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Psychosocial wellbeing among new mothers with diabetes: Exploratory analysis of the postnatal wellbeing in transition questionnaire

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ABSTRACT

Objective: The Postnatal Wellbeing in Transition (PostTrans) Questionnaire assesses psychosocial wellbeing among women transitioning to motherhood while managing pre-existing diabetes. Face and content validity have been previously reported; however the PostTrans questionnaire has 51 items which imposes a substantial burden on respondents. The aim of this study was exploratory analysis of the PostTrans questionnaire to investigate whether a reduction in the number of items was statistically supported, and whether clinically meaningful subscales could be derived.

Methods: A prospective cohort of women with type 1 or type 2 diabetes was recruited from three metropolitan hospitals in Melbourne, Australia. Women completed surveys across three postnatal time points. Data were pooled for the analysis. Suitability for factor analysis was confirmed and exploratory Principal Components Analysis with oblique rotation was conducted.

Results: The number of responses in the pooled dataset was 117. The reduced PostTrans scale has 27 items and six factors, which together explain 68.7% of the variance. The subscales assess: feeling as if one is coping with diabetes and the infant; feeling anxious and guilty about diabetes; feeling supported by family; sensitivity to the opinions of others; prioritising self-care; and health professional support.

Conclusion: The number of items in the PostTrans Questionnaire was reduced from 51 to 27 items. Six meaningful subscales emerged, which can help health professionals identify and address areas in which women with diabetes are experiencing psychosocial difficulties. The revised scale provides a feasible instrument to be tested for psychometric properties in a larger sample.

Introduction

Pre-existing diabetes currently affects about one in 10 pregnancies in Australia [1]. In 2014–2015, 4700 babies were born to women with either type 1 diabetes (T1DM) or type 2 diabetes (T2DM) [1]. Women with diabetes and their infants are at greater risk of adverse perinatal outcomes than women without diabetes, and diabetes can have serious short- and long-term complications including increased likelihood of hospitalisation and impaired quality of life and wellbeing [2–5].

Women with pre-existing diabetes can face complex psychosocial challenges during the transition to motherhood [6]. Life transitions are usually associated with significant change, increased stress, and often the need for complex decision-making. These factors can affect problem-solving and coping abilities and profoundly affect diabetes

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management and glycaemic control [8]. For new mothers with diabetes, daily life consists of simultaneously managing their own diabetes as well as the needs of their infant [7] and often requires high levels of organisation and planning [6]. Women may be concerned about their blood glucose levels as well as the impact of the diabetes on their capacity to care for their infant, and their infant's physical health [8–10]. For example, in the early postpartum period, women may find it difficult to breastfeed and simultaneously maintain even reasonably stable blood glucose levels [11].

Health professionals play an integral role in supporting women with diabetes, however women often report that their health professionals do not provide them with adequate knowledge, skills and support in the transition to motherhood in the context of their diabetes [11,12]. During the transition to motherhood, women with diabetes may actively seek the advice and support of health professionals with whom they can communicate meaningfully, who recognise their self-management efforts, treat them as equals, and display empathy, understanding and respect [12,13].

For women with diabetes, research suggests that non-judgmental support from partners, family and friends plays an integral role in how women manage the transition to motherhood [12]. Social and professional supports are essential to achieve optimal diabetes self-management and adjustment to motherhood [14,15].

In order to better understand the psychological and social wellbeing of women, and the psychosocial needs of women transitioning to motherhood while managing T1DM, the Postnatal Wellbeing in Transition (PostTrans) Questionnaire was developed [11]. Items were developed within a conceptual framework which included the following themes: (1) psychological wellbeing; (2) the social environment (including support from health professionals as well as family and friends); and (3) physical (maternal and infant) wellbeing. The initial PostTrans questionnaire had 48 items. Following item validation among women with T2DM [16], this was increased to 51 items. Although face and content validity have been reported [11,16], the length of these questionnaires limits their usability with pregnant women or new mothers in both clinical and research contexts.

