

May 2018

Postpartum Maternal Mood among Hadza Foragers

Kristen Herlosky

Follow this and additional works at: <https://digitalscholarship.unlv.edu/thesesdissertations>



Part of the [Social and Behavioral Sciences Commons](#)

Repository Citation

Herlosky, Kristen, "Postpartum Maternal Mood among Hadza Foragers" (2018). *UNLV Theses, Dissertations, Professional Papers, and Capstones*. 3260.
<http://dx.doi.org/10.34917/13568478>

This Thesis is protected by copyright and/or related rights. It has been brought to you by Digital Scholarship@UNLV with permission from the rights-holder(s). You are free to use this Thesis in any way that is permitted by the copyright and related rights legislation that applies to your use. For other uses you need to obtain permission from the rights-holder(s) directly, unless additional rights are indicated by a Creative Commons license in the record and/or on the work itself.

This Thesis has been accepted for inclusion in UNLV Theses, Dissertations, Professional Papers, and Capstones by an authorized administrator of Digital Scholarship@UNLV. For more information, please contact digitalscholarship@unlv.edu.

POSTPARTUM MATERNAL MOOD AMONG THE HADZA FORAGERS

By

Kristen N.V. Herlosky

Bachelor of Arts - Anthropology
University of Nevada, Las Vegas
2015

A thesis submitted in partial fulfillment
of the requirements for the

Master of Arts - Anthropology

Department of Anthropology
College of Liberal Arts
The Graduate College

University of Nevada, Las Vegas
May 2018



Thesis Approval

The Graduate College
The University of Nevada, Las Vegas

May 7, 2018

This thesis prepared by

Kristen N.V. Herlosky

entitled

Postpartum Maternal Mood Among the Hadza Foragers

is approved in partial fulfillment of the requirements for the degree of

Master of Arts – Anthropology
Department of Anthropology

Alyssa Crittenden, Ph.D.
Examination Committee Chair

Kathryn Hausbeck Korgan, Ph.D.
Graduate College Interim Dean

Daniel Benyshek, Ph.D.
Examination Committee Member

Peter Gray, Ph.D.
Examination Committee Member

Carolee Dodge Francis, Ph.D.
Graduate College Faculty Representative

Abstract

Postpartum Maternal Mood Among Hadza Foragers

By

Kristen Noelle Valencia Herlosky

Dr. Alyssa N. Crittenden, Examination Committee Chair
Associate Professor in Anthropology
University of Nevada, Las Vegas

The postnatal period immediately following birth is a time of critical importance for both mother and offspring due to the vulnerabilities associated with poorer health outcomes. Infant and maternal mortality rates are among the highest in the world in Sub-Saharan African, often due to lack of professional health care services available. Further, postpartum depression (PPD) impacts 1 in 5 women in low and middle-income countries, with those estimates likely being underestimated. Cross-cultural research on PPD is often measured using westernized screening tools, but new research recommends utilizing combined qualitative methodologies. Here, we present the first investigation of postpartum maternal mood among the Hadza foragers of Tanzania. We administered the Edinburgh Postnatal Depression Scale (EPDS) to twenty-three women, ranging in age from 15- 40 years, all with infants under the age of 12 months. We further analyzed relevant demographic characteristics, including household composition, presence of mother in camp, parity, and age at first birth and found no associations. Follow up interviews served as a validity cross-check for the EPDS, and also suggest that a high proportion of Hadza women are depressed postpartum, and that postpartum “unhappiness” has intimate ties

to pain, anxiety, and sleep patterns. These data are important for increasing our understanding of the etiologies of PPD cross-culturally.

Acknowledgements

I first want to thank my committee chair, Dr. Alyssa Crittenden, for everything she has done to make this adventure reach this false summit. From data entry and reading groups in my undergraduate years, to crafting the most perfect project for a “terminal” MA, and then shipping me off to East Africa to go on the life’s most precious educational opportunity (twice), I could not be more grateful for all I have learned in academia, and more importantly, all I have learned in my most formative adult years. You are my inspiration.

I would also like to thank my committee members, Dr. Dan Benyshek and Dr. Peter Gray. Dan, thank you for your continued hard work into this project and analysis, we would not be where we are today without your impeccable mind. Thank you for your kindness, generosity, and continued laughs. Peter, thank you for all of your consistent “dad” jokes, reading group edits, and professional guidance during my graduate time, truly beginning from day one. I appreciate you both immensely. One last committee thank you to Dr. Carolee Dodge-Francis, my final member, for being a part of this academic group and paving the way for this project and manuscript to come to fruition.

To my friends, family, senior staff, Kelly and Alisa, and everyone else who has offered me guidance, love, and opportunity during this time period, I appreciate your actions and your words, and I would not be here today without my amazing support system. I am especially grateful to Dr. Karen Harry, who offered me guidance and assistance on the statistical analysis portion of this project. To my graduate partner-in-crime, Trevor, you are my rock. Nakupenda.

Finally, a gracious thank you to some of my many funding sources, particularly the Angela Peterson Scholarship, the Department of Anthropology, and the Graduate & Professional Student Association. A special thank you to my most consistent and eager funder, Alyssa, as

well. Without you, there would be no international research. Your magical funding ways never cease to amaze me.

Most importantly, I would like to send a gracious thank you to the many Hadza mothers, children, infants, grandmothers, and the men and boys alike, who tolerated my persistent presence over the past two summer seasons in your homes. I hope that one day our research will be half as impactful to your lives as you have been on mine. Nubaeeya.

TABLE OF CONTENTS

Abstract	iii
Acknowledgements	v
Chapter 1 Introduction	1
Chapter 2 Literature Review	2
Depression and Maternal Health	2
Explanatory Models of Postpartum Depression	6
Cultural Diversity in Treatment Practices	9
Chapter 3 Research Questions and Hypotheses	13
Chapter 4 Methods	16
Study Population	16
Interviews & the Edinburgh Postnatal Depression Scale	17
Analysis Methodology	19
Chapter 5 Results	22
EPDS Results	22
Interview Results	22
Unhappiness and Relationship to Pain	23
Concern over Wellbeing of Infant	24
Anxiety about Death	25
Happiness in Motherhood	27
Attitudes towards Infertility	27
Key Findings	28
Chapter 6 Discussion	33

Limitations	39
Future Work.....	40
Chapter 7 Conclusion	41
Significance	41
<i>Appendix 1 Edinburgh Postnatal Depression Scale Questions</i>	<i>42</i>
<i>Appendix 2 Interview Questions on Birth Experience</i>	<i>43</i>
<i>Appendix 3 Interview Questions on Social Support.....</i>	<i>44</i>
<i>Appendix 4 UNLV IRB Approval</i>	<i>45</i>
References.....	46
Curriculum Vitae.....	5

Chapter 1

Introduction

While the physiology of birth is largely the same for women throughout the world, the manifestation of birthing experience is influenced by a range of biological, cultural, and psychosocial values and attitudes (Adeponle, Groleau, Kola, Kirmayer, & Gureje, 2017; Hrdy, 2011; Stern & Kruckman, 1983). Globally, maternal health is a pressing public health concern, and postpartum depression (PPD) has been identified as a mounting health issue in many populations cross-culturally, with those in low and middle-income countries at the highest risk, where approximately 1 in 5 women may experience PPD (Adeponle et al., 2017; Gelaye et al., 2017).

The postnatal period is often characterized as a time of heightened happiness and bonding between an infant and mother, but for some mothers, there is an onslaught of negative, mixed emotions. While between 30-70% of mothers will experience some form of postpartum “baby blues”, simply defined as a time of “weepiness” and ultra-sensitivity, it often improves without any formal medical intervention (Robertson, Celasun, & Stewart, 2003; Yim, Tanner Stapleton, Guardino, Hahn-Holbrook, & Dunkel Schetter, 2015) . Postpartum depression (PPD), however, is identifiable by a more serious onset of depressive episodes with the most commonly cited experiences associated with feelings of anxiety and/ or stress, hypersomnia or insomnia, irritability, lack of concern for offspring, and overall hostility (Adeponle et al., 2017; Hagen, 1999; Haroz et al., 2017; Hrdy, 1999; Mathers, Fat, & Boerma, 2008; O'hara & Swain, 1996; O'Hara, 2009; Stern & Kruckman, 1983). Postpartum depression is further associated with more serious and long-term consequences for mother, infant, and family dynamics such as enduring mental illness, poor infant health outcomes, and social stigmatization (Adeponle et al., 2017; Oates et al., 2004; Wittkowski, Gardner, Bunton, & Edge, 2014).

