiety subscale, and a measure of stressful prenatal life events was included into a latent stress factor for modeling purposes.

[†] In Wadhwa's paper, the score from the Hopkins Symptom Checklist was combined with those on the Daily Hassles Scale and Cohen's Perceived Stress Scale to create a composite measure of "perceived stress" for analysis.

Table 4

Psychosocial stress scales measuring enhancers of stress

Name and description of scale	Psychometric properties	No. of studies	Associated with decrease in gestational age or PTB	Not associated with decrease in gestational age or PTB	Associated with decrease in birth weight or LBW	Not associated with decrease in birth weight or LBW
DEPRESSION						
Center for Epidemiologic Studies Depression scale (CES-D; Radloff, 1977) 20 items measure symptoms of depression and their frequencies in the past week in the general population; score of 16 is cutoff for depression	In general households and psychiatric patients: <ul style="list-style-type: none"> Internal consistency in general (0.85) and patients(0.90) Test-retest reliability over 2–8 weeks (0.57) Validity- patient scores were significantly higher than scores of general population; CES-D correlates with other self-report scales for depression or general psychopathology¹⁴⁷ 	18	OR 1.4 (1.01–2.1) ²⁵ (p=0.05) ¹⁴⁸ Score ≥24 and taking psychiatric medications, OR 2.0 (1.1–3.6) ¹⁴⁹ 16 item version, OR 1.04 (1.01–1.07) (p<0.01) ¹⁵⁰ Score ≥22, Hazard Ratio 2.2 (1.1–4.7) ¹⁵¹ OR 1.96 (1.04–3.72) ¹⁵²	19, 44–46, 139, 153 “Short form” ¹⁵⁴ 16 item version ¹⁵⁵	In women with BMI<22, (p=0.005) ¹²⁴ (p=0.05) ¹⁴⁸ 16 item version (p<0.001) ¹⁵⁵	26, 45, 66, 139, 156
Beck Depression Inventory (BDI; Beck, 1961) 21 items measures the severity of behavioral manifestations of depression, including mood, pessimism, sense of failure, lack of satisfaction, guilt, punishment, self-dislike, self-accusation, suicidal ideation, crying, irritability, social withdrawal, indecisiveness, body image, work, sleep disturbance, fatigue, loss of appetite, weight loss, somatic symptoms, and libido	In psychiatric patients: <ul style="list-style-type: none"> Internal consistency (0.76–0.95) Split-half reliability (0.93) Test-retest reliability (0.48–0.86) Content validity- items constructed from clinical symptoms of depressed patients, and reflect criteria in DSM-III Concurrent validity- BDI scores correlate with clinical ratings of depression(r=0.55–0.96), Hamilton Rating Scale for Depression (r=0.61–0.86), and other depression scales Discriminant validity- BDI scores are more correlated with clinical ratings of depression (r=0.59) than anxiety (r=0.14); 	5	BDI-II version, OR 1.06 (1.01–1.11) ¹⁵⁹	BDI-II version ⁶⁰ BDI-II version ⁹⁶	BDI-II version, OR 1.07 (1.02–1.12) ¹⁵⁹	^{60, 160} BDI-II version ⁶⁷

Name and description of scale	Psychometric properties	No. of studies	Associated with decrease in gestational age or PTB	Not associated with decrease in gestational age or PTB	Associated with decrease in birth weight or LBW	Not associated with decrease in birth weight or LBW
Edinburgh Postnatal Depression Scale (EPDS; Cox, 1987) 10 items originally developed for measuring severity of postpartum depression symptoms, but has been validated for use in non-postpartum women	<ul style="list-style-type: none"> and distinguish between psychiatric and non psychiatric patients Construct validity- BDI scores are related to suicide and alcoholism, maladjustment, and variety of medical symptoms^{157,158} 	3	OR 3.3 (1.2–9.2) (p=0.02) ¹⁶² (p<0.001) ¹⁶³			163, 164
Hamilton Rating Scale for Depression (Hamilton, 1960, revised 1967) 17 items originally developed as clinician-rated scale in patients already diagnosed with depression; items assess depressed mood, suicide, loss of interest, psychomotor agitation and retardation, insight, loss of weight, gastrointestinal symptoms, and hypochondriasis	<p>In non-postpartum and postpartum mothers:</p> <ul style="list-style-type: none"> In non-postpartum women, sensitivity (88%), false positive rate (20%), positive predictive value (21%) In postpartum women, sensitivity (75%), false positive rate (16%), positive predictive value (24%)¹⁶¹ <p>In multiple study patients:</p> <ul style="list-style-type: none"> Internal consistency (0.48–0.92) Inter-rater reliability (0.70–0.96) Test-retest reliability (0.65–0.96) Concurrent validity- HAM-D scores correlate with other instruments for depression, such as BDI (r=0.56–0.92), and global measures of mental health (r=0.65–0.90) Discriminant validity- HAM-D can distinguish between depressed and not depressed respondents HAM-D scores are sensitive to changes over time with treatment¹⁶⁵ 	1				56
ANXIETY						
State-Trait Anxiety Inventory (STAI; Spielberger, 1970)	In students, working adults, and military recruits:	20	State anxiety subscale (p<0.03) ^{18*}	60, 75, 116, 162, 169 Trait anxiety subscale ⁴⁵	State anxiety Trait anxiety subscale (p<0.01) ^{18*}	26, 60, 116, 156

