

With the Compliments of Springer Publishing Company, LLC

JNM

Journal of Nursing Measurement

SPRINGER  PUBLISHING COMPANY

www.springerpub.com/jnm

Development and Psychometric Testing of the Rural Pregnancy Experience Scale (RPES)

Jude Kornelsen

Kathrin Stoll

Stefan Grzybowski

University of British Columbia

Rural pregnant woman who lack local access to maternity care due to their remote living circumstances may experience stress and anxiety related to pregnancy and parturition. The Rural Pregnancy Experience Scale (RPES) was designed to assess the unique worry and concerns reflective of the stress and anxiety of rural pregnant women related to pregnancy and parturition. The items of the scale were designed based on the results of a qualitative study of the experiences of pregnant rural women, thereby building a priori content validity into the measure. The relevancy content validity index (CVI) for this instrument was 1.0 and the clarity CVI was .91, as rated by maternity care specialists. A field test of the RPES with 187 pregnant rural women from British Columbia indicated that it had two factors: financial worries and worries/concerns about maternity care services, which were consistent with the conceptual base of the tool. Cronbach's alpha for the total RPES was .91; for the financial worries subscale and the worries/concerns about maternity care services subscale, alpha were .89 and .88, respectively. Construct validity was supported by significant correlations between the total scores of the RPES and the Depression Anxiety Stress Scales (DASS [$r = .39, p < .01$]), and subscale scores on the RPES were significantly correlated and converged with the depression, anxiety, and stress subscales of the DASS supporting convergent validity (correlations ranged between .20; $p < .05$ and .43; $p < .01$). Construct validity was also supported by findings that the level of access and availability of maternity care services were significantly associated with RPES scores. It was concluded that the RPES is a reliable and valid measure of worries and concerns reflective of rural pregnant women's stress and anxiety related to pregnancy and parturition.

Keywords: anxiety; maternity care; parturition; pregnancy; rural women; stress

The majority of childbearing women reside in urban or suburban centers with easy access to maternity services. Maternity care options in rural or remote areas are more restricted because of a shortage of maternity care providers who are easily accessible. Although attempts have been made to develop models of care that address the shortage of rural maternity services, rural parturient women are increasingly required to seek obstetric services in referral centers or more in urban settings (Chamberlain & Barclay, 2000; Hutten-Czapski, 1999; Jasen, 1997; Kornelsen & Grzybowski, 2005c; Rourke, 1998). This is part of a general trend toward the centralization of care (Collier, 2010).

Pregnant and parturient women who reside in rural areas may be required to leave home prior to the onset of labor, whereas some can remain in their home communities until the onset of labor if there is a referral hospital within an hour driving time. Women from rural areas who deliver outside of their home communities are likely to be subjected to circumstances that result in worry and concerns reflective of the stress and anxiety that are unique to this situation. The phenomenon of worry and associated stress and anxiety of a rural birth, particularly in those who reside in remote settings, has not been assessed quantitatively. Qualitative work with rural parturient women in British Columbia (Kornelsen & Grzybowski, 2005c) provides a strong rationale for studying emotional aspects of rural birth quantitatively. This article presents the development and psychometric evaluation of a scale that was developed based on this qualitative work, which bridges that gap—the Rural Pregnancy Experience Scale (RPES).

There are several instruments that quantify stress and anxiety during pregnancy. These scales typically measure stressful external events, physical sources of distress related to pregnancy (Omer, Elizur, Barnea, Friedlander & Palti, 1986) and/or internal events (thoughts and feelings) that may result in increased stress or anxiety (Arizmendi & Affonso, 1987). For instance, Berkowitz and Kasl (1983) measured stressful life events during the prenatal period (e.g., trouble at work, death of a close family member, interpersonal and financial problems). DiPietro, Christensen, and Costigan (2008) developed a 20-item pregnancy experience scale that includes both uplifts (e.g., feeling happy, positive, or uplifted about being pregnant) and daily hassles (e.g., feeling unhappy, negative, or upset about your weight). Other measures assess more pregnancy specific stressors such as bodily changes during pregnancy and concerns over the health and well-being of the unborn child (Arizmendi & Affonso, 1987; Yali & Lobel, 1999) or anxiety related to being pregnant, giving birth, and being hospitalized (Levin, 1991). However, none of these instruments focus on measuring the factors that worry rural pregnant women, which reflect the stress and anxiety of pregnancy and parturition in a rural or remote setting.