The PPD global prevalence rate is 10-20%, with lower rates most often found in high-income countries (American Psychological Association, 2015; Gavin et al., 2005; Gibson, McKenzie-McHarg, Shakespeare, Price, & Gray, 2009; Katz, Crean, Cerulli, & Poleshuck, 2018; O'hara & Swain, 1996; Robertson et al., 2003;

Stern & Kruckman, 1983). These ranges, however, do not account for cross-cultural variation in illness recognition and treatment, differences in evaluation measurements and cutoff scores in screening tools, and intra-cultural variation (Halbreich & Karkun, 2006). The majority of prevalence studies have been conducted among women in the post-industrialized west, from so-called WEIRD (western, educated, industrialized, rich, and democratic) populations (Henrich, Heine, & Norenzayan, 2010). This trend is shifting, however, and more recently there has been an increase in cross-cultural studies in both rural and urban settings (Adeponle et al., 2017; Haroz et al., 2017; Musyimi, Mutiso, Musau, Matoke, & Ndeti, 2017; Pishgar et al., 2016). Incorporating a diversity of global populations widens the range of PPD prevalence to 0-73% of new mothers across populations (see review (Halbreich & Karkun, 2006; Haroz et al., 2017), with ranges for low-income to middle-income countries most often cited between 10-30% (Adeponle et al., 2017).

Despite a growing number of cross-cultural studies, the validity of international PPD research has been contested, particularly over the concern that “depression”, as it is currently understood and treated, is a ‘culture-bound’ western concept, with little applicability or relevance to non-western populations (Oates et al., 2004). Most research utilizes diagnostic and screening tools developed in the post-industrialized west and translated from English regardless of the geographic location or first language spoken of the target population. A recent review of qualitative literature on mental health (Haroz et al., 2017) calls for expanded research programs to understand the meanings and significance of cultural influences on mental health. There are few studies that utilize qualitative methodologies to investigate local, culture-specific recognition of, and experiences with, postpartum mood disturbances let alone the variable social and cultural contexts of perinatal motherhood (Adeponle et al., 2017; Bina, 2008; Oates et al., 2004).

Here, we provide the first investigation exploring postpartum maternal mood utilizing qualitative interviews and a standardized PPD screening tool among a contemporary small-scale non-industrial foraging population, the Hadza of Tanzania. The Hadza are an ideal population in which to study the efficacy of the Edinburgh Postnatal Depression Scale (EPDS) to identify postpartum mood disturbances in a small-scale

population, as they are semi-nomadic foragers who do not use birth control, but who engage in long-term, on demand breastfeeding and live in intensive social care networks (Crittenden & Marlowe, 2013). More importantly, they are also undergoing massive socio-political and nutritional changes as their land rights are increasingly threatened and their traditional and diverse diet of wild foods shifts towards one with heightened incorporation of processed foods and the increased consumption of maize and other domesticated grains. Similar to other forager and small-scale populations, maternal and infant mortality rates are high and professional health care access is limited (Hewlett, 1991; Jones, 2016; Volk & Atkinson, 2013). There is currently a dearth of research on how such transitions and health risk factors might be affecting the health of mothers and their infants during the postpartum period.

Chapter 2

Literature Review

Depression and Maternal Health

Postpartum depression is an affective mood disorder that often occurs up to one year after childbirth and is considered a serious global public health problem for women (Adeponle et al., 2017; Wittkowski et al., 2014). Despite the high disease burden, PPD is often left untreated in most African countries (Adeponle et al., 2017). Postpartum depression is characterized by insomnia, hypersomnia, adverse fetal and infant health outcomes, and diminishing social reputation (Adeponle et al., 2017; Hagen, 1999; Haroz et al., 2017; Hrdy, 1999; Mathers et al., 2008; O'hara & Swain, 1996; O'Hara, 2009; Stern & Kruckman, 1983). In addition, the lived experience of PPD is influenced by a wide range of factors, such as distress, variations in social support, the influence of various cultural belief systems, and, importantly, a variety of culturally-determined idioms of distress (Adeponle et al., 2017; Oates et al., 2004; Sawyer et al., 2011). Prevalence data and commonly associated symptoms are well established for western countries; however, prevalence data for low and middle-income countries are lacking, and accompanying symptoms are often poorly identified or understood (Adeponle et al., 2017; Gelaye et al., 2017).

Although some screening and diagnostic tools have been validated in non-western cultural contexts, some researchers suggest that their development and primary use in high income western countries should temper the assumption of their applicability in non-western cultural contexts (Oates et al., 2004; Sawyer et al., 2011). A cross-cultural research project undertaken by Oates and colleagues (Oates et al., 2004) explored postpartum “unhappiness” and “happiness”, rather than “postpartum depression”, utilizing small focus groups in 11 countries. The study was predominately qualitative and aimed to determine whether or not PPD could be considered a “universal” maternal experience with similar attributes and expressive components. The authors found that “postpartum morbid unhappiness” was present in every population that they studied, and the descriptions were similar to those found in western conceptions of postpartum depression (Oates et al., 2004).

Building on this concept, a recent study conducted in Nigeria (Adeponle et al., 2017) stressed that strategies for the treatment of perinatal depression in low-income countries must consider local social contexts and localized meanings of depressed mood utilizing qualitative and narrative-based methods. Women describe their symptoms in terms of culture-specific social and personal idioms, and many cultures have social norms and ritual practices surrounding reproductive behaviors, paving the way for qualitative research to recognize these interweaving factors (Adeponle et al., 2017).

Precisely how these factors are reflected in patterns of postpartum maternal mental health, remains unclear, however. Based on current screening estimates, we know that approximately 1 in 5 women experience PPD in low and middle-income countries, although some researchers warn this is likely a significant underestimate, since PPD screening and treatment efforts in these countries are often scarce and under-resourced (Gelaye, Rondon, Araya, & Williams, 2016). Africa's maternal health situation is further impacted by some of the highest morbidity and mortality rates in the world (Afolabi, Bunce, Lusher, & Banbury, 2017; Sawyer, Ayers, & Smith, 2010).

Maternal mental health issues in low and middle-income countries are further complicated by the health risks many mothers face due to lack of access to professional health care services and high rates of unassisted home deliveries (Sawyer et al., 2011; World Health Organization, United Nations Population Fund, & Key Centre for Women's Health in Society, 2009). The highest rates of maternal mortality are found in Sub-Saharan Africa, where approximately 1 in 16 women may die in childbirth (Sawyer et al., 2011; World Health Organization et al., 2009). The National Bureau of Statistics in Tanzania, East Africa, estimated the maternal mortality rates to be 432 maternal deaths per 100,000 live births (C. Hanson et al., 2015). There are further geographic, economic, and geo-political landscapes that affect maternal resources and health care practices in Tanzania, particularly for different regions, such as urban or rural populations (Hanson et al., 2015). Birth experience and the rituals associated with pregnancy, labor, delivery, and postpartum health are often very

different for populations living in the post-industrialized west and those outside of the cultural west (Adeponle et al., 2017; Sawyer et al., 2011).

Evolutionary Hypotheses of Postpartum Depression

Increasingly, global public health is incorporating evolutionary medicine into traditional models of care (Wells, Nesse, Sear, Johnstone, & Stearns, 2017), allowing us to ask questions in light of our unique life history as humans, and to further explore origins of certain traits, while integrating cultural, historical, and biological factors (M. Hanson & Gluckman, 2016). For example, one way in which we can garner a better evolutionary understanding of the onset and prevalence of PPD is to pay special attention to populations who are thought to utilize similar ecological resources to those of our hominin ancestors. Hunting and gathering societies are often used as reference populations for Paleolithic populations. While foragers are by no means Paleolithic peoples, they are in many respects the best (and only) proxy we have for natural fertility, highly cooperative, small scale and semi-nomadic populations who have limited or no access to health care and who subsist, at least for part of their economy, by hunting and gathering.