The aim of this study was to conduct exploratory analysis of the PostTrans questionnaire among postpartum women living with diabetes in Australia, including whether: (a) a reduction in the number of items in the questionnaire was statistically supported; and (b) clinically meaningful subscales could be derived.

Materials and methods

Study design

The data reported here are from an exploratory cohort study which investigated factors associated with breastfeeding among women with pre-existing diabetes. A prospective cohort of pregnant women with a diagnosis of T1DM or T2DM, recruited from three metropolitan maternity hospitals in Melbourne, Australia, was followed from pregnancy (30–34 weeks' gestation) to 6 months postpartum.

A secondary a priori aim of the study was to investigate the psychometric properties of the PostTrans questionnaire; it is this component that is described in this paper.

Recruitment

Pregnant women with T1DM or T2DM were recruited from obstetric or diabetes clinics at three hospitals in Victoria, Australia. At all of the recruitment sites, women are referred to these clinics with a carefully documented diagnosis of T1DM or T2DM, based on clinical characteristics and diagnostic testing.

Women with T1DM or T2DM who attended a scheduled consultation at between 30 and 34 weeks' gestation were identified by a member of the research team through patient lists and their medical records. Prospective participants were approached by a member of the diabetes management team and screened for eligibility. They were given a Participant Information and Consent Form (PICF) and asked to provide written consent, including their contact details.

Inclusion and exclusion criteria

Pregnant women with T1DM or T2DM who were able to provide written informed consent in English were eligible to participate in the study. Women were excluded from participation if they had a pregnancy known to be affected by a fetal abnormality or had a significant medical co-morbidity in addition to diabetes. As this was part of a broader study examining the relationship between pre-existing diabetes and breastfeeding, women were also excluded if they were taking medication where breastfeeding was contra-indicated.

Data sources

Data on type of diabetes were extracted from women's medical records. Demographic characteristics were assessed in the first survey completed during pregnancy (**T1**). The remaining three surveys were completed during the postnatal period (**T2–T4**) and these are the data reported in this paper.

The **Postpartum T2** survey was conducted after the birth of the infant, as soon as the participant contacted the research team and an interview time could be arranged. The survey consisted of the PostTrans questionnaire (51 items). The PostTrans questionnaire was also included in the **Postpartum T3** (6–8 weeks postpartum) and **T4** (6 months postpartum) surveys.

Each survey took approximately 15–30 min to complete. If participants could not complete the survey by phone a softcopy or hardcopy of the survey was sent to them for completion at their convenience.

Data management and analysis

Data were assessed for suitability for exploratory factor analysis. This included checking that the recommended criterion of five cases per item was reached, that the Kaiser-Meyer-Olkin (KMO) value was at least 0.6, and that Bartlett's Test of Sphericity reached statistical significance ($p < 0.05$) [17].

Exploratory factor analysis was conducted, specifying Principal Components Analysis (PCA), using IBM SPSS Statistics version 24. As one of the aims was to investigate whether reduction in the number of items was statistically supported, this was an iterative process, in which items were removed if the absolute value of their loadings on all factors was less than 0.5. This process was repeated until all items loaded on at least one factor with an absolute value of at least 0.5.

Once this was achieved, PCA was run on the remaining items, specifying oblique rotation, to allow correlation amongst factors. Communalities were examined as an indication of the variance in each item that was explained; items with communalities < 0.4 were removed and the analysis was repeated. The number of components was determined by examining the scree plot [18].

Cronbach's alpha was calculated for the resulting subscales, and for the total scale with all remaining items to assess internal consistency. These data are also reported separately for women with T1DM and those with T2DM.

Ethics

Approval to conduct the study was obtained from Deakin University Human Research Ethics Committee (2015–226) and the following three hospital ethics committees: Royal Melbourne Hospital on behalf of the Royal Women's Hospital (15/13); The Mercy Hospital (R15/16); and Sunshine Hospital (LNR/15/WH/57).