Name and description of scale	Psychometric properties	No. of studies	Associated with decrease in gestational age or PTB	Not associated with decrease in gestational age or PTB	Associated with decrease in birth weight or LBW	Not associated with decrease in birth weight or LBW
One 20 item scale measures state or transitory anxiety experienced at that moment while the other 20 item scale measures trait anxiety, or propensity towards anxiety based on personality	<ul style="list-style-type: none"> Internal consistency for trait anxiety (0.90) and state anxiety (0.93) Test-retest reliability after 20–104 days for trait anxiety (0.73–0.86) and state anxiety (0.33) Construct validity of state anxiety scale was demonstrated by higher scores in stressful situations and lower scores in relaxed situations Concurrent validity- trait anxiety scores were correlated with Cattell's IPAT Anxiety Questionnaire and Taylor's Manifest Anxiety Scale score ($r=0.73-0.85$)¹⁶⁶ 		State anxiety subscale ($p<0.05$) ²² 10 item version of state anxiety subscale ($p<0.01$) ¹⁶⁷ Trait anxiety subscale ($p<0.05$) and State anxiety subscale ($p<0.01$) ¹⁶⁸	State anxiety subscale ^{30, 62, 170} 10 item version of state anxiety subscale ¹¹⁷⁻¹¹⁹	In African American women ($p=0.03$) ⁷⁵ In women with BMI<22, trait anxiety subscale, ($p=0.0002$) ¹²⁴	10 item version of state anxiety subscale ^{117, 118, 167} State anxiety subscale ^{30, 62, 170} Trait anxiety subscale ^{45, 171}
Manifest Anxiety Scale (MAS; Taylor, 1953) 50 true or false statements assessing anxiety; items were adapted from the Minnesota Multiphasic Personality Inventory (MMPI)	<p>In college students and psychiatric outpatients:</p> <ul style="list-style-type: none"> Test-retest reliability after 4 weeks (0.88) Validity- MAS scores are moderately correlated with MMPI ($r=0.68$) Patients score higher on manifest anxiety than healthy individuals¹⁷² 	1				173
Hamilton Rating Scale for Anxiety (HAM-A; Hamilton, 1959) 14 item interview scale designed for assessing anxiety symptoms in patients already diagnosed with anxiety states; instrument has 2 subscales of psychic anxiety and somatic anxiety	<p>In psychiatric patients:</p> <ul style="list-style-type: none"> Inter-rater reliability for total scale (0.74), psychic anxiety (0.73) and somatic anxiety (0.70) Concurrent validity- HAM-A scores correlate with Covi Anxiety scale ($r=0.63$) HAM-A scores are sensitive to changes in clinical status^{174,175} 	1			($p<0.01$) ⁵⁶	
Institute for Personality and Ability Testing	In nursing and college students:	1			($p<0.0005$) ¹⁷⁷	

Name and description of scale	Psychometric properties	No. of studies	Associated with decrease in gestational age or PTB	Not associated with decrease in gestational age or PTB	Associated with decrease in birth weight or LBW	Not associated with decrease in birth weight or LBW
Anxiety Scale (IPAT; Cattell, 1963) 40 items measure indirect and overt manifestations of anxiety	<ul style="list-style-type: none"> • Test-retest reliability after 2–3 weeks (0.94) • Criterion validity- IPAT scores not related to clinical ratings of anxiety, nor with other instruments for measuring anxiety • IPAT scores were higher in students exposed to hypnotically induced anxiety and those infused with hydrocortisone than in control students¹⁷⁶ 					
Karolinska Scales of Personality (KSP; Schalling, 1993) 135 items with 15 subscales measuring personality traits, psychic and somatic anxiety, muscular tension, lack of energy and assertiveness, detachment, impulsivity, sensation seeking, socialization, indirect and verbal aggression, irritability, suspicion, guilt, and social desirability	<p>In college students:</p> <ul style="list-style-type: none"> • Internal consistency of subscales (0.35–0.78) • Factor analysis revealed 4- factors of negative emotionality, aggressive nonconformity, impulsive unsocialized sensation seeking, and social withdrawal • KSP factors correlate with Eysenck Personality Questionnaire (EPQ) subscales: EPQ neuroticism relates to KSP negative emotionality, EPQ extraversion relates to KSP social withdrawal, and EPQ psychoticism relates to KSP aggressive nonconformity and impulsive unsocialized sensation seeking¹⁷⁸ 	1	Somatic and psychic anxiety subscale (p>0.05) ¹⁷⁹			179
Screen for Child Anxiety Related Emotional Disorders (SCARED; Birmaher, 1997) 38 items screening tool for anxiety disorders in children aged 9–18; measures 5 factors of somatic/panic symptoms, general anxiety, separation anxiety, social phobia and school phobia	<p>In children and parents:</p> <ul style="list-style-type: none"> • Internal consistency for total score (0.93) and factor values (0.74–0.89) • Test-retest reliability after 5 weeks for total score (0.86) and for factors (0.70–0.90) • Discriminant validity- SCARED scores were significantly different between children with anxiety disorders from those 	1				67