The fact that humans are often considered to be cooperative breeders prompted Hagen (2002) to argue that depression (and especially postpartum depression (Hagen, 2003) might be a kind of ‘bargaining tool’ in which individuals manipulate others to garner resources. Humans are highly social and entirely dependent upon distributed childcare, allowing mothers to use their helpless infant’s vulnerability as a negotiation to elicit more childcare resources. For instance, should a mother determine that she is receiving insufficient social support, she may essentially “bargain” with investment by reducing care or provisioning to her own offspring, in the aims of eliciting assistance from others, as the infant’s needs are not being met ((Hagen, 2002; Hagen, 2003). If Hagen is correct in this hypothesis, this would have likely left hominin mothers particularly vulnerable to their perception of available assistance in childrearing (Hrdy, 2016a). Most depressive episodes postpartum are minor and short-lived (the so-called ‘baby blues’). For the mothers who are receiving inadequate childcare

assistance, however, the ability to defect from obligate care in the form of more debilitating and longer-term depressive episodes is possibly a key component of cooperative breeding or distributed care models (Hagen, 1999; Hrdy, 2016).

Postpartum depression has also been interpreted through an evolutionary mismatch lens; labeled as a “disease of civilization” characterized by cultural factors that are a “mismatch” with our ancestral ecological and social environments (Hahn-Holbrook & Haselton, 2014; Yim, Stapleton, Guardino, Hahn-Holbrook, & Schetter, 2015). Drastic changes in nutrition, sunlight exposure, breastfeeding prevalence, and social support in childrearing between foraging populations and those living in the post-industrialized west, provide a range of potentially mismatched environmental and behavioral factors that might result in postpartum mood disorders in post-industrial contexts. Yet, such a mismatch can offer only a partial explanation for depression, particularly postpartum depressive states (Hahn-Holbrook & Haselton, 2014). Although such a perspective might explain the high rates of postpartum depression among populations living in high income countries, it fails to account for the equally high prevalence of PPD in low and middle income countries, as well for cultural contexts that more closely approximate our ancestral environments (Eberhard-Gran, Eskild, Tambs, Opjordsmoen, & Ove Samuelsen, 2001; Gibson et al., 2009; Hahn-Holbrook & Haselton, 2014; Haroz et al., 2017; Oates et al., 2004; O'hara & Swain, 1996).

Cultural Diversity in Treatment Practices of PPD

As we are increasingly coming to appreciate in diverse disciplines, it is often inappropriate to apply universal diagnostic methodologies and treatments wholesale to all populations (Rohli, Haeusler, Saniotis, & Henneberg, 2016). Research practices, much like medical treatment, must acknowledge individualized and population specific factors in order to improve data collection, interpretations, and, ultimately, health outcomes.

This project sought to address this lacuna in cross-cultural PPD research by utilizing the Edinburgh Postnatal Depression Scale (EPDS), which is considered the global gold-standard screening tool (J. L. Cox,

Holden, & Sagovsky, 1987), and pairing it with qualitative interviews of postpartum “happiness” and “unhappiness”. Using these data, the postpartum mood among a small-scale foraging population from Northern Tanzania was explored, utilizing a screening tool which could allow rates of probable depression to be established in a population in which no postpartum health work has been completed to date. Utilizing the qualitative questions on postpartum “happiness” and “unhappiness” outlined in the Oates et al. qualitative study (Oates et al., 2004), culturally adapted and culturally relevant postpartum behaviors and expectations from local women in the study population were analyzed. These two methodologies, when combined, allow for increased understanding of the use of the EPDS in small-scale societies, as well as establishing what Hadza women deem as the sources of happiness and unhappiness in the postpartum period. Reviewing postpartum happiness and unhappiness in a small-scale society is especially important for our understanding of the global applicability of the definition of depression and treatment practices.

Chapter 3

Research Questions and Hypotheses

As previously discussed in the literature review, most cross-cultural studies, until recently, have lacked the integration of qualitative data to explore perceptions of health. Much of the reported data in the literature has used clinical diagnostic tools that might fail to account for cultural diversity and localized definitions of depression. Further, evolutionary explorations of PPD and maternal health have yet to be completed among a small-scale foraging population. The aims of the current project are to: (1) incorporate qualitative maternal mood data alongside data collected using traditional PPD methodology from the cultural west, and (2) explore maternal health in a small-scale non-industrialized population, and (3) review baseline evolutionary questions.

Research Question 1a: *Can the Edinburgh Postnatal Depression Scale, a cross-culturally validated PPD screening tool be validated among a small-scale, non-industrialized population?*

Research Question 1b: *Do qualitative questions exploring postpartum happiness and unhappiness in maternal mood map onto the scoring results from the Edinburgh Postnatal Depression Scale?*

The EPDS scale has been validated cross-culturally in many different societies and has further been validated among populations on the continent of Africa (Adewuya, Eegunranti, & Lawal, 2005a; Bass, Ryder, Lammers, Mukaba, & Bolton, 2008; Khalifa, Glavin, Bjertness, & Lien, 2015; Lawrie, Hofmeyr, De Jager, & Berk, 1998; Tesfaye, Hanlon, Wondimagegn, & Alem, 2010; Uwakwe, 2003). Utilization of the EPDS scale in a foraging population has not been undertaken, to our knowledge, and prior validation is lacking. Based on our understanding of cross-cultural PPD research, there is a lack of qualitative data that can serve to help validate the use of westernized screening tools in depression research. By utilizing the EPDS among Hadza mothers and also including qualitative data on happiness and unhappiness, we hypothesize the following:

H1: The themes and topics addressed in the qualitative happiness and unhappiness questions will be similar for Hadza mothers that are considered probable depressive according to the EPDS tool. The converse will be true as well, Hadza mothers that are not considered depressive according to the EPDS tool will have similar themes and topics in their qualitative interviews.

H2: The EPDS is a validated screening tool for small-scale, foraging populations when used concurrently with detailed qualitative questions on postpartum happiness and unhappiness.

Research Question 2: *Do low levels of social support increase presence of PPD in Hadza women one year postpartum?*

Some evolutionary anthropologists interested in PPD have argued that higher levels of social support from caregivers other than parents will decrease levels of low postpartum mood due to increased resource allocation and investment in a new infant (Hagen, 1999; Hagen, 2002; Hagen, 2003; Hrdy, 2016b). Based on these human life history and cooperative breeding models of resource allocation and investment, our hypothesis is as follows:

H3: Hadza women with highest levels of social support from outside caregivers, such as husbands, friends, and family members, will have lower levels of probable postpartum depression than women with lower levels of social support.

Chapter 4

Methods

Human Research Subjects approval was obtained from the University of Nevada, Las Vegas Institutional Review Board (IRB). Informed consent was obtained orally from all participants, as the Hadza are a predominantly non-literate population. All consent procedures and data collection were approved by the Tanzanian Commission for Science and Technology (COSTECH).¹

Study Population

The Hadza of Tanzania occupy a 4000 km² region in Northern Tanzania in a savannah woodland habitat south of the Serengeti (Marlowe, 2010; Blurton Jones, 2016). They are semi-nomadic and live in fluid camps of roughly 30 individuals, where much of the food consumed come from wild sources. Recently, their diet has begun to incorporate increased amounts of agricultural products, such as maize (Crittenden et al., 2017). While no foraging population relies exclusively on wild foraged food any longer, the Hadza represent a population in which a subset of the total population, around 150 individuals, continue to consume a diet that is largely composed of wild foods (Crittenden et al., 2017). As of 2016, their food system is undergoing drastic change as more Hadza (approximately 15% annually) transition into a market economy, engage in wage labor, and benefit from government, missionary, and non-governmental organization (NGO) food drops of maize and other domesticates (Crittenden et al., 2017; Jones, 2016; F. Marlowe, 2010).

