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Investigating tangible and mental resources as predictors of perceived household food insecurity during pregnancy among women in a South African birth cohort study

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ABSTRACT

Rationale: Food insecurity during pregnancy is concerning given the increased nutritional needs of the mother for proper fetal development. However, research is lacking within the South African context to investigate the association of economic and psychosocial factors and food insecurity among pregnant women, using comprehensive, conceptually driven models.
Objective: This study applies the Network-Individual-Resource (NIR) Model to investigate individual, intimate dyadic, and family level predictors of perceived household food insecurity for pregnant women.
Methods: 826 pregnant women enrolled in the Drakenstein Child Health Study (DCHS), a birth cohort in two communities in a peri-urban area of South Africa. Hierarchical logistic regressions were used to investigate the impact of household/family, intimate dyads, and individual tangible and mental resources on perceived household food insecurity during the critical period of pregnancy. Perceived household food insecurity was assessed through an adapted version of the USDA Household Food Security Scale – Short Form.
Results: Among 826 pregnant women in South Africa, individual-level tangible resources (e.g. income, social assistance, HIV status) and mental resources (e. g. depression, childhood trauma) predicted perceived household food insecurity and these predictors differed by community. Intimate dyadic and family level resources did not predict household food insecurity.
Conclusions: Our findings of the economic and psychosocial predictors of perceived household food insecurity among pregnant women in South Africa, mirror findings in general populations. This study provides support for the extension of the NIR model to perceived household food insecurity, particularly regarding individual-level mental and tangible resources, as well as the impact of community-level factors. Future research should investigate the extent to which resource sharing occurs within networks.

Food insecurity during pregnancy a concern for both maternal and fetal health. There are increased nutritional needs of the mother for proper fetal development (Ivers and Cullen, 2011), which, if not met, can increase the risk of low birth weight (Borders et al., 2007) and risk of birth defects such as spina bifida (Carmichael et al., 2007). Additionally, malnutrition among women has also been associated with iron deficiency anemia, a major cause of maternal mortality (Darnton-Hill and Coyne, 1998). Although there is an established literature on the determinants of food insecurity among general populations (Gundersen, 2013; Gundersen et al., 2011), the literature is lacking with regards to socio-demographic and psychological predictors of food insecurity during pregnancy, particularly in low and middle income counties

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(LMIC; Ivers and Cullen, 2011).

In southern Africa, the food insecurity literature has largely been focused on economic and environmental stressors with regards to maternal nutrition (Misselhorn, 2005; Salam et al., 2015; Weaver and Hadley, 2009). However, psychological factors can also play a role in an individual's ability to procure food (Misselhorn, 2005). For example, depressive symptoms, anxiety, and greater perceived stress have all been associated with food insecurity among pregnant women and mothers in high income countries (Laraia et al., 2006; Whitaker et al., 2006). However, research is lacking within the South African context to investigate the association of psychosocial factors and food insecurity among pregnant women. Furthermore, previous literature lacks a comprehensive focus on the multiple levels of factors that can impact food insecurity among pregnant women through a theoretical lens. This is particularly true in low and middle income countries (LMIC), where food insecurity is often more extreme and where large portions of the populations may face a wider range of environmental, structural, family, and individual risk factors for food insecurity (Grobler, 2016). A meta-analysis of food insecurity factors in southern Africa found that poverty, environmental stressors, and conflict accounted for 50% of the drivers of food insecurity (Misselhorn, 2005).

We propose using the Network-Individual Resource (NIR; Johnson et al., 2010) model to examine predictors of food insecurity comprehensively among pregnant women in South Africa, a key population for public health impact. The NIR model was first developed within the HIV prevention literature to address how both personal risk and prevention efforts depend on the resource needs of individuals being met and how these resources are shared within networks (Johnson et al., 2010). It has since been used to discuss a variety of health behaviors (Johnson and Michie, 2015) including college drinking (Reid et al., 2015), family planning (Mohan and Shellard, 2014), and the impact of social stigma on population health (Cook et al., 2014). The NIR model proposes that there are two categories of resources, mental and tangible, and these resources operate at the individual level and the network levels (intimate dyad, family, peers/community, and/or society). Additionally, resources are necessary for the individual to "survive and thrive" and individuals and networks most value the resources that satisfy their most pressing needs. Furthermore, networks serve as resources for individuals, who, in turn, are resources for the networks to which they belong (Johnson et al., 2010).