Name and description of scale	Psychometric properties	No. of studies	Associated with decrease in gestational age or PTB	Not associated with decrease in gestational age or PTB	Associated with decrease in birth weight or LBW	Not associated with decrease in birth weight or LBW
<i>COMPOSITE MEASURES OF MENTAL WELL-BEING</i>						
General Health Questionnaire (GHQ; Goldberg, 1972) Screening tool for detecting psychiatric illness through items regarding disruptions in performing daily activities and feelings of subjective distress; 12, 28, 30, and 60 item versions.	In psychiatric patients: <ul style="list-style-type: none"> Internal consistency of GHQ-30 (0.84–0.93) Split-half reliability (0.95) Validity- for GHQ-28, sensitivity (86%) and specificity (82%); for GHQ- 30, sensitivity (81%) and specificity (80%) Median correlation between other similar instruments and GHQ-28 ($r=0.76$) and GHQ- 30 ($r=0.59$)¹⁸¹ 	9	12 item version, RR 2.3 (1.2–4.6) ($p=0.015$) ¹¹⁶ 30 item version, RR 1.8 (1.2–2.5) ¹⁸²	73, 183, 184	12 item version, RR 2.0 (1.1–3.5) ¹¹⁶ 12 item version, OR 3.5 (1.5–8.2) ¹⁸⁵	58, 73, 186 22 item version ⁷⁰
Hopkins Symptom Checklist (HSCL; Parloff, 1954) 58 items measure five symptom dimensions of somatization, obsessive-compulsive, interpersonal sensitivity, depression, and anxiety	In both patients and community members: <ul style="list-style-type: none"> Internal consistency for five symptom dimensions (0.84–0.87) Test-retest reliability after 1 week (0.75–0.84) Construct validity- HSCL symptom dimensions correspond highly with psychiatrist ratings of patients¹⁸⁷ 	3		37 [†]	34 item version, OR 1.12 (1.01– 1.24) ⁴¹	10, 37 [†]
SCL-90 (Derogatis, 1973) Modified from the HSCL, 90 items measure 9 primary symptom dimensions in psychiatric outpatients, including somatization, obsessive-compulsiveness, interpersonal sensitivity, depression, anxiety, anger-hostility, phobic anxiety, paranoid ideation and psychoticsm. Three global indices of distress	In drug trial volunteers: <ul style="list-style-type: none"> Internal consistency of all subscales (0.77–0.90) Test-retest reliability after 1 week (0.78–0.90) Convergent validity- SCL- 90 subscales scores correlate with analogous measure in MMP1 Discriminant validity- subscales did not correlate with nonanalogous scales¹⁸⁸ 	1	Increased anger-hostility subscales ($p<0.05$) ²² Paranoid ideation and psychoticsm ($p<0.005$) ²²			

Name and description of scale	Psychometric properties	No. of studies	Associated with decrease in gestational age or PTB	Not associated with decrease in gestational age or PTB	Associated with decrease in birth weight or LBW	Not associated with decrease in birth weight or LBW
are derived: Global Severity Index (GSI), Positive Symptom Distress Index (PSDI), and Positive Symptom Total (PST)						
Brief Symptom Inventory (BSI; Derogatis, 1975) Derived from the SCL-90, this 53 item scale measures psychological symptoms in psychiatric, medical, and healthy individuals. Similar to the SCL-90, there are 9 primary symptom dimensions and 3 global indices of distress.	In psychiatric outpatients, psychiatric inpatients, and healthy individuals: <ul style="list-style-type: none"> • Internal consistency (0.71–0.85) • Test-retest reliabilities after 2 weeks for 9 symptom dimensions (0.68–0.91) and for 3 global indices (0.80–0.90) • Concurrent validity- BSI symptom dimensions correlate with analogous measure on MMPI • Construct validity- factor analysis shows 7 of 9 symptom dimensions reproduced¹⁸⁹ 	3		190		Depression subscale ⁶⁹ 190
Profile of Mood States (POMS; McNair, 1971) 65 items measure 6 dimensions of affect and mood, specifically depression-dejection, anger-hostility, vigour-activity, fatigue-inertia, and confusion-bewilderment	In college students and psychiatric outpatients: <ul style="list-style-type: none"> • Internal consistency of POMS subscales (>0.84) • Test-retest reliability after 20 days (0.65–0.74) and after 9 weeks (0.43–0.53) • Concurrent validity- POMS scores correlate with other personality measures and symptom checklists¹⁹¹ 	2		38, 76		38
Post-traumatic Stress Disorder Checklist (PCL; Weathers, 1993) 17 items assess severity of symptoms of PTSD in the last month, based on DSM-III-R	In war veterans: <ul style="list-style-type: none"> • Internal consistency (0.97) • Test-retest reliability over 2–3 days (0.96) • Convergent validity- PCL scores correlate with Mississippi Scale (r=0.93), Impact of Event Scale (0.90), and Combat Exposure Scale (0.46) 	1		60		60

Name and description of scale	Psychometric properties	No. of studies	Associated with decrease in gestational age or PTB	Not associated with decrease in gestational age or PTB	Associated with decrease in birth weight or LBW	Not associated with decrease in birth weight or LBW
Crown-Crisp Experiential Index (CCEI; Crisp, 1978) Previously known as the Middlesex Hospital Questionnaire, this scale has 48 items that examines psychoneurotic symptoms and traits using subscales of free-floating anxiety, depression, hysteria, phobic anxiety, obsessiveness, and somatic anxiety	<ul style="list-style-type: none"> PCL as a predictor of PTSD diagnosis based on Structured Clinical Interview for DSM-IIIIR- sensitivity (82%), specificity (83%)¹⁹² 	1				
RAND Mental Health Index (Ware, 1985) 32 items measure depression, anxiety, feelings of belonging, positive affect	<p>In psychiatric patients and healthy adults:</p> <ul style="list-style-type: none"> Split-half reliability coefficients of all subscales (0.37–0.82); the obsessiveness and somatic subscales have the lowest reliabilities Validity- subscale scores differed significantly between patients and healthy adults; similarly, clinician ratings differed significantly between patients and healthy adults using all except the obsessiveness subscale¹⁹³ <p>In outpatients:</p> <ul style="list-style-type: none"> Internal consistency reliability ($\alpha=0.98$) Validity- mental and physical factors are distinguishable, and scales that measure aspects of mental health correlate more with each other than they do with scales measuring physical health variables¹⁹⁴ 	1			Anxiety subscale ($p<0.05$) ¹⁹⁵	"Free floating anxiety" subscale ¹⁶⁴
Primary Care Evaluation of Mental Disorders (PRIME-MD; Spitzer, 1994) Evaluates mood, anxiety, somatoform disorders, alcohol use, and eating disorders in the primary care setting. Patients complete 26 yes/no questions for symptoms in last month and clinicians follow up with 12 page evaluation guide; items	<p>In primary care patients:</p> <ul style="list-style-type: none"> Inter-rater reliability between primary care doctors and mental health professionals for any psychiatric diagnosis (0.71) For any psychiatric diagnosis, sensitivity of PRIME-MD (83%), specificity (88%), positive predictive value (80%), overall accuracy rate (86%) Construct validity- patients with PRIME-MD diagnoses have 	1		197		197