¹ As this was not an intervention study and was interview based, no research approval was required from the National Institute of Medical Research.

Currently, the Hadza are living in a transitional period that is replete with sociopolitical, demographic, and environmental change. They are simultaneously fighting for access to formal education, adequate health care, and land rights to maintain access to their traditional foraging lands, while also interacting with missionaries, traveling health care providers, government agencies, researchers, ecotourism companies, and NGOs. Hadza women are dealing with high levels of infant and maternal mortality, with lack of access to appropriate and professional health care services in a rural environment. Moreover, some are actively participating in the market economy as labor-driven work increases in nearby villages and daily wages are accrued from participation among the eco-tourism companies and hunting concessions.

Sample Size

A total of 25 Hadza women, aged 15-40 years, were recruited utilizing convenience sampling from ten semi-nomadic camps in July and August of 2016 and 2017 from the Lake Eyasi region of Northern Tanzania. All individuals included in final analysis agreed to participate in a three-part interview process that included one demographic questionnaire, two semi-structured interviews, and the administration of the EPDS scale. One woman in a village camp declined to participate and another participant declined to finish the study, citing research fatigue. The final sample size included 23 (92%) of 25 women with infants less than one year of age from the ten camps visited.

Interviews

The first semi-structured interview asked questions about the overall birth experience of the mother and included questions on happiness and unhappiness during pregnancy and directly after birth. This interview was conducted in order to contextualize and aid in interpretation of the validity of the EPDS scale. The second semi-structured interview sought to measure social support and recorded presence of mother or mother-in-law, father,

and/or grandparents residence in camp. Demographic information was also taken on parity, and age at first birth.

Edinburgh Postnatal Depression Scale

We used the Edinburgh Postnatal Depression Scale (Abbott & Williams, 2006; Abiodun, 2006; Chibanda et al., 2010; Eberhard-Gran et al., 2001) which has been found to be effective cross-culturally, in both urban and rural environments, as a screening tool for postpartum depressive symptoms (Cox et al., 1987). While the scale does not diagnose depression, it does screen for behavioral symptoms that are commonly linked to depression.

The EPDS is a 10-question survey that takes approximately 5-10 minutes to complete. Each question is scored 0 to 3 points, on a Likert scale, and is based on how the participant has felt in the past 7 days. In total, participant scores may range from 0-30. The EPDS uses different cut off points to detect potential depressive states²; the cut off for “probable depression” or major depression is 12/13, whereas the cut off for “possible depression” or minor depression is typically 9/10 (Cox et al., 1987; Gibson et al., 2009). One systematic review of 143 studies found that average cut-off scores varied from 9-13 (Halbreich & Karkun, 2006). Based on suggestions from the scale developers (Cox et al., 1987), and other cross-cultural studies conducted using the scale, we chose a cut-off score of 12 for the current study. For the purposes of this study, women scoring 12 or above will be referred to as “depressive” or “depressive-scoring” women; however, our team was not comprised of medical doctors and no participants received a clinical medical diagnosis of depression.

The survey was translated into Swahili and back translated by five native Swahili speakers for accuracy. The EPDS questionnaire is typically administered independently to women whom are expected to read and mark answers on their own, however, it can be administered verbally among non-literate populations (Cox et

² It is important to note that the EPDS is merely a screening instrument and diagnosis of depression must be made by an appropriately trained health professional (Cox, 1987; Gibson et al., 2009).

al., 1987). Here, because the Hadza are largely a non-literate population, the EPDS was administered verbally. The scale was administered in Swahili, the second language of the study population, to participating Hadza mothers with responses marked by the researcher. The questions and translations were not adjusted over the two field seasons in an effort to maintain consistency. Typically, the EPDS scale is given to new mothers within six weeks of birth (J. Cox, Holden, & Henshaw, 2014) (Cox et al., 2014), however, due to the low population density of the Hadza, the scale was administered to all women who had an infant under one year of age at the time of data collection with no repeat collection between field seasons. Administration of the EPDS in the first year postpartum has been validated previously with sufficient sensitivity (Anderson, 2010; Goodman, 2005).

Analysis Methodology

Interviews were transcribed by K Herlosky. The interviews were also transcribed for accuracy by two native Swahili speakers with previous experience transcribing interviews. The inductive thematic analysis sought to conceptualize recurrent trends and patterns that directly derived from the interview participants themselves. For the purpose of the current study, the following questions were used for postpartum mood theme analysis:

1. *What do you think brings happiness to women during pregnancy?*
2. *What do you think brings unhappiness to women during pregnancy?*
3. *What do you think brings happiness to women after childbirth?*
4. *What do you think brings unhappiness to women after childbirth?*
5. *What do you think people (you) know/ understand about being emotionally unwell following birth (postnatal depression)?*
6. *When a woman is emotionally unwell during the postpartum period, what do you think can be done to help her?*

We chose this subset of questions, rather than all 16 for analysis, because they are the questions established by a previously published universal states of morbid unhappiness study on which we modeled our own research design (Oates et al., 2004).

We reviewed the interviews to establish recurrent themes. After initial review of the transcripts, five recurrent themes were established for the six questions: (1) unhappiness and its relationship to pain, (2) high concern for the wellbeing of the infant, (3) anxiety about death or complications during labor and delivery for mother, (4) happiness in motherhood, and (5) attitudes towards being infertile. A coding team reviewed the interviews, and tracked words and phrases directly related to the five themes that we identified. These word counts were used to identify trends between depressive and non-depressive scoring women.

The thematic coding of the interviews was aimed at better understanding language used to describe characteristics related to attitudes, beliefs, and causes of possible depression for Hadza mothers. Detailed results concerning interview themes, word counts, and postpartum happiness and unhappiness factors are discussed in the next chapter. The coding team had inter-rater reliability (IRR) confidence score of 95% after the first review of pain and anxiety coding. The second IRR received a score of 100% reliability.

The EPDS screening tool was analyzed using methods outlined per Cox (1987). The cut-off score was 12, so all women with scores of 12 and above were scored as “probable” for a depressive state. Any individual with this score will be hereafter referred to as “depressive-scoring women”. Scores for each woman was totaled based on their verbal responses from each question, denoting an option of a 0-3 score per question. Descriptive data comparison of depressive-scoring women and non-depressive-scoring women were analyzed using IBM SPSS Statistics software 23. Each question (1-10) in the EPDS was compared between depressive-scoring and non-depressive-scoring mothers in SPSS using a Mann-Whitney U test. We further analyzed relevant demographic and social support characteristics utilizing a Chi-Square Test of Independence. Due to the small sample size, we used Fisher’s Exact Test (2-sided) to interpret the p value for all social support characteristics, including: presence of mother in camp, presence of husband in camp, and presence of grandparents in camp. Residence location in the bush or village was also compared using a Chi-Square Test, to identify any differences in EPDS score. Demographic characteristics including the age of mother, parity, and first-time

mothering, were also correlated to depressive -scoring and non-depressive-scoring mothers to see if the Pearson Correlation value was significant (2-tailed).

Participants reported the presence of mother, husband, and/or grandparents in camp in the verbally administered demographic questionnaire. The presence of the father in camp was recorded if he currently lived in the same camp as the mother, even if residing in a separate household. Presence of grandparents was coded as either maternal or paternal grandmother and/or grandfather residing in camp.

Chapter 5

Results

EPDS Results

Using the EPDS, twelve of the twenty-three women (52%) in our sample are considered at risk of depression according using a cut-off score of 12. We further analyzed relevant social support characteristics using a Chi-Square test, including presence of mother ($p=.667$), husband ($p=.478$), and grandparents ($p=1.00$) in camp and found no associations of depressive-scoring. After analyzing relevant demographic characteristics, such as first-time mothering ($p=1.00$), parity ($p=.838$), and the age of mother ($p=.790$), we also found no association with depressive-scoring.