With regard to household food insecurity, we can consider influential factors at three levels, individual (the pregnant woman), intimate dyadic (the partnership between the pregnant woman and their significant other) and at the family level. At the individual-level, some pregnant women may have their own personal income to assist with obtaining food for their household, thereby reducing household food insecurity (Schmeer et al., 2015). Additionally, programs that provide financial assistance for things other than food such as care for disabled dependents can take strain off finances that can be re-appropriated towards the costs of acquiring food (Ivers and Cullen, 2011). Also, according to the NIR model, physical health is a tangible resource. South Africa has the largest HIV epidemic in the world (UNAIDS, 2015) and previous research has established multiple links between food insecurity and HIV acquisition risk and HIV morbidity and mortality through nutritional, mental health, and behavioral pathways (Weiser et al., 2011). At the individual-level there are also many mental resources, or psychosocial factors, which can bolster or impede perceived household food insecurity. For example, depression may impact a pregnant woman's motivational and/or cognitive abilities to obtain food on a regular basis (Hernandez et al., 2014; Melchior et al., 2009). Depression may also impact a pregnant woman's work productivity and, in turn, her wages (Stewart et al., 2003). Although less research has been conducted investigating the impact of stressful life events and psychological distress on perceived household food insecurity, one can hypothesize that the process may be similar to depression and perceived household food insecurity (Becerra et al., 2015; Jebena et al., 2015). Childhood trauma has also been shown to negatively impact a pregnant woman's ability to procure food because of its lifelong income consequences caused by poor schooling and job performance (Chilton et al., 2015) as well as also being a significant risk factor for mental disorders in adulthood (Norman et al., 2012). Depression, childhood trauma, stressful life events, and psychological distress all undermine overall mental health and can impact perceived control over current circumstances and skills to address household food insecurity.

There are also resources that operate at the family level that can influence perceived household food insecurity. For instance, household income would be a tangible resource that operates at the family level, which can influence perceived household food insecurity (Loopstra and Tarasuk, 2013). While household income includes individual-level incomes, it also takes into account the family context of resource sharing, which is particularly true in South Africa. Many pregnant women also have another important source of tangible and mental resources: their intimate partner, such as in a marriage or marriage-like relationship (Zwang and Garenne, 2008). In this "intimate dyadic" relationship, both partners may benefit from shared tangible resources, for example, partner income may contribute to maternal resources to increase the likelihood of being able to afford enough food for the household (Johnson et al., 2010). This relationship between tangible resources and household food insecurity may also be moderated by the level of trust in the relationship (Johnson et al., 2010; Piperata et al., 2016). Furthermore, according to the NIR model, the intimate dyad may provide key mental resources, such as relationship satisfaction, that bolster overall mental health and the pregnant woman's sense of security within the relationship and her perceptions of household food security (Johnson et al., 2010). Overall, the NIR model posits that mental and tangible resources are utilized at multiple levels (individual, intimate dyadic, and family) simultaneously and each can have an impact on perceived household food insecurity.

The benefit of the NIR model within the context of perceived household food insecurity among pregnant women is that it puts forth a wide-ranging conceptual model to predict risk, in this case risk of malnutrition, which can have significant consequences for maternal and child health during pregnancy (Ivers and Cullen, 2011). No studies, to our knowledge, conceptually bring together the constructs of resources (mental and tangible) operating at multiple levels (individual, dyadic, and family) to elucidate predictors of perceived household food insecurity among pregnant women. Improved understanding of risk factors and how they affect perceived food insecurity at multiple levels may be instrumental in creating effective interventions, especially where family or community level factors need to be addressed.

The purpose of the present study is two-fold: 1) to examine the utility of the NIR conceptual model in the context of studying perceived household food insecurity in order to further develop this theory; and 2) to tease apart how mental and tangible resources at varying levels (individual, intimate dyadic, and family) simultaneously influence perceived household food insecurity among pregnant women in South Africa, a key population that has not been adequately addressed in the current research. Thus, the hypotheses for the current study are as follows:

1. At the individual level, tangible and mental resources will predict maternal perceptions of household food insecurity.