Heterogeneity among different populations makes it difficult to generalize findings from prenatal stress studies. For this reason, it is important to design stress and anxiety focused scales that take into consideration the geographic, racial, cultural, social, and economic context of each country and specific group (Torres-Arreola, Constantino-Casas, Flores-Hernández, Villa-Barragán & Rendón-Macías, 2005). Although several scales have been validated to quantify psychological states during pregnancy (Levin, 1991; Goldenberg et al., 1997), prenatal stress in particular (Arizmendi & Affonso, 1987; DiPietro, 2008; Huizink et al., 2002; Levin, 1991; Yali & Lobel, 1999), and include items that are relevant to rural parturient women, none assess the worry reflective of the stress or anxiety associated with rural birth. That is, these scales do not address the issues particularly relevant to rural parturient women who have to relocate to give birth such as separation from family and community and financial concerns (Kornelsen & Grzybowski, 2005c).

BACKGROUND AND CONCEPTUAL FRAMEWORK

The rural pregnancy experience has unique characteristics that can result in worry, stress, and anxiety unique to rural settings. Within the context of the rural pregnancy experience, stress is a state of mental or emotional strain or tension resulting from adverse or very demanding circumstances. Worry is a characteristic behavior reflective of stress and anxiety.

The psychosocial impact of rural pregnancy and parturition arise from several factors. Rural women who deliver outside of their home communities are more isolated from health care services and are confronted with various factors that may elicit worry, stress, and anxiety. Isolation from family members and a more familiar environment and reduced continuity of care can be distressing. In addition, pregnant and parturient women in rural areas may experience financial strain because they are expected to pay out of pocket for travel and accommodation, costs associated with rural birth. For example, in British Columbia where close to 15% of the population resides in rural areas of the province (BC Statistics, 2006a), rural parturient women are increasingly evacuated from their home communities to access obstetric services in referral centers (Chamberlain & Barclay, 2000; Hutten-Czapski, 1999; Jasen, 1997; Kornelsen & Grzybowski, 2005c; Rourke, 1998). In some communities, women who travel away from home are eligible to get some expenses reimbursed, but this is not always the case. Recent qualitative research suggested that rural parturient women from remote communities without local maternity services experience high degrees of stress and anxiety because of actual or potential evacuation from their community for labor and delivery (Chamberlain & Barclay, 2000; Jasen, 1997; Kornelsen & Grzybowski, 2005a, 2005b, 2005c). As a woman becomes more remote from available maternity care services, the more likely she is to be confronted with circumstances that increase worry and concerns reflective of the stress and anxiety of a rural birth.

Worry and concerns of parturient women often result in stress and anxiety. Women who experience stress and anxiety during pregnancy are at increased risk for poor neonatal outcomes, such as preterm birth and low birth weight (Heaman, Blanchard, Gupton, Moffatt, & Currie, 2005; Mackey, Williams, & Tiller, 2000; Norbeck & Tilden, 1983; Nordentoft et al., 1996; Paarlberg, Vingerhoets, Passchier, Dekker, Van Geijn, 1995; Rondó et al., 2003; Sable & Wilkinson, 2000; Wadhwa, Sandman, Porto, Dunkel-Schetter, & Garite, 1993), spontaneous abortion, and congenital anomalies (Mulder et al., 2002). The suspected etiology for the link between stress and adverse neonatal outcomes is stress-induced hormonal changes in parturient women, which effect fetal development (Gitau, Cameron, Fisk, Glover, 1998; Ruiz, Fullerton, Dudley, 2003; Wadhwa, Dunkel-Schetter, Chicz-DeMet, Porto, & Sandman, 1996).

Qualitative research with rural parturient women in British Columbia (Kornelsen & Grzybowski, 2005a, 2005b, 2005c) provides a strong rationale for studying psychosocial aspects of rural birth quantitatively. Measuring prenatal worry and concerns that can lead to stress and anxiety can help determine what psychosocial support and interventions pregnant women need to ameliorate negative psychological states. This is significant for public health and labor and delivery nurses who work with women in the perinatal period because it provides insight into both social and clinical challenges rural parturient women face.

PROCEDURES FOR DEVELOPMENT OF THE RURAL PREGNANCY EXPERIENCE SCALE

The purpose of the RPES is to measure the psychological worry that can lead to stress and anxiety in rural women as they await the birth of their child. Worry is reflected in the concerns that rural women have related to their pregnancy experience. This conceptualization has structured the RPES to explore issues that rural women have identified as worrisome and distressing.

The item development and selection process for the RPES was implemented to build a priori and posteriori content validity into the tool. An initial pool of 21 scale items was generated based on results from in-depth qualitative interviews and focus groups with 76 women in 11 rural communities in British Columbia (Kornelsen & Grzybowski, 2005c), thereby facilitating a priori content validity. Scale items were based on extensive qualitative interviews and focus groups undertaken with rural women in British Columbia. These findings revealed themes of both stress (a state of mental or emotional strain or tension resulting from adverse or very demanding circumstances) and associated anxiety (a normal reaction to stress) in response to traveling to access maternity care (Kornelsen & Grzybowski, 2005b, 2005c). Underlying responses were women's reports that they felt worried about their travel situation. The term *worried* reflects both stress and anxiety. Thematic analysis of interview transcripts revealed that pregnant rural women were most concerned about access to and continuity of maternity care, availability of financial resources, psychosocial support during pregnancy and childbirth, and actualizing their vision of birth. These events led to participant descriptions of both stress and associated anxiety. The scale items were constructed in response to the thematic analysis of the qualitative data to measure the extent of the stress and associated anxiety experienced by respondents.