Table 1. EPDS Questions: Depressive vs. Non-Depressive Scoring Women

	Category	Mean Score	Variance	Standard Deviation	P-Value	U-Value
Question 1	D*	1.75	2.02	.411	.059	35.5
	ND**	.55	.47	.688		
Question 2	D	1.83	1.97	1.40	<i>.316</i>	49.0
	ND	1.18	1.164	1.079		
Question 3	D	1.00	.545	.739	<i>.169</i>	43.5
	ND	.55	.873	.934		
Question 4	D	2.08	1.356	1.165	.059	35.5
	ND	1.09	1.491	1.221		
Question 5	D	1.75	1.659	1.288	<i>.079</i>	37.0
	ND	.73	1.618	1.272		
Question 6	D	.67	1.152	1.073	<i>.347</i>	50.0
	ND	.18	.364	.603		
Question 7	D	2.25	.568	.754	.001	14.5
	ND	.64	.855	.924		
Question 8	D	1.42	1.174	1.084	<i>.151</i>	42.0
	ND	.73	.618	.786		
Question 9	D	1.42	.629	.793	.011	25.0
	ND	.45	1.073	1.036		
Question 10	D	.80	1.879	1.371	<i>.118</i>	40.0
	ND	.73	1.218	1.104		

*D, depressive-scoring women (scores < 12); **ND, non-depressive scoring women (scores > 12)

We found statistical significance ($p < .05$) for depressive-scoring women for four of the ten questions (questions 1,4,7, and 9). The women had significant differences in their self-reported ability to laugh ($p = .047$), feelings of anxiety ($p = .049$), difficulties with sleeping ($p = .001$), and crying levels ($p = .011$), see Table 1. The mean score of all questions for all women was 11.52. The mean score of all questions for depressive-scoring women was 15.92, and 6.82 for non-depressive-scoring women, respectively; there was a statistically significant difference between the EPDS mean scores of the depressive-scoring and non-depressive scoring group ($p = .000$; mean rank 17.50 v. 6.00), see Table 2. There was no statistical difference between bush-dwelling Hadza and village-based Hadza mothers' scores ($p = .593$).

Table 2. Depressive-Scoring and non-depressive scoring women EPDS Questions 1-10., comparison of mean scores

		Mean Score	Variance	Standard Deviation	P-Value
Total Score Questions 1-10.	Depressive-Scoring	15.92	11.174	3.343	$P < .000$
	Non-Depressive	6.82	13.964	3.737	
	All	11.57	33.53	5.79	

Interview Results

The interview questions on birth experience sought to characterize and explore happiness and unhappiness in mood for women during pregnancy and after birth, while also asking questions on the overall birth experience of the mother. A subset of six questions of the interview are the main focus of the current study and were selected to better reveal and contextualize attitudes, beliefs, and causes of Hadza postpartum depressive mood.

After initial review of the transcripts, five recurrent themes were established for the six questions: (1) unhappiness and its relationship to pain, (2) high concern for the wellbeing of the infant, (3) anxiety about death

or complications during labor and delivery for mother, (4) happiness in motherhood, and (5) attitudes towards infertility.

Unhappiness and its relationship to pain

Physical difficulties associated with the hardship of labor and delivery were described often by mothers. Pregnancy and childbirth were described as physically exhausting and painful for mothers, particularly if they had any complications during labor and delivery, or had anticipated any complications during pregnancy, such as: breech, extended labor with little to no progress, maternal hemorrhage, still birth, and infants being reported as “too big” to deliver without medical assistance. Labor pains and expectations of pain during pregnancy are distressful. However, both depressive and non-depressive-scoring women used pain descriptive words outside of the confines of childbirth, associating pain with “unhappiness”, or “sadness” during pregnancy and after birth.

“You get sad if you have stomach problems after childbirth. But you still have trouble in the stomach, so you suffer, you get sad, and pains are still inside and have yet to get out. You will now be sad.” (V13)

“There is no happiness [after birth] because you feel heavy in your stomach.” (S11)

Based on EPDS scale responses, depressive-scoring women scored significantly higher on questions related to difficulty sleeping (7.) and crying (9.). Crying and sleeping were frequently mentioned, and subsequently coded, as directly related to physical pain. Moreover, nine of the twelve (75%) depressive-scoring mothers and eight of the eleven (72.7%) non-depressive-scoring mothers discussed pain outside of childbirth at least one time during the interview. The qualitative interview data from depressive-scoring women is further associated with their EPDS answers as best exemplified by these three women:

“[unhappiness in pregnancy] you feel body pains, you always sleep, and you remain sad always.” (A10)

“[unhappiness in pregnancy] sleep. A lot of sleep. Some sleep because they feel ill, they vomit, there is dizziness, when you get pregnant you vomit and sleep a lot.” (G11)

“[unhappiness after birth] you are tired, and then you are sad always.” (Q12)

Happiness, on the other hand, is often associated with the absence of pain. There is an expectation that if there is no pain in pregnancy or after childbirth, there will not be any unhappiness. Taken together, these interviews suggest that sadness and physical pain, related to childbirth, are intricately tied together when discussing postpartum unhappiness mood.

“When the bleeding and the pain stops you cannot feel sick or cry, you are happy because you are healed.” (G15)

“If you do not have problems, just give birth without any troubles, you are happy with women.” (Q14)

High Concern of the Wellbeing of the Infant

Several participants expressed concern over the health and wellbeing of their infants, both during pregnancy, labor and delivery, and after childbirth. Themes mentioned included stillborn infants, death of infants from delivery complications, and general concerns for the health of both the mother and infant. Some participants also mentioned religious statements pertaining to God and the assurance for a safe delivery.

“[unhappiness after birth] when you delivery a stillborn baby.” (H13)

“I’m just thinking if I am going to give birth safely or the baby is going to die, or I am going to die. These are the thoughts, but not the actual case of what God has planned, He knows I am going to deliver safely.” (F11)

Some women also reported fear of traveling to nearby village hospitals to deliver their infants. It is interesting to note that all 23 women in this sample reported that they believed home births to be superior to hospital births.

Women related infant complications to hospital transport as well.

“You are worried, you are asking for God’s help to give birth safe and the baby to be alive. You have two things, asking God’s help to have a good birth because you might deliver the baby but unfortunately it has already died in the womb. You are also praying to God to help you give birth at home so you don’t need to go to the hospital for surgery... you pray to God to birth safe at home with the parents” (P13)

“[unhappiness in pregnancy] is when the baby is seated wrongly in the womb.” (W11)

Anxiety about Death

Similar to fears about infant mortality and complications, mothers feared the same for themselves during pregnancy, labor and delivery, and complications directly after giving birth. All women in the sample, regardless of residing in the village or the bush, reported fears about labor complications and death. This is likely not only because maternal mortality is a possibility, but also because all women residing near villages in our sample were still approximately two hours away from a hospital by car or motorcycle. The women in our sample have limited, if any, access to telephone communication to get an ambulance, and even if they could call the hospital, it is possible that a vehicle could not reach them. Most women in the sample report that medical practices are limited to traditional remedies, unless there are currently traveling doctors or nurses present in the camps during childbirth.

“The truth is we do not have any kind of help or assistance here other than just offering herbal medicine to them to take when they (mothers) are not feeling well.” (M15)

Women tend to associate a safe delivery with happiness during pregnancy and after childbirth. The inverse was true for unhappiness; a delivery associated with complications, or the fear of dying, brings unhappiness for mothers.

“Before giving birth women are sad because they worry about whether they will have a safe delivery or maybe they will have problems during delivery... when you give birth safely you are happy” (H11)

“No happiness [during pregnancy] because you keep thinking of how well you will give birth” (T12)

“[Pregnancy] is sad because it is life and death.” (X11)

“For someone like me, I never experienced any sadness because I had a good experience when I gave birth. I never had to go to the hospital.” (N13)

Overall, depressive-scoring women had statistically significant higher scores than non-depressive women on the question related to anxiety and worry (4.). Concern for the wellbeing of their infant and concern over maternal complications death in childbirth are possibly related to this question, even after childbirth has occurred. For instance, 78.2% of all mothers made anxiety statements concerning their health, or their infant's health; 83.3% of depressive mothers' qualitative responses had anxiety-based responses. "[Women] do not have peace." (M12)

Happiness in Motherhood

Hadza women place a great deal of emphasis on happiness and motherhood. All of the women in the sample reported the birth experience as something sacred to women and a "woman's secret" kept from the men. Women often reported having the desire to have children and bring them into the world as a member of their family and the value of their roles as mothers within their community.