Table 1
Sample characteristics of women with T1DM and T2DM who completed T2 survey (n = 39).

	n (%)*	Mean (SD, Range) *
Participant's age		33.1 (4.5, 24–43)
Partner's age		35.6 (5.5, 25–48)
Born in Australia	26 (67%)	
Tertiary education	31 (80%)	
Married/Living with partner	33 (85%)	
First child (primiparous)	16 (41%)	
Diabetes type		
type 1	25 (64%)	
type 2	13 (33%)	
Missing	1 (3%)	

* Sample characteristics collected at T1.

Results

Of the 132 pregnant women invited, 79 women (60%) agreed to participate and completed the T1 survey. The mean (SD) gestation at recruitment was 31.5 (5.4) weeks.

Thirty-nine women (37.8%) completed the T2 survey (Mean (SD) infant age = 4.4 (3.3) weeks). The demographic and health characteristics of these women are reported in Table 1. Forty-eight women (46.6%) completed the T3 survey (Mean (SD) infant age = 13.4 (4.3) weeks) and 32 (31%) completed the T4 survey (Mean (SD) infant age = 7.4 (1.3) months). Most of the surveys were completed by phone, although at T2 one hard copy was returned by mail and four surveys by e-mail, at T3 eight hard copies were returned by mail and four by e-mail, and at T4 four hard copies were returned by mail, and three by e-mail.

The number of women who completed the PostTrans questionnaire at each of the postnatal time points did not reach the recommended criterion of five cases per item to proceed with a factor analysis [17]. To facilitate sufficient data for exploratory analysis of the PostTrans questionnaire, data were pooled from the three postnatal surveys: T2, T3 and T4. The combination of data from the three postpartum time points provided a total of 117 responses. The Kaiser-Meyer-Olkin (KMO) value was 0.730, exceeding the recommended value of 0.6, and Bartlett's Test of Sphericity reached statistical significance ($p < 0.05$), indicating that factor analysis was appropriate [17].

The iterative factor analysis process resulted in 27 items and six components, explaining 20.9%, 14.7%, 11.2%, 10.0%, 7.5% and 4.4% of the variance respectively. An inspection of the scree plot revealed a clear break after the sixth component. There were several high loading marker variables (factor loadings above 0.80) in the solution.

In total, 68.7% of the variance was explained. The pattern and structure matrix is shown in Table 2.

The six components (factors) in Table 2 can be meaningfully interpreted as assessing: 1. Feeling as if one is coping with diabetes and managing the infant (5 items); 2. Feeling anxious, guilty about diabetes (5 items): 3. Feeling supported by family (3 items); 4. Sensitivity to the opinions of others (4 items); 5. Prioritising self-care (4 items); and 6. Health professional support and information (6 items).

The Cronbach's alpha-values for the total scale and subscales of the PostTrans questionnaire are shown in Table 3.

Internal consistency was acceptable for all subscales among women with T1DM and those with T2DM. For the scale overall, α was acceptable among women with T1DM but not among those with T2DM.

Discussion

In this study, the psychometric properties of the PostTrans questionnaire were examined using data from women with T1DM or T2DM in the postpartum period. As a result, the number of items in the scale substantially decreased from 51 to 27 items, which will reduce participant burden if used as an assessment tool, making it more appropriate for use in clinical and research settings.

In addition to the reduction of items for the total scale, meaningful subscales were derived for the PostTrans questionnaire, and internal consistency was demonstrated for each of these subscales among women with T1DM and those with T2DM. Women's responses to the items in these subscales may assist health professionals, such as endocrinologists, lactation consultants, midwives, diabetes educators and maternal child health nurses, to identify the psychosocial support needs of women with diabetes, and offer more targeted assistance specific to these identified needs.