Name and description of scale	Psychometric properties	No. of studies	Associated with decrease in gestational age or PTB	Not associated with decrease in gestational age or PTB	Associated with decrease in birth weight or LBW	Not associated with decrease in birth weight or LBW
correspond with diagnoses from DSM-III-R	<p>significantly impaired functioning and greater health care utilization</p> <ul style="list-style-type: none"> Concurrent validity-PRIME-MD diagnoses correlated with corresponding self-rated symptom severity scales.¹⁹⁶ 					
Hospital Anxiety and Depression Rating Scale (HADS; Zigmond, 1983) 14 items developed for the hospital setting with 7 items for symptoms of depression (HADS-D) and 7 items for symptoms of anxiety (HADS-A) experienced during the previous 7 days	<p>In medicine outpatients:</p> <ul style="list-style-type: none"> Internal consistency for HADS-D (0.3–0.6) and HADS-A (0.41–0.76) Psychiatric severity rating has significant positive correlation with HADS-D score ($r=0.70$) and HADS-A score ($r=0.74$) Patient and interviewer ratings were correlated for each subscale, but were not correlated between contrary disorders (ie. HADS-A not correlated with HADS-D score)¹⁹⁸ 	1		¹⁹⁹		¹⁹⁹
Anomie Scale (Strole, 1956) 5 items measure individual's sense of alienation	<p>In adults:</p> <ul style="list-style-type: none"> Coefficient of reproducibility (0.90) and coefficient of stability (0.65) Convergent validity- Anomie scale scores correlate with social isolation and relate to negative attitudes towards minorities ($r=0.43$)^{200, 201} 	1	In African American women without Medicaid, OR 1.8 (1.2–2.6) ²⁰²			
State-Trait Personality Inventory (STPI; Spielberger, 1995) 80 items measure anxiety, anger, curiosity, and depression, each as states and traits; 8 subscales with 10 items each	<p>In college students:</p> <ul style="list-style-type: none"> Internal consistency for state and trait depression subscales (0.90) Validity- trait depression subscale correlates higher with other scales measuring depression ($r=0.78$) than state depression ($r=0.66$) STPI depression subscales correlate positively with STPI 	2	State anxiety subscale, OR 2.4 (1.2–5.0) ($p<0.05$) ³²	State anxiety subscale ²⁹		State anxiety subscale ²⁹

Name and description of scale	Psychometric properties	No. of studies	Associated with decrease in gestational age or PTB	Not associated with decrease in gestational age or PTB	Associated with decrease in birth weight or LBW	Not associated with decrease in birth weight or LBW
	anxiety, negatively with curiosity, and has a weak correlation with anger. ⁶⁶					

* In Lobel's paper, Cohen's Perceived Stress Scale, Spielberger's State Anxiety subscale, and a measure of stressful prenatal life events was included into a latent stress factor for modeling purposes.

[†] In Wadhwa's paper, the score from the Hopkins Symptom Checklist was combined with those on the Daily Hassles Scale and Cohen's Perceived Stress Scale to create a composite measure of "perceived stress" for analysis.

Table 5

Psychosocial stress scales measuring buffers of stress

Psychometric properties						
Name and description of scale	No. of studies	Associated with decrease in gestational age or PTB	Not associated with decrease in gestational age or PTB	Associated with decrease in birth weight or LBW	Not associated with decrease in birth weight or LBW	
<i>SOCIAL SUPPORT</i>						
Social Support Questionnaire (SSQ; Sarason, 1983) 27 items measure the number of support persons available (SSQ-N) and the satisfaction with support received (SSQ-S)	3	In college students: <ul style="list-style-type: none"> Internal reliability for SSQ- N (0.97) and SSQ-S (0.94) Test-retest reliability over 4 weeks for SSQ-N (0.90) and SSQ-S (0.83) Validity: high SSQ-N score correlates with positive change score with Sarason Life Experience Survey and with high self esteem on Rosenberg's Self Esteem Scale; low SSQ-N score correlates with more external locus of control on Nowicki and Duke's Locus of Control Scale²⁰³ 	6 item version ¹⁷ 47	16 item version (p<0.01) ²⁰⁴		
Maternal Social Support Index (MSSI; Pascoe, 1988) 21 items measure the amount of support and satisfaction with support received in terms of help with daily tasks, satisfaction with visits from family, help with crises, emergency child care, satisfaction with communication from male partner or another support person, and community involvement	3	In mothers from a prenatal, pediatric, or psychology clinic: <ul style="list-style-type: none"> Internal consistency (0.60– 0.63) Test-retest reliability after 6–8 weeks (0.72) Concurrent validity- MSSI score was significantly and positively correlated with Dyadic Adjustment Scale (r=0.393) and correlated with increased pathology on Personality Inventory for Children Family Relations subscale (r=-0.498)²⁰⁵ 	45			36, 45, 124
Norbeck Social Support Questionnaire (NSSQ; Norbeck, 1981) Items measure social support through 9 subscales combined to form three main dimensions: functional (Affect, Affirmation, Aid), network (size,	2	In nursing students: <ul style="list-style-type: none"> Internal consistency of affect (0.97), affirmation (0.96), aid (0.89), network (0.88–0.96), and loss (0.54–0.68) Test-retest reliability for functional and network items (0.85–0.92) and loss (0.71–0.83) 	In African American women (p=0.02) ⁷⁵			40, 75

