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**What are we measuring and why? Using theory to guide perinatal research and
measurement**

Invited paper for a special issue of the
Journal of Reproductive and Infant Psychology

Abstract

Background: A theory is a set of ideas that attempt to explain phenomena and can provide guiding principles on which to base practice. Many theories from biological and social sciences are relevant to women's health and wellbeing during pregnancy and after birth, yet theory is not commonly explicitly reported in perinatal research.

Method: This paper outlines the importance of theory to perinatal research and provides a pragmatic overview of when and how to use theory in research. In particular, we consider (i) deciding when it is appropriate to use theory, (ii) choosing which theory to use and (iii) how to operationalise theory in research. We give examples that illustrate how four different theories have been used in perinatal research to increase understanding and inform the development of interventions.

Conclusion: Even when it is not appropriate to use theory in our research, careful consideration of pertinent theories contributes to greater clarity of concepts and understanding of different explanations or perspectives on what we are studying. It also prompts us to consider where our research fits in terms of contribution to knowledge or the development and evaluation of treatments. However, it is important that a critical approach is taken so that theories continue to be developed. In this way we will systematically advance our understanding of general factors or processes that are relevant to perinatal health, as well as those factors that are unique to perinatal health.

Keywords: Theory, measurement, research, pregnancy, postpartum, postnatal, perinatal

Word count: 3715 words

A theory is a set of ideas that attempt to explain phenomena and provide guiding principles on which to base practice. Many theories from biological and social sciences are relevant to women's health and wellbeing during pregnancy and after birth. Which theory we use affects what we choose to measure and how we interpret it. For example, in the 18th century it was theorised that scurvy was caused by putrifying food in the body. In 1747 James Lind carried out one of the first systematic medical experiments by giving sailors different acids such as citrus fruit, cider and vinegar. This clearly showed that citrus fruits prevented scurvy. Lind concluded that citrus fruits were protective but, not understanding the role of vitamin C, used boiled fruit in subsequent tests – destroying the vitamin C in the process. It was almost 50 years before it was demonstrated unequivocally that supplying sailors with fresh lemon juice prevented deaths from scurvy. This in turn contributed to the search for underlying causes and identification of vitamin C in the 20th century.

This example illustrates how theories underpin our understanding of phenomena, which in turn guides our research and analysis, as well as providing a framework that can be tested. This latter point is particularly important if we want to apply knowledge to clinical treatment, as shown by the above example. Theory building and testing is therefore fundamental for efficient and rapid development of knowledge and understanding. However, to achieve this we need to ensure that theories are used *critically* and are tested, refuted or developed.

A wide range of theories are relevant to perinatal phenomena yet research in this area appears to be largely a-theoretical. For example, a search found that only 15.5% of 5,607 research papers about postpartum or postnatal depression included the word “theory” (Scopus, 15th July 2013). This dropped to 2.6% of research papers if theory was restricted to the title, abstract or keywords. This suggests there is a paucity of perinatal research that explicitly uses theory, despite the many benefits¹. Theories facilitate systematic enquiry and

gains in knowledge. They provide provisional information about relationships between variables, or sets of variables, which can inform what variables we choose to examine. Theories also provide clear conceptual definitions of variables, which enables more clarity about the concepts being measured and helps decisions about which type of measure is appropriate. Theories enable predictions to be made about relationships providing frameworks that can be tested at the micro level (e.g. testing predicted relationships between variables) and the macro level (e.g. using statistical modelling to test the utility of the theory as a whole). In addition to theory informing perinatal research, results of perinatal research can inform the application and development of this theory in other settings and/or populations.

Despite these benefits there are barriers to using theory in perinatal research. These include not knowing when to use theories, and the sheer number of theories available can make it hard to decide which one is most appropriate. The current zeitgeist affects which theories are dominant and this changes over time so theories go in and out of fashion. If theories are consistent with the zeitgeist they may be used without question or critical evaluation. Theories may be too reductionist or too broad in scope. Theories also vary in quality. All this can make it difficult to find a good, comprehensive but practically feasible theory to use. In such circumstances the development, testing and refining of theory becomes critical to ensure that valid yet parsimonious theories are available.

