Predictors of distress and anxiety during pregnancy

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Abstract
Objective: There is a high incidence of distressing psychological symptoms including anxiety in pregnancy. Nevertheless, predictors of distress and anxiety during pregnancy have not been well characterized. We determined whether temperament and character, trait anxiety, resilience, and social support predicted distress and anxiety symptoms in pregnancy. **Method:** Pregnant women (n=105) with low risk singleton pregnancies were recruited from Midwife Obstetric Units. Assessments of distress (using the K-10) and anxiety (using the Spielberger State Inventory) were undertaken in trimester 2 and 3. Measures of temperament and character, trait anxiety, resilience and social support were undertaken at the same time points. Regression analyses were used to determine predictors of distress and anxiety at each trimester. **Results:** Predictors of distress and anxiety were lower self-directedness, higher harm avoidance, higher trait anxiety, lower resilience, and lower social support, at each time point. **Conclusion:** Understanding predictors of distress and anxiety in pregnancy may be useful in developing interventions for addressing such symptoms, as well as perhaps in preventing potential sequelae such as anxiety and mood disorders.

Keywords: Distress; Anxiety; Self-directedness; Harm avoidance; Resilience; Social support

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Introduction

There is a high incidence of distressing psychological symptoms including anxiety in pregnancy.[1] Developing countries such as South Africa have higher rates of anxiety in pregnancy compared to developed countries.[2] Similarly, higher rates of depression in pregnancy has been reported in developing countries and lower rates in developed countries.[3] This higher prevalence has been ascribed to adverse psychosocial and socio-demographic factors, including a lack of social support, high exposure to stressful life events, e.g. childhood trauma, poverty, and low socio-economic status.[2,3] Distress and anxiety during pregnancy may lead to negative adverse outcomes in offspring, including developmental, behavioural and neuropsychological disorders.[4,5]

Nevertheless, predictors of distress and anxiety during pregnancy have not been well characterized.[6] Such predictors might include particular temperament and character traits (e.g. harm avoidance), trait anxiety, degree of resilience, and degree of social support.[7-9] Personality factors including temperament and character are predictors of distress and anxiety outside of pregnancy.[7,10] Resilience is the ability to cope successfully with anxiety-provoking and stressful events[11] and so may also be a relevant predictor. Furthermore, lower social support has been associated with increased distress during pregnancy.[12]

The aim of this study was to determine whether temperament and character, trait anxiety, resilience, and social support predicted distress and anxiety symptoms during pregnancy.

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Methods

Participants and procedures

Pregnant women were randomly recruited from Midwife Obstetric Units in the East Metro region of the Western Cape (South Africa). Pregnant participants had to be 18 years of age or older; fluent in the Afrikaans and/or English language; in good health, i.e. not suffering from a serious medical condition; have a single pregnancy and normal ultrasound scan at their first screening session; and not have a history of significant adverse pregnancy-related conditions or terminations. Based on their medical and obstetrics records, the participants thus had a low risk for complications in pregnancy. The cut-off gestational age for inclusion in the study was 20 weeks, as women generally did not book their first clinic visit e.g. early during the first trimester, in this setting.

Pregnant women attended the sonar division (Tygerberg Hospital) at trimester 2 (22-23 weeks) and trimester 3 (32-33 weeks) of their pregnancy. During these visits, women were required to provide information on demographic factors such as income and employment, obstetric factors including parity and gravidity, and complete various self-report measures on distress and anxiety, and psychosocial factors. The Structural Clinical Interview for DSM-IV (SCID-I Patient Version)[13] was administered by a psychologist to identify the presence of any Axis I disorders[14] including current depressive and anxiety disorders.

Ethics

Women provided informed, written consent. This study was approved by the Health Research Committee of Stellenbosch University and was conducted according to the ethical guidelines of the international Declaration of Helsinki.

Measures of distress and anxiety

General Distress

General distress of participants was assessed using the K-10, a 10-item self-rated measure of general distress.[15] Items are scored on a scale from 1 to 5 (1, none of the time; 2, a little of the time; 3, some of the time; 4, most of the time; 5, all of the time). A maximum score on the K-10 of 50 indicates severe distress, whereas a minimum score of 10 indicates no distress. Women scoring under 20 are likely to experience ''normal'' or situational appropriate rates of distress and are generally well, while those scoring 20 to 24 may be more likely to have a mild mental disorder. A score of 25 to 29 may suggest presence of a moderate mental disorder, while a score of 30 may suggest the presence of a severe mental disorder. The K-10 has demonstrated good validity and reliability in assessing distress in the general population and in pregnancy.[16,17]