Name and description of scale	Psychometric properties	No. of studies	Associated with decrease in gestational age or PTB	Not associated with decrease in gestational age or PTB	Associated with decrease in birth weight or LBW	Not associated with decrease in birth weight or LBW
duration of relationships, frequency of contact, and loss (absence or presence, number of persons lost, amount of support lost)	<ul style="list-style-type: none"> Validity- NSSQ was not related with social desirability by Marlowe-Crowne Test of Social Desirability Concurrent validity- NSSQ total loss scores were negatively correlated with tangible support score Cohen and Lazarus Social Support Questionnaire ($r = -0.44$); NSSQ affect score had positive correlation with emotional scale ($r = 0.51$)²⁰⁶ 					
MOS Social Support Survey (Sherborne, 1991) 19 items measure the frequency of receipt of four dimensions of social support, specifically emotional/informational support, tangible support, positive social interactions, and affectionate support	In clinic patients: <ul style="list-style-type: none"> Internal consistency of total scale (0.97) and other subscales (0.91–0.96) Stability coefficients after 1 year (0.72–0.78) Validity- low social support scores correlate with loneliness and high social support scores correlate with family/marital functioning Discriminant validity- items correlated higher with their own subscale than with other subscales²⁰⁷ 	2	19, 44			
Provisions of Social Relations Scale (PSR; Turner, 1983) 15 items measure subjects' perceptions of support from family and friends in terms of attachment, social integration, reassurance of worth, reliable alliance, and guidance	In college students and Mental Health and Physical Disability study participants: <ul style="list-style-type: none"> Internal consistency (0.75–0.87) Validity- PSR scores correlate positively with social support resources and negatively with anxiety, depression, BSI scores, and anger/aggression²⁰⁸ 	2		Family support subscale ($p < 0.01$) ¹⁶ Family support subscale ($p < 0.05$) ²⁰⁹		
Interpersonal Relationship Inventory (IPRI; Tilden, 1990) 39 items measure support with 3 subscales of social support, reciprocity, and conflict	In college students, women living in shelters, and women in community: <ul style="list-style-type: none"> Internal consistency for support (0.92), reciprocity (0.83), and conflict (0.91) 	1				83

Name and description of scale	Psychometric properties	No. of studies	Associated with decrease in gestational age or PTB	Not associated with decrease in gestational age or PTB	Associated with decrease in birth weight or LBW	Not associated with decrease in birth weight or LBW
	<ul style="list-style-type: none"> • Test-retest reliability after 2 weeks for support (0.91), reciprocity (0.84), and conflict (0.81) • Validity- IPRI scores not related to social desirability • Construct validity- people with high IPRI conflict scores and low IPRI support scores have high scores on BSI; as support increases, symptom scores decrease • Criterion-related validity- IPRI support scores correlate with Personal Resource Ques ($r=0.64$); and IPRI conflict scores correlate with Family Relationships Index conflict subscale ($r=0.62$) • IPRI scores were between shelter and home residents • Validity of reciprocity subscale is equivocal²¹⁰ significantly different 	1				
Interpersonal Support Evaluation List (ISEL); Cohen, 1983 48 items measure 4 categories of support, including tangible (sources of material aid), appraisal (available people to talk to about problems), self-esteem, and belonging (available people to do activities with)	<p>In college students:</p> <ul style="list-style-type: none"> • Internal consistency of total scale (0.77), tangible support (0.71), appraisal (0.77), self-esteem (0.60), and belonging (0.75) • Validity- ISEL is correlated with Inventory of Socially Supportive Behaviors ($r=0.46$) • ISEL is also negatively correlated with social anxiety in two samples of college students ($r=-0.52$, $r=-0.64$)²¹¹ 	1			($p<0.01$) ¹⁶	
Family Support Scale (Dunst, 1984) 18 items measure how helpful each source of support is to parents raising young children in the last 3–6 months	<p>In parents of children with disabilities:</p> <ul style="list-style-type: none"> • Internal consistency (0.79) • Split half reliability (0.77) • Test-retest reliability after 1–2 years (0.42–0.50) 	1				121

Name and description of scale	Psychometric properties	No. of studies	Associated with decrease in gestational age or PTB	Not associated with decrease in gestational age or PTB	Associated with decrease in birth weight or LBW	Not associated with decrease in birth weight or LBW
Interview Schedule for Social Interaction (ISSI; Henderson, 1980) 52 items measure the availability and perceived adequacy of social relationships in terms of the number of people and quality of relationships; results scored by the availability of attachment (AVAT), perceived adequacy of attachment (ADAT), availability of social integration (AVSI), and adequacy of social integration (ADSI)	<ul style="list-style-type: none"> Construct validity- factor analysis yielded 5 different sources of social support Concurrent validity- High FSS scores correlate with low personal and family problems on Questionnaire on Resources and Stress subscales²¹² 	1				
Support Behavior Inventory (SBI; Brown, 1986) 45 items measure the receipt of and satisfaction with supportive behaviors in four areas of emotional, material, informational, and appraisal support	<p>In general population:</p> <ul style="list-style-type: none"> Internal consistency (0.67–0.81) Test-retest reliability after 18 days (0.75–0.79) Face validity- items reflect availability and adequacy of attachment in adulthood ISSI scores followed hypothesized distributions in that married people had higher scores and those who just moved into a new city had lower scores Higher ISSI scores correlate positively with extroversion on Eysenck Personality Inventory²¹³ <p>In pregnant women and their partners:</p> <ul style="list-style-type: none"> Internal consistency of emotional (0.96), material (0.89), informational (0.90), and appraisal support (0.83) Content validity-expectant parents reviewed list of supportive behaviors, and only items rated highly were included in final scale Discriminant validity is equivocal given high correlations among subscales compared to reliabilities of subscales²¹⁴ 	1				
Arizona Social Support Interview Schedule (ASSIS; Barrera, 1981)	<p>In college students:</p> <ul style="list-style-type: none"> Internal consistency of satisfaction (0.33) and support need (0.52) 	1				