Broadly speaking, barriers to using theory in perinatal research can be summarised as difficulties (i) deciding when it is appropriate to use theory, (ii) choosing which theory to use and (iii) operationalising theory in research. In the rest of this paper we look at each of these in turn. The next section examines when it is appropriate to use theory in research. After that we look at how to choose a theory and use examples of four theories to illustrate the application of theory in perinatal research. Finally, we look at how to operationalise theory in

perinatal measurement. In doing so, this paper provides a pragmatic overview of when and how to use theory in perinatal research. As such, we use terms such as ‘theory’, ‘model’ and ‘framework’ interchangeably. For a more detailed introduction to using theory in social sciences see Jaccard and Jacoby (2010).

When to use Theory

Deciding when to use theory is the first challenge in perinatal research. Research studies can be thought of as lying on a continuum, from bottom-up, exploratory or problem-driven approaches to top-down, theory-driven approaches. Both bottom-up and top-down approaches are important and have their place. Bottom-up approaches may appear a-theoretical but share some similarity and overlap with exploratory or theory-building research. There are many examples of problem-driven research finding new treatments or solutions not encompassed by current theories, which then leads to the development of new understanding and theories. This is exemplified by James Lind’s experiments contributing to the search for and identification of vitamin C years later. Exploratory work can also lead to theory development, as exemplified by grounded theory research (Glaser & Strauss, 1967) where theoretical frameworks are developed from detailed qualitative analysis and are therefore ‘grounded’ in the data. This shows that the application of theory is not specific to certain methods and can be used in qualitative and quantitative research.

A key question for researchers who do not routinely use theory in their work is therefore knowing when to use theory. Asking “*what are we measuring and why?*” should provide some insight into whether theory would enrich your research. Our view is that theory is highly relevant to the perinatal period and can provide additional insight and understanding, as well as new or competing perspectives on topics. Therefore, even if we choose not to use theory in our research, we should at least be aware of relevant theories and

critically evaluate these before deciding whether to use them or not. It may also be helpful to consider where our research lies on the continuum of bottom-up (theory development) to top-down (theory testing) because this can clarify where the field is in terms of theory development and consequently what role theory should play in our research. Importantly, there is increasing expectations that theories are used for intervention development e.g. through Intervention Mapping (Bartholomew, Parcel & Kok, 1998) or the MRC framework (Craig et al, 2008). Although we advocate greater use of theory in perinatal research it is important to emphasise that we are not suggesting theory is used without criticism or question, as this will not advance understanding.

Choosing which Theory to use

A plethora of theories are available that can inform perinatal research. These include theories of health-related topics, measurement, the research process, interventions, and intervention development. Health-related theories range from broad frameworks for understanding health outcomes, such as the biopsychosocial or diathesis-stress models, to specific theories of behavioural and psychological phenomena. To use the example of postnatal depression, this has been explained by biological theories such as the monoamine hypothesis (Nutt, 2008) and circadian rhythm/sleep disturbances (Adrien, 2002). Psychological theories of depression include cognitive (e.g. Beck's cognitive theory of depression; Beck, Rush, Shaw & Emery, 1979), behavioural (e.g. learned helplessness; Seligman, 1975), and interpersonal (e.g. attachment theory; Bowlby 1998) theories. Evolutionary theories include social rank (Stevens & Price, 2000), signalling and bargaining theories (Hagen 1999; 2003). Social theories include the role of social deprivation and gender (Brown & Harris, 1986). In other words, it may not be easy to choose what theory to use. Whilst there is no conclusive definition of a good theory, factors that are good to look out for include how well conceptualised the theory

is, if the relationships between variables are clearly specified, if the theory is empirically supported and parsimonious.

In this section we give examples of four theories that have been applied to perinatal research to illustrate how theory can be used and some of the advantages and disadvantages of using these theories. We have chosen theories that cover different types of research. First, we look at theories of stress and health that can be used to understand perinatal wellbeing. Next we look at theories that have been used in intervention research, namely those of health behaviour and health promotion. Finally we look at a theory of health professionals' behaviour and care.