Psychological wellbeing

Two of the subscales that emerged from the PCA in relation to psychological wellbeing were: Subscales 1 and 2. Subscale 1: Feeling as if one is coping with diabetes and managing an infant, includes positively worded items about coping and looking after the needs of an infant while managing one's diabetes. Subscale 2: Feeling anxious and guilty about diabetes, refers to negative feelings of guilt and anxiety in relation to having diabetes and managing diabetes while caring for an infant.

A review of studies examining the experiences of women with T1DM during the transition to motherhood concluded that the risk of diabetes-related complications may have a negative impact on feelings of general wellbeing among women with T1DM [6]. Although the evidence is not conclusive [19], there is some evidence that women with pre-existing diabetes are more likely than women without diabetes to experience anxiety and depressive symptoms during the postnatal period [2].

Feelings of anger, guilt and fear about diabetes complications are also common among women with diabetes, especially during important life transitions [7], and can demotivate people with diabetes to complete diabetes self-management tasks [20]. Some research suggests that women with diabetes may be sensitive to the opinions of family and friends in the postnatal period, and may be at risk of feeling overwhelmed and feel a sense of guilt if they do not meet others' expectations for managing both their diabetes and the care of their infant [6,13].

The two psychological wellbeing subscales of the PostTrans questionnaire identified in this study may assist health professionals in identifying the psychological needs of women with diabetes during the postpartum period.

Social support

Three subscales (Subscale 3: Feeling supported by family; Subscale 4: Sensitive to the opinion of others; and Subscale 6: Health care professional support and information) describe aspects of social support for women with diabetes while caring for an infant during the postpartum period.

An Australian study found that women with T1DM considered it important to involve family members in their diabetes management during the transition to motherhood, when they attempted to balance responding to their infants' needs and the requirements of their diabetes self-management [8]. Due to the demands of diabetes management, unstable blood glucose levels, and risk of hypoglycaemia, women may rely especially on their mothers [21], partners and close friends [12] to help manage daily activities with an infant, their diabetes and, for many women, breastfeeding. Thus, support from partners, family and friends is particularly important for women with pre-existing diabetes in the postnatal period (Subscale 3).

The fourth subscale assesses women's experiences of family and friends knowing "what's best" in caring for the infant and their diabetes. This may represent a barrier to optimal functioning, as women may receive conflicting advice from various sources, and may feel

Table 2
Reduced PostTrans scale (27 items) showing pattern and structure matrix for Principal Components Analysis with oblique rotation of six factor solution (absolute values > 0.5 shown in bold).