Spielberger State Inventory

The Spielberger State Inventory, a 20-item self-report questionnaire, was used to assess state anxiety.[18] State anxiety is the transitory or fluctuating condition of perceived tension associated with certain stimuli, i.e. current tension or apprehension.[19] Each item is scored on a scale from 1 to 4 (1, not at all; 2, somewhat; 3, moderately so; 4, very much so). Scores are reversed on anxiety-absent items. Scores can range from 20 to 80, with higher scores indicating higher levels of anxiety. The scale has demonstrated good validity and reliability in assessing anxiety in pregnancy.[20]

Psychosocial correlates

Temperament and Character Inventory

The self-report Temperament and Character Inventory (TCI) was used to measure behaviours associated with certain personality dimensions, including 'novelty seeking', 'harm avoidance', 'reward dependence' (temperament); and 'self-directedness', 'cooperativeness', and 'self-transcendence' (character).[21] Novelty seeking indicates the degree to which one is explorative, curious and enthusiastic about new or different things. Harm avoidance indicates the degree to which one is bold or careful to do things, and confident to interact with others. Reward dependence indicates the degree to which one is attentive of the feelings of others and dependent on others. Self-directedness indicates the degree to which one is mature and strong, responsible and reliable. Cooperativeness indicates the degree to which one is socially tolerant, empathic, and principled. Self-transcendence indicates the degree to which one is wise, imaginative and self-forgetful, and in touch with the universe. Each question is answered by selecting either 1 (true) or 0 (false); thus, higher scores on each of the subscales indicate increased endorsement of each of the personality traits. The TCI has demonstrated reliability and validity across cultures and versions.[22-24]

Spielberger Trait Inventory

The Spielberger Trait Inventory is a 20-item self-report questionnaire that was used to assess trait anxiety.[18] Trait anxiety is defined as a relatively stable personality characteristic of anxiety proneness or disposition.[19] Each item is scored on a scale from 1 to 4 (1, not at all; 2, somewhat; 3, moderately so; 4, very much so). Scores are reversed on anxiety-absent items. Scores can range from 20 to 80, with higher scores indicating higher levels of anxiety. The scale has demonstrated good validity and reliability in assessing anxiety in pregnancy.[20]

Connor-Davidson Resilience Scale

The ability of participants to cope successfully with stressful events was assessed using the Connor-Davidson Resilience Scale (CD-RISC).[11] The questionnaire consists of 25 items, which are rated based on feelings during the past month, as 0 to 4 (0, not true at all; 1, rarely true; 2, sometimes true; 3, often true; 4, true nearly all of the time). The total score ranges from 0 to 100, with higher scores indicating greater resilience. The scale has demonstrated good validity and reliability in clinical samples and the general population.[11]

Multi-dimensional Scale of Perceived Social Support

Social support, which may influence coping in reaction to stressful events[25], was assessed using the Multidimensional Scale of Perceived Social Support (MSPSS). The MSPSS is a measure of perceived social support from family, friends and significant others[26] and consists of 12 items, which is scored on a scale from 1 to 7 (1, very strongly disagree; 2, strongly disagree; 3, mildly disagree; 4, neutral; 5, mildly agree; 6, strongly agree; 7, very strongly agree). The scale has proven reliability and validity to assess social support in pregnancy.[26]

Statistical analyses

Data was analysed using Statistica (Statsoft Inc.). To investigate distress and anxiety, and associations with demographic, obstetric and psychosocial variables, one-way and repeated measures ANOVA and Spearman correlational analyses were used at trimester 2 and 3. Regression models controlling for age, parity and gravidity were used to determine predictors of distress and anxiety. Regression analyses also controlled for diagnoses of current major depressive episode (MDE) (12%) and anxiety disorders (6%).

Results

Participants

A sample of 110 pregnant women was included in the study. Five (n=5) data sets were excluded due to current methamphetamine use (n=1), erroneous data and incomplete visits (n=4). Of the final sample (n=105) the majority of women were of mixed race (89%), had a mean age of 25 years, and mean education at the high school equivalent of grade 11 (Table I).

Table I: Demographic information of participants	
Age (years, SD)	25.39 (5.38)
Education (years, SD)	10.90 (1.54)
Ethnicity (%)	
Mixed race	88.6
Black	2.9
Caucasian	3.8
Employed (%)	57.1
Annual household income (ZAR; %)*	
< 10 000	39.1
10 000 – 20 000	18.1
20 000 – 40 000	18.1
40 000 – 60 000	10.5
60 000 – 100 000	9.5
> 100 000	
Marital status (%)	
Single	41.0
Married	36.2
Living with partner	17.1
Divorced	2.9
Separated	1.0
Widowed	1.9
Parity (%)	
0 children	48.6
1 child	34.3
>1 child	17.1
Gravidity (%)	
1st pregnancy	39.0
2nd pregnancy	37.1
>2 pregnancies	23.9

SD, standard deviation; ZAR, South African Rand
*Income was unknown in some instances

Distress and anxiety

General distress and state anxiety scores were similar over time. Participants had mean (SD) K-10 scores of 22.32 (7.57) and 22.61 (7.56) at trimester 2 and 3, respectively. Participants had mean (SD) state anxiety scores of 42.10 (12.87) and 40.14 (11.52) at trimester 2 and 3, respectively. Distress and state anxiety scores were significantly associated with each other ($p<0.001$). K-10 scores correlated significantly with state anxiety at trimester 2 ($r=0.58$) and trimester 3 ($r=0.70$). Education, work status, level of income, and marital status did not have significant associations with distress and anxiety.