The initial pool of items was organized into four subcategories, according to the qualitative themes, and was sent to 14 experts in rural maternity care. The panel was selected based on achieving a balance of diverse professional orientation and in-depth clinical knowledge of maternity care and rural environments. Having initial items reviewed by a panel of experts contributed to the posteriori content validity of the scale because experts confirmed or invalidated whether or not individual items measure the phenomenon under study. In addition, the expert panel commented on the relevance and clarity of each item and suggested new items that are pertinent to the construct being measured but were not included in the initial pool of items (DeVellis, 1991).

Eight of the 14 experts participated in the review of initial items, including a maternity care policy maker, rural maternity care providers (physician, obstetrician, and midwife), and other experts in maternity care. The expert panel was asked to rate each item based on its clarity and relevancy to what the instrument is measuring. Relevancy and clarity were rated separately for each item on a three point scale (a) not relevant/not clear, (b) relevant/clear but needs minor revision, and (c) very relevant and succinct/very clear. Based on their responses, a content validity index was calculated for each item (I-CVI) and for the scale (S-CVI). The I-CVI was calculated to determine whether each item was sufficiently relevant and clear. CVI was calculated by dividing the number of times an item was rated 2 or 3 by the total number of experts who rated the item. All items were included in the scale because they received a CVI greater than .80. The relevancy S-CVI for this instrument was 1.0 and the clarity S-CVI was .91. The baseline criterion for instrument validation is an S-CVI score of 0.90 (Grant & Davis, 1997; Lynn, 1986; Polit & Beck, 2004).

Comments and suggestions that were made by the experts were carefully reviewed by the study team. Based on their feedback, some items were reworded and two new items were added, resulting in a 23-item scale. The scale items had the following response options: (1) Strongly Disagree, (2) Disagree, (3) Neutral, (4) Agree, and (5) Strongly Agree. Higher scores on the RPES scale indicate higher levels of stress and anxiety during pregnancy. Items 11, 14, 16, 19, 22, and 23 were reverse scored. Respondents were prompted to describe their experiences with and feelings about the current pregnancy over the past week and circle the number that best fit with their response to scale items.

METHODS

Sample Characteristics

The sample included 187 parturient women. The average age of respondents was 29 years ($SD = 5.6$) with a mean gestational age of 30.4 weeks (range 19–39). Over half of the women (54%) were pregnant with their first child when participating in the study. See Table 1 for additional sample characteristics.

Procedures

Approval to conduct the study was obtained from the Behavioral Research Ethics Board of the University of British Columbia, Vancouver, Canada. Distribution of surveys to women in rural communities was achieved via a total of 66 “third party” distributors in 52 communities over the course of 13 months. These individuals included health care providers (physicians, midwives, nurses, and specialists), allied health professionals (public and community health nurses), and community-based maternity care advocates (prenatal course instructors, doulas, and pregnancy outreach program workers). Eligibility criteria

TABLE 1 Characteristics of Sample ($N = 187$)

Sample Characteristics	Percent
Ethnicity	
White	79.9
Aboriginal	14.5
Other	1.6
Missing	4.0
Relationship status	
Single	10.2
Married	60.2
Common law	25.3
Divorced or separated	4.3
Education	
Did not complete high school	11.4
Completed high school	14.1
Postsecondary certificate	26.6
Completed some postsecondary education	17.9
Completed university degree	30.0
Family Income	
\$0–24,999	32.6
\$25,000–54,999	22.1
\$50,000–99,999	28.3
> \$100,000	17.0

for the sample population included English language proficiency, rural residency, and second or third trimester pregnancy. Rural residence was broadly defined as living in towns and municipalities including referral centers outside of the core provincial urban areas of Vancouver—lower mainland and Victoria—Southern Vancouver Island (Grzybowski, Schuurman, & Kornelsen, 2009).

A total of 890 copies of the survey were distributed to women in communities ranging from no local maternity services to communities with specialist services. Surveys were sent to care providers in rural communities with different levels of obstetric service provision to ensure representation of both women birthing in their home community or away. This sampling strategy ensured representation of women who resided in communities with different levels of obstetric services. Of the 890 copies that were distributed, 187 were completed (response rate = 21%). The women were asked to complete the survey and were supplied with a stamped envelope, allowing them to mail the completed survey to researchers without incurring any cost to participants. The respondents were asked to complete the RPES along with the Depression Anxiety Stress Scales (DASS), and questions about their place of residence, age, gestational age, ethnicity, relationship status, educational achievements, income, and obstetric history.