Scale items	Pattern coefficients						Structure coefficients					
	Component						Component					
	1	2	3	4	5	6	1	2	3	4	5	6
I am coping well with looking after both my baby and diabetes	**0.842**	0.058	0.145	0.001	0.036	0.091	**0.880**	−0.166	0.355	0.079	0.080	0.304
I can maintain blood glucose levels to my satisfaction whilst nursing my baby	**0.787**	−0.053	0.127	0.042	0.110	0.064	**0.851**	−0.265	0.328	0.118	0.140	0.262
Balancing the needs of my diabetes care and my baby's needs is a real challenge (reverse scored)	**0.773**	−0.138	−0.019	0.101	−0.031	−0.145	**0.783**	−0.387	0.134	0.169	−0.047	0.028
I feel anxious about my diabetes management since becoming a mother (reverse scored)	**0.599**	−0.359	−0.190	0.159	−0.078	0.084	**0.692**	−0.562	−0.077	0.250	−0.127	0.188
I feel I can manage whatever is involved in being a mother and having diabetes	**0.516**	−0.209	0.346	0.027	0.121	0.064	**0.674**	−0.324	0.474	0.110	0.177	0.207
I worry about dropping my baby when I have a hypo (reverse scored)	−0.019	**−0.794**	0.054	0.045	0.093	0.216	0.294	**−0.791**	−0.053	0.004	−0.102	−0.028
I feel guilty knowing that diabetes might affect my baby's health (reverse scored)	0.069	**−0.780**	0.006	−0.094	−0.073	0.026	0.279	**−0.769**	0.025	0.144	0.070	0.168
I worry about my baby developing diabetes (reverse scored)	−0.127	**−0.713**	0.071	0.075	0.082	−0.318	0.347	**−0.704**	−0.173	0.084	−0.160	0.035
I worry more about low blood glucose levels now that I have to take care of a baby (reverse scored)	0.185	**−0.638**	−0.154	−0.004	−0.109	0.060	0.388	**−0.703**	−0.113	0.123	−0.198	−0.073
I feel guilty about the effect my diabetes has on family and friends now I have a baby (reverse scored)	0.250	**−0.607**	−0.095	0.037	−0.148	−0.071	0.030	**−0.698**	−0.022	0.112	0.030	−0.382
I feel emotionally supported by my family (e.g. parents, in-laws, brothers, sisters)	−0.008	0.047	**0.875**	0.019	−0.043	0.080	0.196	0.118	**0.877**	0.078	0.106	0.156
I feel supported by my family (e.g. parents, in-laws, brothers, sisters) with the practicalities of caring for my baby	0.001	0.071	**0.806**	−0.038	0.155	−0.083	0.144	0.138	**0.828**	−0.015	0.289	−0.002
I feel supported by my partner with the practicalities of caring for our baby	0.030	−0.069	**0.791**	0.043	−0.129	−0.024	0.226	−0.031	**0.772**	0.110	−0.007	0.042
My friends think they know what is best for my baby (reverse scored)	0.026	0.014	0.023	**0.924**	0.092	−0.034	0.098	−0.089	0.099	**0.915**	0.021	0.062
My friends think they know what is best for my diabetes (reverse scored)	−0.021	−0.004	0.051	**0.863**	−0.108	−0.055	0.050	−0.097	0.077	**0.869**	−0.173	0.013
My family think they know what is best for my baby (reverse scored)	−0.056	−0.083	0.037	**0.800**	0.258	0.134	0.078	−0.127	0.122	**0.798**	0.204	0.204
My family claims they know what is best for my diabetes (reverse scored)	0.178	0.054	−0.070	**0.760**	−0.139	−0.028	0.202	−0.094	−0.004	**0.773**	−0.208	0.069
Being a mother has made me more aware about looking after my diabetes	−0.013	−0.103	0.073	0.041	**0.842**	−0.110	0.024	−0.063	0.193	−0.021	**0.839**	−0.060
Having a baby makes me realise my own health is very important	−0.168	0.035	−0.087	0.160	**0.802**	0.081	0.130	0.217	0.239	−0.114	**0.779**	0.147
Having a baby motivates me to look after my diabetes more carefully	0.159	0.210	0.063	−0.053	**0.749**	0.048	−0.154	0.106	0.026	0.080	**0.779**	0.101
I find it easier to prioritise my long term health goals now I am a mother	0.396	−0.041	−0.036	−0.284	**0.615**	0.007	0.386	−0.096	0.135	−0.297	**0.636**	0.105
My health professionals explained how breastfeeding could affect my blood glucose levels	−0.205	−0.135	−0.011	0.028	−0.017	**0.956**	0.169	0.123	0.043	0.031	0.045	**0.928**
My health professionals explained how to manage my blood glucose levels when breast feeding	−0.022	0.047	−0.032	−0.043	−0.012	**0.937**	0.054	−0.010	0.014	0.110	0.028	**0.900**
I received adequate information about how breastfeeding impacts on blood glucose levels	−0.108	−0.005	−0.080	−0.025	0.129	**0.822**	0.063	0.090	−0.014	0.023	0.166	**0.795**
My health professionals equipped me with the skills needed to manage my diabetes after giving birth	0.365	0.235	0.093	−0.017	−0.114	**0.654**	0.465	0.180	0.230	0.060	−0.040	**0.754**
I have enough information about caring for a baby whilst having diabetes	0.221	−0.206	0.143	−0.052	0.020	**0.595**	0.446	−0.209	0.229	0.048	0.076	**0.640**
I feel supported by my health professionals	0.178	0.142	0.049	0.219	−0.064	**0.508**	0.282	0.105	0.147	0.271	−0.033	**0.579**

Table 3
Cronbach's alpha values for overall scale and subscales.