"When you are pregnant you feel happy because you are going to give birth to a baby and you get an additional family member... when you have your baby you are happy, nothing else." (B10)

"You feel good when you give birth and you get to extend the family." (C10)

"If you see the baby you become happy, you have pains but later become happy to see your baby... after birthing, nothing brings sadness, I am happy because the baby is out and there is no pain." (D12)

"Women are so happy after birth because now a child has come to the world." (G12)

"It's great joy to become pregnant because I am now referred to as someone's mother. That brings so much joy and happiness." (N10)

Attitudes Towards Infertility

A great deal of emphasis was placed on maternal social status of becoming a mother. The sacred process of birth and motherhood was evident with expectations on growing a family, leading 6 of the 23 mothers (26%) to independently discuss "barrenness" and infertility as sources of unhappiness.

“[before birth unhappiness] is being “barren”, and everybody talking about you being barren, and a lot of worries...

“When you are “barren”, everybody hates you so much.” (C11)

“The baby makes me very happy and it also makes me fit in like the rest of the women.” (M12)

“They [the woman] are happy because they know she will not be infertile because she is pregnant.” (E10)

“It’s joy and happiness when you give birth to a child because being referred to as “barren” in life is very bad.”

(N11)

Key Findings

The five themes established from interview analysis identified key factors in how Hadza women characterized happiness and unhappiness in pregnancy, childbirth, and postpartum. Women described their relationship to happiness as related to healthy infant outcomes, fertility, and the joys of motherhood. Unhappiness was tethered to pain, complications during pregnancy and labor, and anxiety over the health of an infant. Some of these themes were more apparent than others within the sample, but descriptions of morbid states of postpartum unhappiness appear to have broadly similar ranges of characteristics to western definitions of PPD.

Chapter 6

Discussion

The aim of this study was to explore postpartum maternal mood among a small-scale, non-industrialized society utilizing a cross-culturally validated scale and corresponding qualitative interviews. Further aims include highlighting cross-cultural variation in postpartum behavior and testing the potential validity and strength in using combined qualitative and quantitative methods when researching maternal health in non-western populations.

Social Support

We hypothesized that low levels of social support would be associated with the presence of PPD in women one year postpartum. Poor levels of social support have been correlated with depressive symptoms in other studies; however, this study was unable to lend additional support to this hypothesis (Adewuya, Egunranti, & Lawal, 2005b; Beck, 2001; Haroz et al., 2017; Sawyer et al., 2010). Child care practices in other small-scale foraging populations are similar to those of the Hadza as women are intimately supported throughout their communities through the support of friends and family (Crittenden & Marlowe, 2008; Hewlett & Lamb, 2002; Hill & Hurtado, 2017; Kramer, 2005; Meehan & Hawks, 2013; Winking, Gurven, Kaplan, & Stieglitz, 2009). Infant attachment is not only focused on the mother, but also on these other caregivers, or allomothers. The total Hadza population is very small, so women remain in close contact with siblings, cousins, grandmothers, mothers, and other family members, with whom they are able to share infant care (F. W. Marlowe, 2005). A study conducted on allomaternal care among the Hadza found that cooperative care and infant holding was most readily done among related kin, but unrelated helpers of all ages also contribute (Crittenden & Marlowe, 2008). The women in this sample were no different, as those who were still in camp with the infant's father often spoke highly of their help and assistance with childcare duties, food gathering, and the collection of water. Participants also described intimate relationships with grandmothers, which are centered

on childcare investment. Despite the high levels of social support reported among participants, our data suggest that Hadza women are experiencing extremely high depressive rates (52%) for any population, but particularly high for a low-income country (Adeponle et al., 2017).

Hagen (2002) and Hrdy (2016) hypothesize that low levels of social support would increase the likelihood of postpartum depression among mothers, yet there was no significant difference between mothers that had more social support, i.e. having more alloparents available, or those without husbands. Not all of the women had their mother living in camp and 75% of depressive-scoring mothers had their mothers present, so this did not contribute to the likelihood of depressive-scoring. Surprisingly, only 54% of mothers that did not score in the depressive range had their mother present in camp. Social support fails to account for these high levels of depressive-scoring among Hadza women. This finding was quite unexpected given the protective effect from PPD social support has been shown to provide in other studies.

Furthermore, in terms of evolutionary studies on postpartum depression, arguments have been made that PPD is a “mismatch” from our ancestral lifestyles (Hahn-Holbrook & Haselton, 2014), or that it is an evolutionary adaptation to elicit more resources (Hagen, 2002). Arguments that PPD is a mismatch are unlikely, not only based on the findings from the current study, but other depression studies that found rates other than 0% outside of the cultural west (Gelaye et al., 2016; Haroz et al., 2017; O'Hara, 2009). Postpartum depression appears to be a debilitating illness all around the world, and that is not correlated to closer approximations to ancestral ecologies or lifestyles.

Qualitative Interviews and EPDS Thematic Analysis

Our hypotheses related to the cross-cultural validity of the EPDS among a small-scale, foraging population directly tie into the qualitative exploration of postpartum maternal happiness and unhappiness, as first described by Oates and corresponding project authors in the cross-cultural study (2004) There were statistically significant differences between depressive scoring and non-depressive scoring women on EPDS

questions related to anxiety, crying, lack of laughter, and sleeping. We suggest here that morbid states of unhappiness are recognized by all mothers in our sample as associated with sadness, pain, and anxiety. Importantly, this sadness was not pathologized, at least to the research team, with an illness name or described as a malady or mental disorder that could be effectively treated with biomedical health care.

Although the EPDS was previously validated in several studies conducted in Sub-Saharan Africa (*Stewart depression malawi*; Adewuya et al., 2005; Bass et al., 2008; Khalifa et al., 2015; Lawrie et al., 1998; Uwakwe, 2003), two studies found it to be an insufficient measurement in detecting postpartum depression among rural populations of Ethiopia when compared to a second screening tool (Hanlon et al., 2008; Tesfaye et al., 2010). The Ethiopian rural sample had difficulties with translation for questions 1-3 on the EDPS, as well as difficulties with reading the questions verbally for participants (Hanlon et al., 2008; Tesfaye et al., 2010). The Ethiopian research team noted confusion with the formatting of the questions in the likert scale format, as this was unfamiliar with the rural women. However, both Hadza men and women have been exposed to likert scale research studies for at least the past 15 years and the concept was validated in the results of the subsequent publications (Butovskaya et al., 2012; Doll et al., 2014; F. W. Marlowe, 2004; Sorokowska et al., 2017). Our team did not note any explicit confusion when the scale was verbally administered, making the Ethiopian team's format experience unlikely among the Hadza. Interestingly, the Ethiopian sample scored highest on the question related to anxiety in both of their depression screening tool samples, similar to Hadza women. The study conducted in Nigeria (Uwakwe, 2003) had a depression rate of 10.7%, which is much lower than our sample (52%).

Our qualitative data was particularly useful in identifying causes of anxiety among mothers (i.e. fears of maternal or infant mortality in birth, concern over health of infant, and infant dying in the womb). Studies that have been conducted in the developing world have found that women's experiences of depression are highly correlated with socio-demographic and psychosocial risk factors, such as poor social support, disappointment in an infant's gender, or high global levels of stress and anxiety (Haroz et al., 2017; Sawyer et al., 2010;

Wittkowski et al., 2014). Other studies have found that high levels of stress and anxiety are potential risk factors for depressive states (Haroz et al., 2017; Sawyer et al., 2010; Sawyer et al., 2011; Stubbs et al., 2017; Wittkowski et al., 2014). These high levels of stress and anxiety are often culturally determined risk factors, which are typically associated with psychosocial difficulties, such as poor social support, stressful or negative life events, past history of abuse, or possibly poor marital relationships (Wittkowski et al., 2014). Women located in the bush and in village camps have little to no ability to contact help or assistance for pregnancy or childbirth complications, potentially increasing their anxiety or stress about the process of becoming a mother.