Depression Anxiety Stress Scales

The DASS (Lovibond & Lovibond, 1995) was used for the purpose of assessing concurrent construct validity using convergent validity with the RPES. This scale was chosen because it was validated with nonclinical samples and would, thus, be a suitable instrument to assess stress, anxiety, and depression in parturient women.

The DASS is a 42-item scale with three subscales (i.e., the depression, anxiety, and stress subscales). It has demonstrated convergent validity with similar measures (e.g., Beck Depression and Anxiety Inventories), and it has excellent Cronbach's alpha (0.91 for the depression, 0.84 for the anxiety, and 0.90 for the stress subscales) when administered to a large nonclinical sample ($N = 2,914$; Lovibond & Lovibond, 1995). The psychometric properties of the DASS have been examined in another large nonclinical sample ($N = 1771$) in the United Kingdom, again with excellent inter-item correlations (.90 for the anxiety scale, .95 for the depression scale, .93 for the stress scale, and .97 for the total score). Factor analysis confirmed the three factor structure of the DASS (Crawford & Henry, 2003).

Approaches to Psychometric Analyses

Reliability Assessment. Internal consistency analysis (Cronbach's alpha) was conducted to assess the reliability of the RPES. Item-to-total correlations were calculated to determine each item's relevance to the domain and internal consistency. Alpha-if-item deleted was used to determine the degree that each item contributed to the scale's reliability.

Factor Analysis. The construct validity of the RPES was assessed by determining the number of latent constructs the RPES scale items measured and their consistency with the conceptual base of the tool. First, principal components analysis was conducted. Cattell's scree plot was examined to determine the optimum number of factors as indicated by the graphic representation of eigenvalues comprising the steep section of the plot. Finally, a principal factor analysis with varimax rotation (and Kaiser normalization) was performed. Items that loaded above 0.5 on the same factor were examined for shared conceptual meaning and consistency with the conceptual base of the RPES.

Convergent Validity. To assess convergent validity of the RPES with the DASS (Lovibond & Lovibond, 1995), Pearson correlation coefficients were computed.

Construct Validity Assessment Using Hypothesis Testing. Given the focus of the RPES, it can reasonably be postulated that the accessibility of maternity care services would be associated with the amount of worry experienced by a woman with a rural pregnancy and birth. Therefore, a score of 60 on the revised 20-item RPES would indicate an overall neutral attitude toward scale items (number of scale items multiplied by neutral response option 3). A score of 60 or higher was chosen to indicate clinically significant worry indicative of stress and anxiety among the study population related to a rural pregnancy and birth. Therefore, the level of maternity services available should be associated with RPES scores, and rural women with less access to care and specialist care would be expected to have higher RPES scores. Support for this hypothesis would provide construct validity evidence for the RPES. This was tested using Pearson's Chi-square analysis to compare the frequency of scores above 60 in three groups of rural women: (a) those with low access (no maternity services within 1 hour), (b) those with moderate access (local services provided by family physician or general surgeon), and (c) those with good access (a local maternity specialist available).

RESULTS

Construct Validation Using Factor Analysis

A minimum sample size of 100 to 200 is needed for factor analysis (Guadagnoli & Velicer, 1988); therefore, our sample of 187 was theoretically of adequate size. Principal components analysis was conducted and Cattell's (1966) guidelines for retaining factors above the elbow of the scree plot indicated that two factors explained most of the variance in the 23 items of the RPES scale (Factor 1 eigenvalue = 8.65; Factor 2 eigenvalue = 2.76). Next, a varimax rotation was performed, requesting a 2-factor solution. Factor loadings for the 23 items are displayed in Table 2. Factor loadings > 0.5 were required for inclusion in the final scale (DeVellis, 1991). Factor 1 contained 9 items, and factor 2 included 11 items. Three items loaded < 0.5 and were deleted from the scale. Examination of the two factors indicated that the first factor measured financial worries associated with a rural pregnancy and birth; and, the second factor addressed worries related to maternity care services with a rural pregnancy and birth (continuity of care associated with rural birth, labor support, and access to appropriate maternity services).

Reliability Assessment of the Revised 20-Item Scale

Cronbach's alpha for the full 20-item scale (0.91) and two subscales (0.89, 0.88) were excellent. The item-to-total correlations ranged between .39 and .71, indicating that each item was a measure of the domain and contributed to the internal consistency of the scale. None of the individual items would have improved the scale alpha if deleted.