Subscale	α (all)	α (T1DM)	α (T2DM)
1. Feeling as if one is coping with diabetes and managing an infant (5 items)	0.862	0.881	0.810
2. Feeling anxious and guilty about diabetes (5 items)	0.800	0.787	0.781
3. Feeling supported by family (3 items)	0.770	0.812	0.707
4. Sensitive to the opinions of others (4 items)	0.861	0.845	0.856
5. Prioritising self-care (4 items)	0.769	0.794	0.718
6. Health care professional support and information (6 items)	0.868	0.889	0.811
Total scale (27 items)	**0.705**	**0.721**	**0.670**

pressure to follow advice even when they are unsure about it. This may add to the substantial demands of the transition to motherhood, when women may be particularly vulnerable and sensitive to the opinions of others.

The sixth subscale identified in this study included items about health professionals' support and the provision of relevant information to equip women to simultaneously manage pre-existing diabetes and their infant. Support from health professionals plays a central role in the psychological wellbeing of women with diabetes and their infant in the postnatal period [9,13,22]. Women with T1DM report an increased number of visits to health services during pregnancy [12,23]. However, whether or not women are breastfeeding, support from health professionals or services is often experienced as insufficient or inadequate following the birth of their infant [9,12,15,24].

It is not just the quantity of support from health professionals which is important in the transition to motherhood - the quality of the support is critical. According to Berg and Sparud-Lundin [9], it is paramount that health professionals acknowledge the effort, expertise and hard work that women and their families put into managing diabetes, and the frustrations they experience. Discussion and agreement between women and their health professionals in relation to realistic and achievable diabetes outcomes will facilitate mutual trust and confidence in the relationship [6,11]. Informed, multidisciplinary support has been found to enhance self-esteem among women with T1DM and T2DM, for example in regard to breastfeeding [25]. Health professionals can further engage in strategies that enhance the confidence and self-esteem of women with diabetes by proactively supporting informed decision-making and facilitating communication and coordination within the healthcare team during the transition to motherhood [6].

In summary, while the need to maintain a sense of control over their lives has been identified as very important by women with T1DM [11], social support plays an essential role in women's perception of stress, their sense of control over their diabetes, and their transition to motherhood in general. Social support is optimal when it meets women's needs and recognises their knowledge and capabilities, helps to build trusting relationships with health professionals, and involves partners, friends and family. The support needs to be negotiated and the responsibility for glucose management clarified between the woman, her non-professional support network and her health professionals [12]. Health professionals should focus on working in partnership with women during the transition into motherhood [22].

The three relevant subscales identified in this study could assist health professionals to assess social support needs among women with either T1DM or T2DM.

Prioritising self-care

Subscale 5: Prioritising self-care, includes items about the importance of prioritising self-care in the context of being a new mother. Research shows that predictability and stable routines are beneficial for self-management of diabetes [26]. While everyday life does not have to be highly organised and structured for most people, for mothers with diabetes new daily patterns may need to be established [11,12,27], in addition to adjusting to bodily changes [22]. The additional demands of meeting the needs of an infant require even more organisation, and often a woman with diabetes perceives that the infant's needs come before her own [15]. This has been referred to as a constant "balancing act" [28]; in these circumstances, women may find it difficult to prioritise self-care. Health professionals could assist women with strategies to address this challenge.

Pregnancy and motherhood represent a unique time that instead may motivate women to make changes in their self-management of diabetes to ensure optimal health outcomes for both themselves and their infant. This may be an opportunity for women with diabetes to re-evaluate their goals, priorities, and preferences in relation to managing their health condition, and generate new positive ways to respond and adapt to new situations such as becoming a mother [29,30].