Maternal and infant mortality rates among Hadza mothers are difficult to estimate based on small sample size. A recent Hadza demography book by Nicholas Blurton Jones (2016) estimated Hadza maternal mortality rate at 1022/100,000 live births between 1985 and 2000, placing them slightly higher than the Tanzanian average at that time of 720/100,000 live births. The infant mortality rate for infants under 1 year is high, roughly 21.8%, based on census data collected from 1985-2000 on 330 (Jones, 2016). These data suggest that the Hadza experience some of the highest reported rates of infancy and early childhood (one to four years) mortality in the world. While surprising, these data are similar to those reported for other small-scale, non-industrialized populations. Hewlett (1991) compiled infant and child mortality among other “active” hunter-gather groups, with the highest rates derived from the Agta (34.2%), Mbuti (33%), and Batak (28.5%). Other infant mortality rates included the !Kung (20.2%), Ache (21%), and the Aka (20%); respectively, he calculated the average of all hunter-gatherer infant mortality to be 14% (Hewlett, 1991). Recent work calculating wide ranges of geographic locations, diverse cultures, and time periods further suggests that infant mortality rates, measured by infant death within the first year of life, are estimated to have been 27% for hominins in the environments of evolutionary adaptedness (Volk & Atkinson, 2013).

Arguably, these astronomically high rates of infant mortality might be a central contributing factor to mothers’ anxiety over maternal complications and infant complications in pregnancy and childbirth. Further, the Hadza infant mortality rate is higher than the rest of Tanzania, roughly 6% (World Health Organization, 2018)

and their neighboring tribesman, including the Datoga (Jones, 2016) Although women are unable to reach doctors easily from their home location, they appear to value at least some of their medical practice. When asked how the women could help another woman if they were emotionally “unwell” after childbirth, some of the mothers stated they would offer her fruit or water, and if that did not work, potentially a doctor, or the hospital, could offer assistance (if it were possible to travel there).

The relationship between sadness and pain, as it relates to PPD, is complicated. Almost all of the women in our sample either experienced or expected to experience pain associated with labor and delivery. Women tended to associate labor pain with unhappiness and also reported feelings of unhappiness and distress during pregnancy. One notable quote from a participant was her response to what brings happiness in pregnancy, her reply was “nothing.” Previous research suggests that the perinatal period is not always filled with happiness and may be a time of emotional distress for women (Sawyer et al., 2010; Sawyer et al., 2011). Distress in mothers has the ability to impact a mother’s mental health and the physical health of both mother and infant (Halbreich & Karkun, 2006; Sawyer et al., 2010; Sawyer et al., 2011) Our data suggest that it is possible that when Hadza mothers mention pain, outside of pain directly associated with labor and delivery, this might be considered emotional pain, or a synonym for what Oates et al., consider “sadness” or “unhappiness”. Another possibility, and one that we do not consider viable, is that the women in our sample may have misunderstood the questions about unhappiness and sadness as asking directly about pain. Based on the significance of the EPDS questions related to sleep and crying, we do not believe that this possibility is likely.

Overall, mothers in our sample appear to recognize pain as an indicator that means a mother is not only physically, but emotionally unwell. The mothers often reported that an absence of pain indicated wellness. For Hadza women, whether they experience pain or not, they view pain as a source of sadness and unhappiness for mothers. Our findings are consistent with other studies that have found associations between pain and depression (Major Depressive Disorder-MDD). Major depressive disorder and PPD have distinct differences related to experiences of distress, stress, irritability, and phobias, and they are typically screened for differently

in a biomedical setting (Jolley & Betrus, 2007). However, the EPDS tool is not only used for PPD screening, but also MDD screening, as it has been validated and administered in many different settings due to its general applicability to depression measurement (Jolley & Betrus, 2007). A recent meta-analysis of 237,952 people across 47 low and middle-income countries found that depression and pain are highly comorbid, and with increased severity of pain, so too increased depression (Stubbs et al., 2017). Furthermore, Stubbs and colleagues (2017) also found that women exhibited a higher overall prevalence of pain than did men, which is further supported through other studies (Mogil, 2012; Rosen, Ham, & Mogil, 2017). Other data suggests that there is a strong association between sleep and pain (Finan, Goodin, & Smith, 2013), and even sleep, pain, and depression (Emery, Wilson, & Kowal, 2014; Wilson, Eriksson, Joyce, Mikail, & Emery, 2002) which potentially negatively impact health and well-being. Similar to these previous findings, Hadza depressive-scoring women are describing pain and negative sleep quality in both the EPDS and in their qualitative interviews. If these results are broadly applied to PPD and associations of pain, or PPD and associations of sleep quality, our results are consistent with these previous findings.

God and Religion

The Hadza have previously been reported as minimally religious, but recent work suggests this is changing (Marlowe, 2010; Purzycki et al., 2016). Work from the research team has noted that the presence of missionaries has been relatively constant throughout the 2016 and 2017 field season. Hadza males, females, and children enjoy when the missionaries come due to the social interaction of song, dance, and food it provides. A large sample of Hadza assessed prior to 2016 stated their belief in a supernatural, celestial based agent, but this agent did not have any supernatural powers or agency (Purzycki et al., 2016). Since then, efforts by missionaries have increased, as noted by the Tanzanian Minister for Natural Resources and Tourism (Juma, 2017). Missionaries are beginning to have a persistent and notable presence in the daily lives of the Hadza. As women started reporting about “God” in their interviews for this study, we asked who they meant. A mother

located in the bush made the distinction that this was the “God above” and “not the sun- god” as might have been expected. The prevalence of God in the women’s interviews is important to note, but it is unclear to what extent missionaries have influenced the women’s belief systems, especially regarding attitudes on health.

Key Findings on EPDS

These results reported here are exploratory and tentative. Although mothers have made statements concerning pain and anxiety, and its relationship to sadness, the qualitative interview supplementation merely suggests that there is an association between these factors and depressive symptoms. Questions on the EPDS proved to have significant differences when reviewing only the individual p-value between depressive-scoring and non-depressive scoring women on questions related to laughing, anxiety, sleeping, and crying. This is interesting, particularly for anxiety, as that was one of the most predominant themes in the qualitative interview. Question seven, related to difficulty sleeping, was the most statistically significant difference between depressive and non-depressive scoring mothers ($p > .001$), followed by crying ($p > .011$). Hadza women spoke of problems with sleep and crying in their qualitative interviews, but not to the same extent as anxiety. It is possible that the Hadza women recognize physical ailments, such as sleeping or crying, to be more associated with unhappiness, as opposed to inner mental states, as in the case of anxiety. This complements the discussion of pain and unhappiness as well; although the women made anxious statements, they never used the word “anxiety” directly.

Cross-Cultural Validity of the EPDS among the Hadza

Finally, it is important to note that although the EPDS and interview questions support the qualitative findings investigating a morbid state of unhappiness, it is not indicative of debilitating levels of depression-like illness in Hadza culture. As previously mentioned, Hadza women may recognize depressive-like symptoms, but it does not necessarily mean that it is affecting their day-to-day livelihood in ways we might expect in

westernized settings following a clinical diagnosis of depression. Oates and colleagues (2004) found that morbid states of unhappiness were universal, but that it is not necessarily an illness that requires treatment. Future work in cross-cultural settings, especially among the Hadza, must take this into account. Mothers do appear to be emotionally suffering, as they reported poor sleep quality, anxiety, crying, stress, and concerns for overall health. Based on these results, the women appear to be minimally in need of assistance or in need of an intervention. It is possible that depressive-scoring mothers have poorer health outcomes for either themselves or their infant, but this study did not measure these outcomes. Morbid states of unhappiness are acknowledged as experienced by some Hadza women following childbirth, but disability associated with that unhappiness would appear to be unknown or extremely uncommon.