Convergent Validity

The Pearson's correlation statistics indicating the correlations between the total RPES and DASS with each other and with each of their subscales are presented in Table 3. Note that all scales and subscales are significantly correlated with each other as expected.

TABLE 2. RPES Scale Items With Factor Loadings, Item-to-Total Correlations, and Alpha-if-Item Deleted, Categorized by Subscales (α for Full Scale = 0.91)

	Factor 1 Loadings Eigenvalue: 8.65	Factor 2 Loadings Eigenvalue: 2.76	Corrected Item-to-Total Correlations	Alpha- if-Item Were Deleted
Subscale 1—Financial Worries ($n = 9$)				$\alpha = 0.89$
1 I am worried that I won't have enough money to access prenatal care.	0.81	-0.04	0.49	0.91
2 I am worried that I won't have enough money to cover travel costs associated with pregnancy (e.g., to travel to prenatal appointments and tests).	0.86	0.18	0.69	0.91
3 I am worried that I won't have enough money to cover travel costs associated with labor and birth.	0.84	0.22	0.70	0.91
4 I am worried that I won't have enough money to cover accommodation costs immediately before and after labor and birth.	0.81	0.17	0.64	0.91
5 I am worried that I won't have enough money to cover other expenses (such as childcare) at the time of birth.	0.85	0.15	0.65	0.91
6 I am worried about loss of family income due to pregnancy and birth.	0.52	0.08	0.39	0.92
7 I have missed prenatal tests because I (my family) was unable to pay for them.	0.58	0.21	0.48	0.91
8 I am worried about how I am going to get home after I give birth.	0.65	0.29	0.60	0.91
9 It will be difficult for me to make arrangements (e.g., for childcare, eldercare, house sitting, pet sitting) during labor and birth.	0.54	0.45	0.64	0.91

(Continued)

TABLE 2. (Continued)

	Factor 1 Loadings Eigenvalue: 8.65	Factor 2 Loadings Eigenvalue: 2.76	Corrected Item-to-Total Correlations	Alpha- if-Item Were Deleted
Subscale 2—Worries/ concerns about maternity care services (continuity of care and labor support and access to appropriate maternity services; $n = 11$).				$\alpha = 0.88$
10 I am concerned that I could deliver with a caregiver who does not know/understand what I want for my labor and birth.	0.19	0.67	0.54	0.91
11 I am satisfied with the level of continuity of care I receive. ^a	0.12	0.76	0.54	0.91
12 I am worried that my needs won't be met during my pregnancy.	0.35	0.69	0.68	0.91
13 I am worried that my needs won't be met during my labor and birth.	0.20	0.76	0.62	0.91
14 I am confident that I will have access to specialist services (cesarean section) in a timely manner in the event of an emergency during labor or birth. ^a	0.06	0.53	0.40	0.91
15 I am concerned about whether my maternity care provider will be able to manage possible complications during pregnancy and birth.	-0.03	0.72	0.43	0.91
16 I feel satisfied with the prenatal care I am receiving. ^a	0.05	0.66	0.43	0.91
17 I am worried that my loved ones won't be present to support me during my labor and birth.	0.47	0.52	0.66	0.91
18 I am concerned that I may be separated from my family during pregnancy and/or labor and birth.	0.43	0.61	0.71	0.91

(Continued)

TABLE 2. (Continued)

	Factor 1 Loadings Eigenvalue: 8.65	Factor 2 Loadings Eigenvalue: 2.76	Corrected Item-to-Total Correlations	Alpha- if-Item Were Deleted
19 I am confident that I will have the kind of birth that I envision for myself and my baby. ^a	0.29	0.60	0.59	0.91
20 I am worried that I may need to get transferred (to a different community) during labor. Items that cross-loaded and were discounted ($n = 3$)	0.18	0.58	0.50	0.91
21 I have missed (a) prenatal test(s) because of difficulties with travel.	0.46	0.30	NA	NA
22 I have a social support system in my local community that I can rely on in case of an emergency. ^a	0.21	0.46	NA	NA
23 I know what resources are available to me in the community where I am planning to give birth. ^a	0.31	0.36	NA	NA

Note. Items 21, 22, and 23 were deleted from the final scale due to low factor loadings.

^aThese items were reverse scored.

TABLE 3. Convergent Validity of Rural Pregnancy Experience Scale (RPES) With the Depression Anxiety Stress Scales (DASS)

	RPES Total	RPES Subscale 1 Financial Worries	RPES Subscale 2 Worries/ Concerns About Maternity Care Services
DASS total	0.39**	0.43**	0.25**
DASS depression	0.37**	0.42**	0.21*
DASS anxiety	0.38**	0.39**	0.28**
DASS Stress	0.32**	0.35**	0.20**

Note. Data based on final 20-item RPES.

* $p < 0.05$. ** $p < 0.01$.