Strengths and limitations

A major strength of this study was the utilisation of established statistical techniques to investigate the validity of the scale and identify subscales. The revised, proposed PostTrans questionnaire includes only 27 of the original 51 items, and this represents a considerably reduced burden to participants. The suitability of the data for factor analysis was confirmed through statistical testing, and a systematic, iterative factor analysis process was used to identify items which should be retained in the revised PostTrans questionnaire. The subscales were identified using clear decision rules about factor loadings and communalities. All subscales derived proved to be meaningfully interpretable.

We acknowledge the limitation that the sample size was extremely small and not sufficient for PCA, according to the criterion of five cases per included item [17]. Women with pre-existing diabetes who are transitioning to motherhood represent a time-poor population and, as a result, it can be extremely difficult to recruit and retain these women in research studies. Recognising that a reduction in items and the identification of meaningful subscales in the PostTrans questionnaire would be of great benefit to clinicians and researchers, we performed exploratory analysis of the postnatal dataset by pooling data from the three postnatal assessment points to ensure sufficient numbers. Unfortunately, insufficient data were collected in the current study to examine the PregTrans questionnaire [11].

An additional limitation is that no data were collected on when women were diagnosed with T1DM or T2DM, and whether, when and how their diagnosis was confirmed. Future studies should include these data so that the impact of these factors on responses to the PostTrans can be investigated. We recommend that future studies should include sufficient women to validate the reduced PostTrans scale separately among women with T1DM and those with T2DM, as psychosocial needs are likely to differ among these two groups [31].

Conclusion

The Postnatal Wellbeing in Transition Questionnaire assesses psychological and social wellbeing and the psychosocial needs of women with pre-existing diabetes during the postnatal period [11]. The findings of the current study resulted in the significant revision of the questionnaire, with the reduction of the scale from 51 items to 27 items, and the identification of six specific subscales with acceptable internal consistency among women with T1DM and those with T2DM. The revised scale is now more suitable for use in both clinical and research settings in assessing the psychosocial needs and experiences of women with T1DM or T2DM in the postpartum period.

The revised PostTrans questionnaire presented here could assist health professionals to identify the postnatal psychosocial support needs of women with T1DM and T2DM diabetes, and engage with the woman and her family to plan their care accordingly. Once the measure

has been validated in a larger sample, the revised PostTrans questionnaire has the potential to be extremely useful in planning and evaluating interventions and programs that aim to enhance the postnatal psychosocial wellbeing of women with T1DM or T2DM.

Declaration of Competing Interest

The authors declare that they have no conflict of interest.