Name and description of scale	Psychometric properties	No. of studies	Associated with decrease in gestational age or PTB	Not associated with decrease in gestational age or PTB	Associated with decrease in birth weight or LBW	Not associated with decrease in birth weight or LBW
6 items assess social support in the last month in the areas of material aid, physical assistance, intimate interaction, guidance, feedback, and positive social interaction; scores include total network size, conflicted network size, unconflicted network size, support satisfaction, and support need	<ul style="list-style-type: none"> • Test-retest reliability over 2 days of network size (0.88), conflicted network (0.54), satisfaction (0.61) and support need (0.80) • Validity- measures of conflicted network size, support need, and satisfaction correlate with negative life events²¹⁵ 					
<i>COPING</i>						
Ways of Coping Questionnaire (Folkman, 1988) 66 items with 8 subscales measuring confrontive coping, distancing, self-controlling, seeking social support, accepting responsibility, escape-avoidance, planful problem-solving, and positive reappraisal	<p>In adults:</p> <ul style="list-style-type: none"> • Internal consistency for all subscales (0.61–0.79) • Stability of scale measured across five occasions was low with highest estimate of $r=0.47$ • Face validity shown by using items reflecting individual reports of coping behaviors in stress • Construct validity demonstrated by study results being consistent with theoretical predictions²¹⁶ 	2	Distancing coping style, RR 1.4 (1.1–1.9) ⁴⁶	44		
Coping Inventory for Stressful Situations (CISS; Endler, 1990) 48 items with 3 subscales measuring basic coping styles of task- oriented, emotion- oriented, and avoidance coping; avoidance is further composed of distraction and social diversion scales	<p>In adults, college students, psychiatric patients, and adolescents:</p> <ul style="list-style-type: none"> • Internal consistency of task (0.90), emotion (0.86) and avoidance (0.82) • Test-retest reliability after 6 weeks (0.51–0.73) • Construct validity- factor analysis was stable across several populations; CISS scores correlate with two other scales measuring basic coping styles²¹⁷ 	1			Emotion-oriented coping ($p<0.05$) ²⁰⁴	
John Henryism Coping Style (James, 1983)	In young, low-income African American males:	1		202		

Name and description of scale	Psychometric properties	No. of studies	Associated with decrease in gestational age or PTB	Not associated with decrease in gestational age or PTB	Associated with decrease in birth weight or LBW	Not associated with decrease in birth weight or LBW
8 items measure the degree to which respondents attempt to control their environment through hard work and determination: "high effort" coping with stressors can lead to adverse health outcomes	<ul style="list-style-type: none"> Internal consistency (0.45) Construct validity indicated employment as the strongest predictor of John Henryism in this sample²¹⁸ 					
LOCUS OF CONTROL						
Multidimensional Health Locus of Control scales (MHLC; Wallston, 1978) 18 items with 3 subscales measuring Internality (IHLC), Chance Externality (CHLC), and Powerful Others Externality (PHLC) loci of control in relation to health status	<p>In people recruited from an airport:</p> <ul style="list-style-type: none"> Internal consistency of IHLC (0.71–0.77), CHLC (0.69–0.75), and PHLC (0.67–0.72) Convergent validity- IHLC is positively correlated with Levenson's Internality scale ($r=0.57$); CHLC is positively correlated to Levenson's Powerful Others ($r=0.57$) and Chance ($r=0.80$) scales; PHLC correlates weakly with Powerful Others ($r=0.28$) and Chance ($r=0.23$) scales Predictive validity- IHLC scores correlate positively with health status ($r=0.40$) and negatively with CHLC ($r=-0.28$)²¹⁹ 	1			Chance locus of control ($p<0.05$) ²⁶	
Parental Health Beliefs Scales (PHBS; Tinsley, 1989) 20 items measure parent's degree of perceived control over children's health and the extent to which "chance" and "powerful others" affect children's health	<p>In mothers:</p> <ul style="list-style-type: none"> Internal consistency reliability (0.96) Test-retest reliability (0.96) Validity- maternal internality was significantly and positively associated with infants receiving timely well-baby exams²²⁰ 	1	5 item version, low internal locus of control, OR 1.8 (1.2–2.6) ($p=0.007$) ¹⁵³			
Locus of Control/I-E Scale (Rotter; 1966) 23 paired items with 6 filler questions measure the degree to which respondent believes he/she has control over outcomes	<p>In college students:</p> <ul style="list-style-type: none"> Split-half reliability (0.73) Test-retest reliability after 1 month (0.72) and 2 months (0.55) Construct validity- I-E scores predict behavior in that people with internal 	1		179		179