TABLE 4. Rural Pregnancy Experience Scale (RPES) Scores Across Obstetric Service Levels

Maternity Service Level	Definition of Service Level	Subsample <i>N</i>	RPES Full Scale Mean, Range, <i>SD</i>	% of Women With RPES Scores > 60
1. No local services	No maternity services within 1 hour	40	52.78, 26–82, 16.03	35.9
2. Local services (Generalist)	Local maternity services provided by family physician or GP surgeon	71	50.30, 28–80, 10.52	12.7
3. Local services (Specialist)	Local maternity services provided by at least one specialist	75	44.02, 26–71, 9.90	8.0

Note. One respondent did not disclose her home community. Data based on final 20-item RPES. Pearson's Chi-square = 15.890; *df* = 2; *p* < 0.001.

Construct Validity Assessment via Hypothesis Testing

The mean RPES score for the sample was 48.17 (*SD* = 12.21; range: 26–82). Therefore, as a group, women in our study showed little worry associated with a rural pregnancy and birth. As can be seen in Table 4, a higher percentage of women with no maternity services within 1 hour scored 60 or above on the RPES followed by those with local services provided by a family physician or general surgeon, and then by those with a local maternity specialist available. This supports the hypothesis that women with less access to maternity care services would score higher on the RPES.

DISCUSSION

The RPES was designed using data generated from qualitative research on the psychosocial and emotional impact of rural pregnancy and parturition, which built a priori content validity into the tool. Results of the content validity assessment of the RPES items by experts in maternity care also provide sound evidence of its posteriori content validity. The results of the factor analysis of the RPES indicated that it is composed of two subdomains or subscales that reflect the factors that worry rural pregnant women, which result in stress and anxiety—(a) financial worries, and (b) worries/concerns about maternity care services. This psychometric study also showed high Cronbach's alpha for the full RPES scale and its two subscales as well as good convergent validity of the RPES with a similar measure, the DASS. Not only were there significant positive correlations with the total DASS scores, but total and subscale scores on the RPES were significantly correlated and converged with the depression, anxiety, and stress subscale scores supporting concurrent validity. It appears that the RPES scale is more strongly associated with anxiety than stress, a finding

that is to be expected considering that RPES items measured “worries” associated with rural birth. The RPES was significantly associated with another dimension of negative affect that we did not anticipate (i.e., depression). This is surprising because none of the RPES items addressed negative thoughts or feelings *per se*, but primarily assess respondent’s perceptions about external factors that resulted in distress for them associated with being pregnant while living in a rural community with limited local access to maternity services. One explanation for this finding may be that the DASS subscales share a common element described as “negative affectivity.” Persons with high dispositional negative affectivity experience subjective distress and unpleasurable feelings, expressed in emotional states such as guilt, anger, and nervousness (Crawford & Henry, 2003). It is possible that some of our respondents exhibited this trait, which may explain the convergent validity of the RPES with the DASS depression subscale.

Items that comprised the financial worries subscale were more strongly correlated with the DASS (full scale) and its three subscales, indicating that financial worries had a significant psychosocial impact on the rural pregnant women in our sample. This is not surprising because the family incomes of respondents fell, on average, below the median family income of approximately CA\$62,000 in British Columbia (BC Statistics, 2006b).

The results of this study that indicated that the access and availability of maternity care services were significantly associated with RPES scores also support the construct validity of the instrument. The development of the RPES for parturient women in rural communities is a foundational step in developing an evidence base on which to explore the relationship between access to maternity services and key adverse neonatal outcomes through the mechanism of stress and anxiety. Previous studies have established a link between rural residence and adverse perinatal outcomes (Larimore & Davis, 1995; Nesbitt, Connell, Hart, & Rosenblatt, 1990), but these studies did not take into consideration the stress and anxiety levels of pregnant women.

The implications of the development of this tool are that, for the first time, health planners and researchers will be able to accurately measure the degree of worry and concern reflective of stress and anxiety associated with different rural maternity health services options. This may strengthen our understanding of the relationship between access to services, psychosocial states, and perinatal morbidity allowing health planners to make appropriate decisions.

This measure could help nurses assess levels of stress and anxiety that women in the community have and adjust their care provision accordingly and, where needed, refer them to specialist care. Currently, no such instrument exists for nurses to systematically assess the unique challenges encountered by rural parturient women who need to leave their communities to give birth. Additionally, the RPES could be used in studies to aid in policy development regarding travel funding for parturient women who must leave their communities to access appropriate services. At this point in time in Canada, the financial burden is placed on women and their families if they do not have First Nations status. This situation leads to significant financial hardship and social stress if women are separated from their partners so family income can be maintained. There are several positive examples of appropriate referral centre housing for birthing women and their families from other jurisdictions. These examples should inform policy for all jurisdictions.