Stress and Health

Being pregnant, giving birth and adapting to a new baby can be challenging and requires significant adjustment. Theories of stress are therefore highly relevant. Biological theories include the 'tend and befriend' model that outlines how hormones such as oxytocin are important in affiliative stress responses (Taylor, 2006). Broader frameworks, such as the diathesis-stress model (sometimes referred to as the vulnerability-stress model) provide an explanation of how exposure to stressful situations such as birth interacts with individual vulnerability and environmental factors to result in different physical and psychological outcomes. Similarly, psychological theories of stress focus on the fit between the individual and the environment. Transactional models posit that stress occurs when an individual perceives the demands of a situation as greater than their ability to cope.

The most influential transactional model was put forward by Lazarus and Folkman (1984), who emphasised the importance of appraisal in stress responses. In primary appraisal an individual evaluates the situation to be benign, challenging or potentially harmful. When a situation is appraised as challenging or potentially harmful then secondary appraisal occurs

where an individual assesses their ability to cope with it. Stress arises when events are appraised as high threat and coping ability is perceived to be low. This model also emphasises that stress and coping are intertwined and form a dynamic process through which individuals attempt to cope and adapt.

Stress theories have been used to inform theories of perinatal outcomes. Ayers (2004) used a diathesis-stress framework for a model of vulnerability risk factors for postnatal post-traumatic stress disorder. Stress theories have also been applied directly to understand perinatal adaptation and outcomes. For example, Swanson (2000) examined whether Lazarus's model of stress and additional contextual and interceding factors (e.g. parity, perceived social support) predicted recovery from miscarriage. Using path analysis, the study found that this model accounted for 63% of the variance in symptoms of depression four months after miscarriage and 54% of the variance one year after miscarriage.

The advantage of using stress theories is that they highlight a number of issues that are very relevant to perinatal research, such as being cognisant of interactions between individual factors and events in perinatal health outcomes; the importance of considering individuals' perceptions of an event or situation; and that numerous factors influence how women cope with perinatal stress such as contextual variables (e.g. parity, perinatal care etc.) and interceding variables (e.g. support, social capital). Stress theories also highlight the complexity of emotional responses to pregnancy and birth. A disadvantage of using stress theories is the multitude of variables and interactions postulated which can make research difficult to carry out. Large numbers of participants are required to test multivariate models so participants may find the number of measures burdensome. Research that takes a biopsychosocial approach and includes biological measures as well becomes increasingly complex. As with many comprehensive theories it is also difficult to test the theory as a whole without large datasets and structural equation models. Research looking at predicted

relationships between components of stress models is therefore easier. For example, we might look in detail at primary and secondary appraisals of events like miscarriage or birth and the relationship with wellbeing; or test the 'tend and befriend' hypotheses that oxytocin modulates affiliative responses to stress.

Changing Health Behaviour

There are many theories of health behaviour and behaviour change. One of the most prominent is the Theory of Planned Behaviour (TPB; Aizen, 1988), which was developed from the Theory of Reasoned Action. The TPB posits that the main determinant of behaviour is intention. Intention in turn is influenced by behavioural beliefs (an individual's attitude towards the behaviour), normative beliefs (other's views on the behaviour) and control beliefs (an individual's belief they can engage in the behaviour).

The TPB provides a useful framework for examining health behaviours and has been used to examine perinatal behaviours such as exercise in pregnancy (Downs & Hausenblas, 2003), smoking cessation in pregnancy (Bennett & Clatworthy, 1999) and breastfeeding (McMillan et al, 2008). Breastfeeding in particular has been frequently researched from a TPB perspective, mainly because it lends itself well to prospective examination of whether intentions predict behaviour. For example, McMillan and colleagues (2008) used a questionnaire including the TPB factors to identify what predicted breastfeeding in women living in areas of economic hardship at four time points; hospital stay, hospital discharge, 10 days and six weeks postpartum. Their findings showed that a combination of TPB, demographic and other variables correctly predicted 78 to 88% of women who were breastfeeding at different postnatal time points. However, whilst attitude and intention were important at the three first time-points, they did not predict behaviour at six weeks postpartum. Important factors at six weeks were ethnicity, social deprivation, age and moral norms. This suggests TPB factors may be more important for behaviour initiation rather than

behaviour maintenance. Consequently, interventions targeting breastfeeding may need to target different psychological constructs at different time points.