Psychosocial predictors

Temperament and character

TCI dimensions contributed significantly to explaining variance in distress (K-10) at trimester 2 [$R^2=0.41$; $F(10,82)=5.62$, $p<0.001$] and trimester 3 [$R^2=0.42$; $F(10,82)=5.87$, $p<0.001$]. Specifically, lower self-directedness and higher self-transcendence were significant predictors of increased distress (Table 2). The TCI also contributed significantly in explaining variance in state anxiety at trimester 2 [$R^2=0.33$; $F(10,82)=4.03$, $p<0.001$] and trimester 3 [$R^2=0.33$; $F(10,82)=4.09$, $p<0.01$]. Specifically, higher harm-avoidance and lower cooperativeness were significant predictors of increased state anxiety (Table 2).

Trait anxiety

Higher trait anxiety contributed significantly to explaining variance in distress i.e. increased levels at trimester 2 [$R^2=0.48$; $F(4,88)=20.67$, $p<0.001$] and trimester 3 [$R^2=0.33$; $F(4,89)=11.06$, $p<0.001$] (Table 2). Higher trait anxiety also contributed significantly to explaining variance in state anxiety i.e. increased levels at trimester 2 [$R^2=0.65$; $F(4,89)=41.77$, $p<0.001$] and trimester 3 [$R^2=0.34$; $F(4,90)=11.60$, $p<0.001$].

Resilience

Lower resilience contributed significantly to explaining variance in distress i.e. increased levels at trimester 2 [$R^2=0.25$; $F(4,96)=8.05$, $p<0.001$] and trimester 3 [$R^2=0.19$; $F(4,96)=5.50$,

Table II: Predictors of distress and anxiety during pregnancy. Significant associations are displayed in bold face.

	K-10								*State anxiety*							
	Trimester 2				*Trimester 3*				*Trimester 2*				*Trimester 3*			
	b	*SE*	*r*	*p*	*b*	*SE*	*r*	*p*	*b*	*SE*	*r*	*p*	*b*	*SE*	*r*	*p*
Temperament and character																
Novelty seeking	-0.06	0.10	-0.06	0.577	0.01	0.10	0.01	0.940	0.04	0.10	0.05	0.671	0.04	0.11	0.04	0.710
Harm avoidance	0.17	0.12	0.16	0.156	0.05	0.12	0.10	0.649	0.36	0.12	0.32	0.004	0.29	0.13	0.24	0.026
Reward dependence	-0.10	0.10	-0.12	0.289	-0.03	0.09	-0.03	0.790	-0.00	0.10	-0.00	0.990	0.06	0.10	0.06	0.559
Self-directedness	-0.45	0.14	-0.34	0.001	-0.45	0.13	-0.35	0.001	-0.10	0.14	-0.08	0.474	-0.21	0.14	-0.16	0.153
Cooperativeness	-0.03	0.11	-0.03	0.790	-0.05	0.11	-0.05	0.668	-0.23	0.11	-0.23	0.039	-0.07	0.12	-0.07	0.540
Self-transcendence	0.15	0.10	0.17	0.128	0.25	0.10	0.26	0.014	0.11	0.10	0.12	0.288	0.20	0.11	0.20	0.064
Trait anxiety	0.68	0.08	0.68	0.000	0.47	0.09	0.49	0.000	0.80	0.06	0.80	0.000	0.53	0.09	0.54	0.000
Resilience	-0.45	0.09	-0.46	0.000	-0.28	0.09	-0.29	0.004	-0.59	0.08	-0.58	0.000	-0.32	0.09	-0.33	0.001
Perceived social support	-0.44	0.10	-0.44	0.000	-0.23	0.10	-0.24	0.021	-0.38	0.10	-0.37	0.001	-0.28	0.10	-0.29	0.006

b, beta; SE, standard error of the mean; r, partial correlation; p, significance level

p<0.001] (Table 2). Lower resilience also contributed significantly to explaining variance in state anxiety i.e. increased levels at trimester 2 [R^2=0.35; F(4,99)=13.59, p<0.001] and trimester 3 [R^2=0.16; F(4,99)=4.61, p<0.01].