This study is limited by the fact that the development of the RPES took place in a relatively homogeneous environment (rural British Columbia), which may or may not be representative of other rural parturient women world wide. It is important that the psychometric properties of the scale be replicated in an independent sample in various settings and cultures.

In conclusion, the RPES scale is a reliable and valid measure of the experiences of rural parturient women during their pregnancy, which assesses the worry in rural pregnant women that can result in stress and anxiety related to living in a remote or rural area with limited access to maternity care services.

REFERENCES

- Arizmendi, T. G., & Affonso, D. D. (1987). Stressful events related to pregnancy and postpartum. *Journal of Psychosomatic Research*, 31(6), 743–756.
- BC Statistics. (2006a). *Census highlights*. Retrieved June 23, 2010, from <http://www.bcstats.gov.bc.ca/data/cen06/c2006hl.asp>
- BC Statistics. (2006b). *Census fast facts: Income of families in British Columbia, 2005*. Retrieved April 15, 2010, from <http://www.bcstats.gov.bc.ca/data/cen06/facts/cff0617.pdf>
- Berkowitz, G. S., & Kasl, S. V. (1983). The role of psychosocial factors in spontaneous preterm delivery. *Journal of Psychosomatic Research*, 27(4), 283–290.
- Cattell, R. B. (1966). The scree test for the number of factors. *Multivariate Behavioral Research*, 1(2), 245–276.
- Chamberlain, M., & Barclay, K. (2000). Psychosocial costs of transferring indigenous women from their community for birth. *Midwifery*, 16(2), 116–122.
- Collier, R. (2010). Different routes to regionalization. *Canadian Medical Association Journal*, 182(4), 330–331.
- Crawford, J. R., & Henry, J. D. (2003). The Depression Anxiety Stress Scales (DASS): Normative data and latent structure in a large non-clinical sample. *The British Journal of Clinical Psychology*, 42(Pt. 2), 111–131.
- DeVellis, R. F. (1991). Scale development: Theory and applications. *Applied Social Research Methods Series* (Volume 26). London, United Kingdom: Sage Publications.
- DiPietro, J. A., Christensen, A. L., & Costigan, K. A. (2008). The pregnancy experience scale-brief version. *Journal of Psychosomatic Obstetrics and Gynaecology*, 29(4), 262–267.
- Gitau, R., Cameron, A., Fisk, N. M., & Glover, V. (1998). Fetal exposure to maternal cortisol. *Lancet*, 352(9129), 707–708.
- Goldenberg, R. L., Hickey, C. A., Cliver, S. P., Gotlieb, S., Woolley, T. W., & Hoffman, H. J. (1997). Abbreviated scale for the assessment of psychosocial status in pregnancy: Development and evaluation. *Acta Obstetrica et Gynecologica Scandinavica Supplement*, 165, 19–29.
- Grant, J. S., & Davis, L. L. (1997). Selection and use of content experts for instrument development. *Research in Nursing & Health*, 20(3), 269–274.
- Grzybowski, S., Schuurman, N., & Kornelsen, J. (2009). Planning the optimal level of maternity service for small rural communities: A systems study in British Columbia. *Health Policy*, 92(2–3), 149–157.
- Guadagnoli, E., & Velicer, W. F. (1988). Relation of sample size to the stability of component patterns. *Psychological Bulletin*, 103(2), 265–275.
- Heaman, M. I., Blanchard, J. F., Gupton, A. L., Moffatt, M. E. K., & Currie, R. F. (2005). Risk factors for spontaneous preterm birth among aboriginal and non-aboriginal women in manitoba. *Paediatric and Perinatal Epidemiology*, 19(3), 181–193.
- Hutten-Czapski, P. A. (1999). Decline of obstetric services in northern Ontario. *Canadian Journal of Rural Medicine*, 4(2), 72–76.
- Jasen, P. (1997). Race, culture, and the colonization of childbirth in northern Canada. *Social History of Medicine: The Journal of the Society for the Social History of Medicine / SSHM*, 10(3), 383–400.
- Kornelsen, J., & Grzybowski, S. (2005a). Is local maternity care an optional service in rural communities? *Journal of Obstetrics and Gynaecology Canada*, 27(4), 329–331.
- Kornelsen, J., & Grzybowski, S. (2005b). Safety and community: The maternity care needs of rural parturient women. *Journal of Obstetrics and Gynaecology Canada*, 27(6), 554–561.
- Kornelsen, J., & Grzybowski, S. (2005c). The costs of separation: The birth experience of women in isolated and rural communities in British Colombia. *Canadian Woman Studies Journal*, 24(1), 75–80.