Name and description of scale	Psychometric properties	No. of studies	Associated with decrease in gestational age or PTB	Not associated with decrease in gestational age or PTB	Associated with decrease in birth weight or LBW	Not associated with decrease in birth weight or LBW
OTHER BUFFERS OF STRESS						
Self-Esteem Scale (Rosenberg, 1965) 10 items originally developed for measuring adolescents' feelings of self-worth	In New York high school students: <ul style="list-style-type: none"> Internal consistency (0.77–0.88) Test-retest reliability after 1–2 weeks (0.82–0.85) Convergent validity- self- esteem scores positively correlate with confidence ($r=0.65$) and popularity ($r=0.39$) and negatively correlate with anxiety ($r=-0.64$), depression ($r=-0.54$), and anomie ($r=-0.43$) Discriminant validity- no correlation between self- esteem scores and locus of control, gender, and age²²² 	6		25, 39, 45, 167 6 item version ²²³	In women with BMI<22 ($p=0.03$) ¹²⁴	39, 45, 167
Mastery Scale (Pearlin, 1978) 7 items measure "extent to which one regards one's life-chances as being under one's own control in contrast to being fatalistically ruled." ²²⁴	In Chicago households: <ul style="list-style-type: none"> Test-retest reliability (0.33) Convergent validity- mastery score is negatively correlated with depression and economic strain, and positively correlated with self-esteem²²⁵ 	5		45, 153, 202 5 item version ¹⁶⁷	In African American women ($p<0.05$) ⁴⁵ In women with BMI<22 ($p=0.002$) ¹²⁴ 5 item version ($p<0.01$) ¹⁶⁷	
Life Orientation Test (LOT; Scheier, 1985) 8 items and 4 filler questions measure dispositional optimism in terms of outcome expectancies	In college students: <ul style="list-style-type: none"> Internal consistency (0.76) Test-retest reliability after 4 weeks (0.79) Convergent validity- Respondents with more optimism have an internal locus of control and higher self-esteem and less hopelessness, social 	3		"Short form" ²⁵ 30 8 item version ¹⁶⁷	($p<0.05$) ³⁰	8 item version ¹⁶⁷

Name and description of scale	Psychometric properties	No. of studies	Associated with decrease in gestational age or PTB	Not associated with decrease in gestational age or PTB	Associated with decrease in birth weight or LBW	Not associated with decrease in birth weight or LBW
	anxiety, depression, and perceived stress ²²⁶					
State Hope Scale (Snyder, 1996) 6 items measure present state of hope; 3 items for agency (goal-directed determination) and 3 items for pathway (planning to meet goals)	<p>In college students:</p> <ul style="list-style-type: none"> Internal reliability for total score (0.93), agency subscale (0.91) and pathway subscale (0.91) Test-retest reliability over 30 days (0.48–0.93) Convergent validity- state hope score correlates positively with dispositional hope, state self esteem, and positive affect scores Discriminant validity- state hope scale scores predicted daily appraisals of events and thoughts (from 30 day daily report form) distinct from dispositional hope scores²²⁷ 	1			OR 4.0 (3.1–4.9) ⁶⁶	
Spiritual Perspective Scale (SPS; Reed, 1987) 10 items measure the extent to which individuals hold spiritual beliefs and engage in spiritual activities	<p>In hospitalized patients and healthy adults:</p> <ul style="list-style-type: none"> Internal consistency reliability (0.93–0.95) Construct validity- women and those with religious affiliations had higher scores on SPS²²⁸ 	1				83

Table 6

Psychosocial stress scales measuring other stress components

Name and description of scale	Psychometric properties	No. of studies	Associated with decrease in gestational age or PTB	Not associated with decrease in gestational age or PTB	Associated with decrease in birth weight or LBW	Not associated with decrease in birth weight or LBW
Medical Outcome Study SF-36 (Ware, 1992) 36 items measure physical health using 4 subscales of physical functioning-PF, role limitations from physical health problems-RP, bodily pain-BP, and general health-GH as well as mental health using 4 subscales of vitality-VT, social functioning-SF, role limitation from emotional problems-RE, and mental health-MH	In clinic patients: <ul style="list-style-type: none"> Internal consistency of PF (0.93), RP (0.84), BP (0.82), GH (0.78), VT (0.87), SF (0.85), RE (0.83), MH (0.90) Convergent and discriminant validity- MH and RE subscales detected patients with poor mental health and not poor physical health; likewise PF and RP subscales detected patients with poor physical health and not mental health^{229, 230} 	2	Poor physical function before pregnancy, OR 2.0 (1.2–3.3) ¹⁵⁴			⁶⁶
Prenatal Psychosocial Profile (PPP; Curry, 1994) 44 items scale is a composite measure of perception of stress, support from partner, support from others, and self-esteem during pregnancy	In low-income pregnant women: <ul style="list-style-type: none"> Internal consistency (0.73–0.96) Test-retest reliability (0.78–0.84) Convergent validity- 11 item PPP stress subscale is highly correlated with Difficult Life Circumstances Scale ($r=0.71$) Subscales are correlated with each other²³¹ 	6	Self esteem subscale, RR 0.87 (0.75–0.99) ($p<0.05$) ⁹⁵ Stress subscale, OR 1.9 (1.2–2.9) ($p=0.005$) ¹⁵³	^{91, 96} Stress and support subscales ⁹⁵ 11 item version ²²³	Stress subscale, OR 2.1 (1.2–3.6) ¹⁰⁶	
Abbreviated scale for the assessment of psychosocial status in pregnancy (Goldenberg, 1997) 28 item scale developed from 5 scales: STAI trait anxiety subscale, Rosenberg's Self Esteem scale, Pearlman's Mastery scale, CES-D, and Schar's Subjective Stress scale	In low-income pregnant women: <ul style="list-style-type: none"> Abbreviated scale highly correlated with total items from 5 scales ($r=0.97$) High scores on both abbreviated and full scores associated with fetal growth restriction and birth weight, not preterm delivery or gestational age²³² 	2	Subjective stress scale, OR 1.16 (1.05–1.29) ($p=0.003$) ²³³ Low psychosocial score, OR 1.4 (1.1–1.7) ($p=0.04$) ²³⁴		Subjective stress scale, OR 1.08 (1.01–1.15) ($p=0.02$) ²³³ Low psychosocial score, OR 1.4 (1.1–1.7) ($p=0.02$) ²³⁴	
Dyadic Adjustment Scale/Marital Satisfaction Questionnaire (Spanier, 1976) 32 items measure the quality of adjustment in marriage with 4 subscales of dyadic consensus,	<ul style="list-style-type: none"> In married couples, cohabiting pairs, and divorced people: Internal consistency of total scale (0.96), consensus (0.90), satisfaction (0.94), cohesion (0.84), and affectional expression (0.74) 	1		²²		