An advantage of using models of health behaviour is the wealth of evidence suggesting they are effective at predicting up to 28% of the variance in health behaviours (TPB; Sheeran, 2002). They are also an example of where theories are revised and refined in light of new evidence. For example, the TPB is often complemented with other variables such as moral norms (McMillan et al, 2008) to improve the prediction of behaviour. A disadvantage is that intention does not always translate into behaviour as the theory suggests (Sheeran, 2002). Other theories that focus on this gap between intention and behaviour are therefore useful (e.g. Health Action Process Approach; Schwarzer, 1992). Another potential disadvantage is that these theories provide explanations of health behaviours but are not necessarily easy to translate into interventions to change health behaviour. For example, Aizen does not provide suggestions for how to change individuals' behavioural, normative or control beliefs. This is in contrast to Bandura's social cognitive theory, where self-efficacy is a key concept and suggestions for how to change self-efficacy are provided (Bandura, 1997; for a more extensive discussion see Ashford et al, 2010). For an example of how self-efficacy can be incorporated into a community intervention targeting obese pregnant women see Smith et al. (2010).

Health Promotion

Health promotion spans both individual and environmental determinants of health. Thus theories of individual health behaviour, such as the TPB and Health Belief Model (Rosenstock, 1966) are relevant, as well as environmental theories such as social ecological models (see Stokols, 1996). One theory often used in health promotion is Protection Motivation Theory (PMT; Maddux & Rogers, 1983). PMT focuses on individuals' motivation and argues that individuals react to information in an adaptive or maladaptive

manner depending on appraisal of a threat and their ability to minimise this threat. PMT posits that four factors predict an individual's intention to engage in a specific behaviour: perceived severity of a threat, perceived vulnerability of the threat, perceived efficacy of the preventive behaviour, and perceived self-efficacy (an individual's confidence in their ability to perform the suggested behaviour).

Gaston and Prapavessis (2009) recently used PMT in a study to assess whether a leaflet on maternal-fetal disease incorporating the four factors from the theory could act as a source of exercise motivation for pregnant women. They compared women's scores on the four factors with women who read a different non-theory based leaflet. Their findings indicated that women who read the PMT leaflet had higher scores for perceived vulnerability, response efficacy and self-efficacy, compared to the other group of pregnant women. Importantly, the PMT leaflet group also had stronger intentions to engage in exercise compared to the other group.

This example illustrates how developing something as simple as a leaflet can, with the help of theory, have an impact on behavioural intention. However, PMT suffers from the same criticism as the TPB – it does not address the gap between intention and behaviour (Orbell & Sheeran, 1998). That said, it has been shown to be a good model to address motivation (Orbell & Sheeran, 1998) and can be combined with other theories to promote health behaviours during pregnancy. For example, Gaston & Prapavessis (2012) further developed the above leaflet to include action and coping planning from the Health Action Process Approach (HAPA; Schwarzer, 1992). In this new study, the pregnant women who had received the PMT and HAPA information were more likely to be physically active, compared to women who had only had the PMT information.

Health Professionals' Behaviour

Partners, health professionals and the clinical environment are important in perinatal wellbeing, care and outcomes. Not surprisingly, there are theories concerning these factors as well. For example, the Theoretical Domains Framework (TDF; Michie et al, 2005) provides a framework for examining health professionals' behaviour. The TDF lists 12 domains such as 'skills', 'beliefs about capabilities' and 'motivation and goals' that may be important in health professionals' behaviour. The TDF was recently used to examine midwives' barriers and facilitators to helping pregnant women stop smoking (Beenstock et al, 2012).