- Larimore, W. L., & Davis, A. (1995). Relation of infant mortality to the availability of maternity care in rural Florida. *The Journal of the American Board of Family Practice*, 8(5), 392–399.
- Levin, J. S. (1991). The factor structure of the pregnancy anxiety scale. *Journal of Health and Social Behavior*, 32(4), 368–381.
- Lovibond, S. H., & Lovibond, P. F. (1995). *Manual for the Depression Anxiety Stress Scales*. Sydney, Australia: Psychology Foundation.
- Lynn, M. R. (1986). Determination and quantification of content validity. *Nursing Research*, 35(6), 382–385.
- Mackey, M. C., Williams, C. A., & Tiller, C. M. (2000). Stress, pre-term labour and birth outcomes. *Journal of Advanced Nursing*, 32(3), 666–674.
- Mulder, E. J. H., Robles de Medina, P. G., Huizink, A. C., Van den Bergh, B. R. H., Buitelaar, J. K., & Visser, G. H. A. (2002). Prenatal maternal stress: Effects on pregnancy and the (unborn) child. *Early Human Development*, 70(1–2), 3–14.
- Nesbitt, T. S., Connell, F. A., Hart, L. G., & Rosenblatt, R. A. (1990). Access to obstetric care in rural areas: Effect on birth outcomes. *American Journal of Public Health*, 80(7), 814–818.
- Norbeck, J. S., & Tilden, V. P. (1983). Life stress, social support, and emotional disequilibrium in complications of pregnancy: A prospective, multivariate study. *Journal of Health and Social Behavior*, 24(1), 30–46.
- Nordentoft, M., Lou, H. C., Hansen, D., Nim, J., Pryds, O., Rubin, P., et al. (1996). Intrauterine growth retardation and premature delivery: The influence of maternal smoking and psychosocial factors. *American Journal of Public Health*, 86(3), 347–354.
- Omer, H., Elizur, Y., Barnea, T., Friedlander, D., & Palti, Z. (1986). Psychological variables and premature labour: A possible solution for some methodological problems. *Journal of Psychosomatic Research*, 30(5), 559–565.
- Paarlberg, K. M., Vingerhoets, A. J., Passchier, J., Dekker, G. A., & Van Geijn, H. P. (1995). Psychosocial factors and pregnancy outcome: A review with emphasis on methodological issues. *Journal of Psychosomatic Research*, 39(5), 563–595.
- Polit, D., & Beck, C. (2004). *Nursing research, principles and methods*. Philadelphia, PA: Lippincott.
- Rondó, P. H. C., Ferreira, R. F., Nogueira, F., Ribeiro, M. C. N., Lobert, H., & Artes, R. (2003). Maternal psychological stress and distress as predictors of low birth weight, prematurity and intrauterine growth retardation. *European Journal of Clinical Nutrition*, 57(2), 266–272.
- Rourke, J. T. (1998). Trends in small hospital obstetric services in Ontario. *Canadian Family Physician*, 44, 2117–2124.
- Ruiz, R. J., Fullerton, J., & Dudley, D. J. (2003). The interrelationship of maternal stress, endocrine factors and inflammation on gestational length. *Obstetrical & Gynecological Survey*, 58(6), 415–428.
- Sable, M. R., & Wilkinson, D. S. (2000). Impact of perceived stress, major life events and pregnancy attitudes on low birth weight. *Family Planning Perspectives*, 32(6), 288–294.
- Statistics Canada. (2001). *Rural and small town Canada analysis bulletin*. Retrieved January 27, 2011, from <http://www.statcan.ca/cgi-bin/downpub/freepub.cgi>
- Torres-Arreola, L., Constantino-Casas, P., Flores-Hernández, S., Villa-Barragán, J. P., & Rendón-Macías, E. (2005). Socioeconomic factors and low birth weight in Mexico. *BMC Public Health*, 5(1), 20.
- Wadhwa, P. D., Dunkel-Schetter, C., Chicz-DeMet, A., Porto, M., & Sandman, C. A. (1996). Prenatal psychosocial factors and the neuroendocrine axis in human pregnancy. *Psychosomatic Medicine*, 58(5), 432–446.
- Wadhwa, P. D., Sandman, C. A., Porto, M., Dunkel-Schetter, C., & Garite, T. J. (1993). The association between prenatal stress and infant birth weight and gestational age at birth: A prospective investigation. *American Journal of Obstetrics and Gynecology*, 169(4), 858–865.
- Yali, A. M., & Lobel, M. (1999). Coping and distress in pregnancy: An investigation of medically high risk women. *Journal of Psychosomatic Obstetrics and Gynaecology*, 20(1), 39–52.

Correspondence regarding this article should be directed to Jude Kornelsen, Center for Rural Health Research, Suite 530, 1501 West Broadway, Vancouver, BC V6J 4Z6. E-mail: Jude.kornelsen@familymed.ubc.ca