Perceived social support

Lower perceived social support contributed significantly to explaining variance in distress i.e. increased levels at trimester 2 [R^2=0.24; F(4,89)=7.21, p<0.001] and trimester 3 [R^2=0.21; F(4,89)=5.78, p<0.001] (Table 2). Lower social support also contributed significantly to explaining variance in state anxiety i.e. increased levels at trimester 2 [R^2=0.16; F(4,89)=4.36, p<0.01] and trimester 3 [R^2=0.16; F(4,89)=4.03, p<0.01].

Relationship between temperament, character, trait anxiety and resilience

There were significant correlations of harm avoidance, self-directedness and cooperativeness with trait anxiety and resilience (Table 3). There was also a significant negative correlation between trait anxiety and resilience (r= -0.56, p<0.001).

Discussion

This study investigated predictors of distress and anxiety during pregnancy. Predictors of distress and anxiety were lower self-directedness and higher harm avoidance, higher trait anxiety, lower resilience, and lower social support, at trimester 2 and 3 of pregnancy.

Distress was measured in this study using the K-10. The K-10 has been shown to be a valid diagnostic screen for depressive and anxiety disorders.[27] Our own data in this cohort confirm this view.[17]

Lower self-directedness and higher self-transcendence were significantly associated with distress. Studies have previously found significant associations between lower self-directedness and depressive symptoms in pregnancy[28] and non-pregnancy.[29] There is also some indication that higher self-transcendence is significantly associated with depressive symptoms in general.[29]

Higher harm avoidance and lower cooperativeness were also significant predictors of anxiety during pregnancy. Studies have suggested that pregnant women display avoidance behaviour as a way to cope with anxiety-provoking situations in pregnancy.[7] Women may instinctively increase avoidance behaviours to protect their pregnancy, and this may be associated with increased anxiety levels. Speculatively, avoidance behaviour may be associated with lower cooperativeness to strangers.

Trait anxiety was also significantly associated with distress and anxiety symptoms in pregnancy. Furthermore, trait anxiety was itself significantly associated with lower self-directedness, higher harm avoidance and lower cooperativeness. A cross-sectional analysis is unable to delineate fully the complex causal relationships between these different constructs, and related ones such as depression.

Lower resilience was a significant predictor of distress and anxiety, and also significantly associated with lower self-directedness, higher harm avoidance and higher trait anxiety. The predictive value of resilience and trait anxiety with distress and anxiety was notable, especially at trimester 2. Resilience provides an indication of the ability to cope with stressful situations[11] including homeostatic disturbances[30] such as the psychobiological changes associated with pregnancy.[31]

Finally, lower perceived social support was significantly associated with distress and anxiety at trimester 2 and 3. Level of social support has previously been found to be a predictor of anxiety during pregnancy.[12] Studies have shown an association of inadequate social support with higher psychological distress[32,33], perhaps mediated by excessive focus on negative circumstances, and/or suppression of emotions as a result.[34] Both these strategies are associated with increased vulnerability to develop depressive and anxiety symptoms.

This study had a number of limitations. The sample consisted essentially of individuals from one ethnic group and of a lower socio-economic status. Use of self-report scales may introduce a

Table III: Associations between temperament, character, trait anxiety and resilience

		NS	*HA*	*RD*	*SD*	*C*	*ST*	*TA*	*R*
	Mean (SD)				*r*				
Novelty seeking (NS)	18.34 (4.33)	-							
Harm avoidance (HA)	17.34 (6.79)	0.08	-						
Reward dependence (RD)	20.22 (4.40)	0.06	-0.23	-					
Self-directedness (SD)	27.15 (7.29)	-0.45**	-0.55**	0.18	-				
Cooperativeness (C)	28.46 (4.95)	-0.21	-0.31*	0.32*	0.54**	-			
Self-transcendence (ST)	19.45 (5.63)	0.13	-0.30*	0.09	-0.04	-0.02	-		
Trait anxiety (TA)	43.22 (11.26)	0.23	0.49**	-0.14	-0.56**	-0.45**	0.18	-	
Resilience (R)	69.43 (16.44)	-0.12	-0.57**	0.17	0.51**	0.33	0.14	-0.56**	-

SD, standard deviation ; r, correlation
*p<0.05; **p<0.001

number of biases e.g. women reporting what they perceive as expected.

Conclusion

This study adds to previous work on pregnancy by identifying psychosocial predictors of distress and anxiety in a resource-poor setting. Understanding predictors of distress and anxiety in pregnancy may be useful in developing interventions for addressing such symptoms, as well as perhaps in preventing potential sequelae such as anxiety and mood disorders. Further work on the causal nature of the associations documented here is needed, as well as on the relevance of other key variables such as exposure to early adversity and stressful life events. Women's perceptions of their previous experience of pregnancy are also a potential area for future investigation.

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