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References

[1] Australian Institute of Health and Welfare, Diabetes Snapshot. Australian Institute of Health and Welfare; 2018.
[2] Dalfrà MG, et al. Quality of life in pregnancy and post-partum: a study in diabetic patients. Qual Life Res 2012;21(2):291–8.
[3] Mitanchez D, Burguet A, Simeoni U. Infants born to mothers with gestational diabetes mellitus: mild neonatal effects, a long-term threat to global health. J Pediatr 2014;164(3):445–50.
[4] Wahabi HA, et al. Pre-existing diabetes mellitus and adverse pregnancy outcomes. BMC Res Notes 2012;5(1):496–500.
[5] Balsells M, et al. Maternal and fetal outcome in women with type 2 versus type 1 diabetes mellitus: a systematic review and metaanalysis; 2009.
[6] Rasmussen B, et al. Psychosocial issues of women with type 1 diabetes transitioning to motherhood: a structured literature review. BMC Pregn Childbirth 2013;13(218).
[7] Rasmussen B, et al. The mother-daughter guilt dynamic: effects of type 1 diabetes during life transitions. J Clin Nurs 2008;11c:380.
[8] Rasmussen B, et al. Young women with type 1 diabetes' management of turning points and transitions. Qual Health Res 2007;17(3):300–10.
[9] Berg M, Sparud-Lundin M. Well-being, diabetes management, and breastfeeding in women with Type 1 diabetes two and six months after childbirth. J Women's Health Care 2012;1:112.
[10] Sparud-Lundin C, et al. Breastfeeding in women with type 1 diabetes: exploration of predictive factors. Diabetes Care 2011;34(2):296–301.
[11] Rasmussen B, et al. Transition to motherhood in type 1 diabetes: design of the pregnancy and postnatal well-being in transition questionnaires. BMC Pregn Childbirth 2013;13(1):1–11.
[12] Sparud-Lundin C, Berg M. Extraordinary exposed in early motherhood – a qualitative study exploring experiences of mothers with type 1 diabetes. BMC Women's Health 2011;11(1). 10–10.
[13] Berg M, Sparud-Lundin C. Experiences of professional support during pregnancy and childbirth – a qualitative study of women with type 1 diabetes; 2009.
[14] Peyrot M, et al. Psychosocial problems and barriers to improved diabetes management: results of the Cross-National Diabetes Attitudes, Wishes and Needs (DAWN) Study; 2005. p. 1379–85.
[15] Rasmussen B, et al. Breastfeeding practices in women with type 1 diabetes: a discussion of the psychosocial factors and policies in Sweden and Australia. Women Birth 2015;28(1):71–5.
[16] Rasmussen B. Cognitive debriefing of the pregnancy and postnatal well-being in transition questionnaires among women with type 2 diabetes mellitus. Melbourne: Deakin University; 2018.
[17] Tabachnik BG, Fidell LS. Using multivariate statistics. 6th ed. Boston: Pearson Education; 2013.
[18] Cattell RB. The scree test for number of factors. Multivar Behav Res 1966;1:245–76.
[19] Ross GP, et al. Relationship between depression and diabetes in pregnancy: a systematic review. World J Diabetes 2016;7(19):554–71.
[20] Fisher L, Gonzalez JS, Polonsky WH. The confusing tale of depression and distress in patients with diabetes: a call for greater clarity and precision; 2014. p. 764–72.
[21] Stenhouse E, Letherby G. Mother/daughter relationships during pregnancy and the transition to motherhood of women with pre-existing diabetes: raising some issues. Midwifery 2011;2:120.
[22] Linden K, et al. Well-being, diabetes management and breastfeeding in mothers with type 1 diabetes – an explorative analysis. Sexual Reprod HealthCare 2018;15:77–82.
[23] Lavender T, et al. Women's perceptions of being pregnant and having pregestational diabetes; 2010. p. 589–95.
[24] Murphy HR, et al. Improved pregnancy outcomes in women with type 1 and type 2 diabetes but substantial clinic-to-clinic variations: a prospective nationwide study. 2017. p. 1668–77.
[25] Fallon A, Dunne F. Breastfeeding practices that support women with diabetes to breastfeed. Diabetes Res Clin Pract 2015;110(1):10–7.
[26] Pyatak E. Participation in occupation and diabetes self-management in emerging adulthood. Am J Occup Ther 2011;65(4):462–9.
[27] Berg M, Erlandsson L-K, Sparud-Lundin C. Breastfeeding and its impact on daily life in women with type 1 diabetes during the first six months after childbirth: a prospective cohort study. Int Breastfeeding J 2012;7(1):20–5.
[28] Poirier-Solomon L. A balancing act. Managing motherhood & diabetes. Diabetes Forecast 2002;55(11):46–7.
[29] Rayman KM, Ellison GC. Home alone: The experience of women with type 2 diabetes who are new to intensive control. Health Care Women Int 2004;25(10):900–15.
[30] Sanden-Eriksson B. Coping with type-2 diabetes: the role of sense of coherence compared with active management; 2000. p. 1393–97.
[31] Lawrence JM. Women with diabetes in pregnancy: different perceptions and expectations. Best Practice Res Clin Obst Gynaecol 2011;25(1):15–24.