Name and description of scale	Psychometric properties	No. of studies	Associated with decrease in gestational age or PTB	Not associated with decrease in gestational age or PTB	Associated with decrease in birth weight or LBW	Not associated with decrease in birth weight or LBW
satisfaction, cohesion, and affectional expression	<ul style="list-style-type: none"> • Criterion-related validity- married couples had higher scores than divorced sample • Construct validity- correlation between Dyadic Adjustment Scale and Locke-Wallace Marital Adjustment Test for married (0.86) and divorced (0.88) couples²³⁵ 					
Family APGAR (Smilkstein, 1978) 5 items measure family function in terms of adaptability, partnership, growth, affection, and resolve	<p>In students and clinic patients:</p> <ul style="list-style-type: none"> • Internal consistency (0.80–0.86) • Test-retest reliability after 2 weeks (0.83) • Validity- students who were “maladjusted”, were adopted, or living separately from family had lower family APGAR scores • Psychiatric clinic patients had the lowest family APGAR scores, followed by college students, and family medicine clinic patients with the highest scores²³⁶ 	2		170	Low family functioning (p=0.001) ⁶⁹	170
Family Adaptability and Cohesion Evaluation Scales (FACES; Olson, 1978) 111 items measure cohesion, adaptability, and social desirability of the family unit. The extremes of cohesion are enmeshment and disengagement, and the extremes of adaptability are rigidity and chaos. There have been multiple revisions since the original version was developed.	<p>In families using the 1984 revised FACES scale:</p> <ul style="list-style-type: none"> • Internal consistency for cohesion (0.95), adaptability (0.92), social desirability (0.68) • FACES-R scores correlate with original FACES scores • Validity of FACES-R is equivocal given that FACES-R scores were not correlated among family members and therapist ratings of family's cohesion²³⁷ 	1			Enmeshed family (p<0.001) ⁵⁴	
Acculturation Rating Scale for Mexican Americans (ARMSA; Cuellar, 1980, revised in 1995) 30 items measure degree of adaptation by an immigrant group to their new country of residence. Includes Mexican Orientation Subscale (MOS) and Anglo Orientation Subscale (AOS) based	<p>In college students:</p> <ul style="list-style-type: none"> • Internal reliability for MOS (0.88) and AOS (0.83) • Split-half reliability for MOS (0.84) and AOS (0.77) • Test-retest reliability after 1 week for MOS (0.96) and AOS (0.94) 	3		31, 239	Revised version, higher score on Anglo orientation subscale, OR 1.28 (p<0.01) ²⁴⁰	31, 239

Name and description of scale	Psychometric properties	No. of studies	Associated with decrease in gestational age or PTB	Not associated with decrease in gestational age or PTB	Associated with decrease in birth weight or LBW	Not associated with decrease in birth weight or LBW
on measures of self-identity, ethnic identity or parents, and language	<ul style="list-style-type: none"> Validity- Scores on original scale and revised scale are highly correlated ($r=0.89$) AOS scores increase while MOS scores decrease with successive generations living in US²³⁸ 					
Bidimensional Acculturation Scale for Hispanics (Marin, 1996) 24 items with 3 subscales measuring language use, linguistic proficiency, and electronic media, 12 items each for Hispanic and non-Hispanic domains	<p>In adult Hispanics:</p> <ul style="list-style-type: none"> Internal consistency for Hispanic domain (0.90) and non-Hispanic domain (0.96) Validity- subscales were highly correlated with time in US, ethnic self-identification, and acculturation score with Short Acculturation Scale for Hispanics (SASH)²⁴¹ 	1	Higher English proficiency, OR 3.9 (1.4–10.9) ($p<0.01$) ²⁴²			
USDA Food Security Scale (USDA, 1995) 18 items measure severity of food insecurity/hunger experienced by a household in the last 12 months; results categorized into food secure, food insecure without hunger, food insecure with moderate hunger, and food insecure with severe hunger	<p>In national sample of households:</p> <ul style="list-style-type: none"> Internal consistency (0.74–0.93) Validity- household security scores correlate with poverty income ratios, weekly food expenditures, food sufficiency, and nutrient intake^{243, 244} 	1			OR 2.6 (1.7–3.5) ⁶⁶	
Family Resource Scale (FRS; Dunst, 1987) 30 items measure adequacy of resources in household, including food, shelter, financial resources, transportation, time with loved ones, and health care	<p>In mothers:</p> <ul style="list-style-type: none"> Internal consistency (0.92) Split-half reliability (0.95) Short-term stability after 2–3 months ($r=0.52$; $p<0.001$) Validity- total FRS scores correlate with measures of personal well-being and commitment to interactions with children²⁴⁵ 	1		153		