Questionnaire results indicated that although midwives had a high level of motivation to help women, they scored low on domains such as 'beliefs about consequences' and 'environmental context and resources'. The authors therefore suggest that interventions need to focus on providing midwives with information about the effectiveness of different smoking cessation services, carbon monoxide monitors and/or information on how to help pregnant women stop smoking.

One of the strengths of the TDF is that it takes into consideration the environment behaviours take place in, lending itself well to being used in different settings and with different populations, using both qualitative and quantitative research (Francis, O'Connor & Curran, 2012). That said, one of the limitations of the framework is that the relationship between the different domains has not been specified so the framework does not produce easily testable hypotheses (Francis et al, 2012).

Operationalising Theory in Research

Once we have chosen which theory to use, the next issue is how to operationalise it in research. Rather than "*what are we measuring and why?*" this deals with "*how do we measure what we want to measure?*" Aspects of perinatal measurement are covered elsewhere in this special edition (Alderdice et al., 2013; Martin & Savage-McGlynn., 2013).

Here we broadly consider processes through which theoretical concepts can be operationalised, rather than issues of measurement per se.

Theories vary in scope and quality. Firstly, theories explain a range of phenomena that can be overt and observable variables (such as physiological responses or behaviour) or hypothetical or unobservable concepts (such as psychological resilience or beliefs; Jaccard & Jacoby, 2010). Good theories clearly define their concepts and in some instances there may be well-established, validated measures of these concepts available. In these circumstances, choosing an appropriate measure is fairly straightforward and the use of established measures enables comparability across studies. However, as with theories, it is important that we critically evaluate these measures and test whether they remain valid and reliable in perinatal samples (Martin & Savage-McGlynn, 2013).

If theories do not define their concepts then these need to be clearly conceptualised before they are operationalised. There are a number of ways in which this can be done. One way is through the process of instantiation where an abstract construct, such as wellbeing, is translated into a particular example or instance, such as postpartum ratings of happiness. A caveat is that many concepts like wellbeing can be defined and instantiated in multiple ways. For example, the World Health Organisation defines mental health as a “state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community” (WHO, 2011). This definition is incredibly broad and could be instantiated in very different ways by different researchers. Ideally we therefore need agreement between researchers over what constitutes the core concept (i.e. shared meaning) as well as what is redundant (i.e. surplus meaning; Jaccard & Jacoby, 2010). Conceptual clarity is therefore the essential first step towards operationalising concepts, but definitions and shared meaning of the essence of these concepts is also important to advance research and understanding.

Practical steps that can be used to achieve conceptual clarity and agreed definitions include synthesis of existing definitions through literature reviews, identification of overlap and shared meanings in these definitions, clarifying component parts or properties of a concept, creating taxonomies, expert discussion, consensus statements, using psychometric techniques to identify key components or factors, and including discussion of theoretical strengths and limitations when reporting findings. These can all contribute to clearer operationalizing of theoretical concepts. A caveat is that, particularly when measuring unobservable phenomena through proxy measures such as self-report, measurement error means it is impossible to get a measure that is totally synonymous with the underlying concept. Careful development and psychometric testing of measures is therefore as important as clear conceptualisation (Martin & Savage-McGlynn, 2013).

Conclusion

In this paper we have outlined how important theory is to informing and advancing research; and provided examples of how theories can be used in perinatal research. Even when it is not appropriate to use theory in our research, careful consideration of pertinent theories will contribute to greater clarity of concepts and understanding of different explanations or perspectives on what we are studying. It will also prompt us to consider where our research fits in terms of contribution to knowledge or the development and evaluation of treatments. Finally, we have seen that using theory is not tied to particular methodologies and can be used in qualitative and quantitative research. However, it is important that we take a critical approach to theory and measurement so these continue to be developed. It is only in this way that we will forward our understanding of general factors or processes that are relevant to perinatal research, as well as those factors that are specific or unique to perinatal research.

Footnote

1 Perinatal research is not the only academic discipline that does not explicitly utilise theory. The same search using the words 'depression' and 'theory' found 19.08% of papers included the word theory, and this decreased to 0.03% when 'theory' was restricted to the title, abstract or keywords.

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