Limitations

Care should be taken not to apply or generalize these results to all Hadza women, all small-scale populations, or even other women in rural areas of Tanzania. Women who experience childbirth at home or with professional health care services may have very different birthing experiences. Another notable limitation of this study is the method of translation used. Translation from English to Swahili, was conducted by five native Swahili-speaking research assistants, but translation is never foolproof. To combat some of the issues associated with translation in analysis, transcription listed both Swahili responses and English responses. Unlike the suggestions of the creators of the EPDS, the Hadza women were read aloud the scale and would give their verbal responses, rather than marking the answers on the scale independently, potentially impacting how they heard or understood the questions. Although it was not atypical for mothers to ask for a question to be repeated, the women did not appear to struggle with the same intensity as described for the Ethiopian sample (Hanlon et al., 2008; Tesfaye et al., 2010). The scale was also administered to women up to twelve months postpartum, which is not typical usage of the scale administration.

Qualitative health findings inform and create questions for future work, but it does not produce findings that are necessarily generalized to the entire population. This study is the first conducted on postpartum depressive states among Hadza women, so there are no previous data with which to compare this sample. It is atypical to analyze the questions of the EPDS individually, however, in our aims of trying to interpret the qualitative and quantitative relative to one another, analysis was made between depressive-scoring and non-depressive-scoring women. The EPDS was also the only scale used, so there are no other depressive symptom screening tools to compare the women's scores and sensitivity.

Future Work

Future work among the Hadza, or any small-scale population, regarding PPD, maternal health, or morbid states of unhappiness, must consider how culture specific factors like social support, maternal and infant health fears, pain, negative life events, or distress, might impact and shape health outcomes and emotional experiences of mothers. Problems associated with one-size-fits-all diagnostic tools can be ameliorated by when they are supplemented and validated with qualitative methods. The results of the survey and scale indicate that depressive-scoring Hadza mothers are suffering emotionally, as they have poor sleep, anxiety, and feelings of pain; however, this study was unable to decipher if these women do in fact have poorer health outcomes than non-depressive scoring mothers. Research conducted in WEIRD societies has found that children with depressive mothers, and the depressive mothers themselves, do in fact tend to have poorer health outcomes (American Psychological Association, 2018; Wisner, Chambers, & Sit, 2006). Future work on PPD among the Hadza, specifically, on evaluating the health outcomes of mothers and infants in the postpartum period, might aim to reduce symptoms and causes of depression among mothers, especially regarding anxiety over infant health.

Only through the combination of these qualitative and quantitative methodologies might we be able to better understand postpartum maternal health in this population. Wide ranging public health implications

evaluating the consequences, i.e. poorer health outcomes among depressive mothers and infants, should be the focus of future research.

Chapter 7

Conclusion

The EPDS scale appears to have sufficient validity among this population when used concurrently with the qualitative interview questions. Given the exceptionally high depressive scores yielded by the administration of the EPDS, had the scale been used without the qualitative interview questions, the scale's validity, as applied to the Hadza, would appear questionable. We might predict that the women were unable to understand the translation or that understanding was compromised by the translation process. However, the qualitative interview data supports the notion that Hadza women are currently expressing depression-like problems, as exemplified by their discussion of physical pain, lack of sleep, and anxiety. These data would be enhanced with population-specific evaluations of health outcomes for mother and infant health. Further, these findings support the critical integration of cross-cultural qualitative research with local understandings of western clinical diagnostic tools. Postpartum morbid states of unhappiness appear to afflict new mothers all over the world. It is necessary to have locally based, and culturally appropriate health interventions in place in order to enhance maternal (and infant) health in the postpartum period.

Significance

These data illustrate that Hadza women do experience morbid unhappiness (i.e., depression-like problems) in the postpartum period. It exemplifies that cross-cultural work is best conducted when close attention is paid to culturally significant idioms of distress that might not be found among the cultural west. Studies of this kind generate new ideas and questions for maternal health research. This study has clinical implications for future research among cross-cultural samples, as it is ideal to include qualitative measures of depression congruently with clinical diagnostic measures in order to identify potential problems for mothers and their infants that might be addressed by local, culturally appropriate interventions. Further, it illustrates the need to have local adaptations for such measurements, especially in low resource environments. Future studies

should include a comparative diagnostic measurement, such as another PPD scale that has been cross-culturally validated, to better assess scale validity. This study has elicited unanswered questions on public health consequences of depressive mothers' health and infant outcomes in a small-scale, non-industrialized society.

Appendix 1

Edinburgh Postnatal Depression Scale (In English)

1. I have been able to laugh and see the funny side of things: As much as I always could ____ (0) Not quite so much now ____ (1) Definitely not so much now ____ (2) Not at all ____ (3)
2. I have looked forward with enjoyment to things: As much as I ever did ____ (0) Rather less than I used to ____ (1) Definitely less than I used to ____ (2) Hardly at all ____ (3)
3. I have blamed myself unnecessarily when things went wrong: Yes, most of the time ____ (3) Yes, some of the time ____ (2) Not very often ____ (1) No, never ____ (0)
4. I have been anxious or worried for no good reason: No, not at all ____ (0) Hardly ever ____ (1) Yes, sometimes ____ (2) Yes, very often ____ (3)
5. I have felt scared or panicky for no good reason: Yes, quite a lot ____ (3) Yes, sometimes ____ (2) No, not much ____ (1) No, not at all ____ (0)
6. Things have been getting to me: Yes, most of the time I haven't been able to cope at all ____ (3) Yes, sometimes I haven't been coping as well as usual ____ (2) No, most of the time I have coped quite well ____ (1) No, I have been coping as well as ever ____ (0)
7. I have been so unhappy that I have had difficulty sleeping: Yes, most of the time ____ (3) Yes, sometimes ____ (2) No, not very often ____ (1) No, not at all ____ (0)
8. I have felt sad or miserable: Yes, most of the time ____ (3) Yes, quite often ____ (2) Not very often ____ (1) No, not at all ____ (0)
9. I have been so unhappy that I have been crying: Yes, most of the time ____ (3) Yes, quite often ____ (2) Only occasionally ____ (1) No, never ____ (0)
10. The thought of harming myself has occurred to me: * Yes, quite often ____ (3) Sometimes ____ (2) Hardly ever ____ (1) Never ____ (0).

Appendix 2

Interview: Birthing Experience and Postnatal Mood (In English)

1. How did you feel when you learned you were pregnant?
2. How did you know that you were pregnant?
3. Did you do anything special to prepare for birth?
4. Where did you give birth?
5. What do you remember about being in labor?
6. Did you feed your baby immediately or did you wait?
7. If yes, what did you feed it?
8. Do you feed the infant colostrum, or the “first milk”?
9. What did you do with the placenta?
10. What do you think brings happiness to women during pregnancy?
11. What do you think brings unhappiness to women during pregnancy?
12. What do you think brings happiness to women after childbirth?
13. What do you think brings unhappiness to women after childbirth?
14. What do you think people know/understand about being emotionally unwell following birth?
15. IF a woman is emotionally unwell during the post-partum period, what do you think can be done to help her?

Appendix 3

Interview Three: Social Support (In English)

1. Who did you first tell you were pregnant?
2. During your pregnancy did you feel supported or alone? If supported, by whom?
3. Who was present at your birth?
4. Did anyone bring your gifts or food after you delivered? If yes, who?
5. Are men allowed near the birth?
6. How long was it until your partner held the infant?
7. Who held your baby in the first few moments after delivery?
8. How old was your baby the first time you left them in camp with someone else?
9. Has your baby been breastfeed by other women? If yes, who?
10. How did your husband help you when you had a newborn?

Appendix 4

Institutional Review Board Approval



**UNLV Biomedical IRB - Expedited Review
Continuing Review Approved**

DATE: March 18, 2017

TO: Alyssa Crittenden, PhD
FROM: UNLV Biomedical IRB

PROTOCOL TITLE: [883560-3] Postnatal Maternal Health among the Hadza
SUBMISSION TYPE: Continuing Review/Progress Report

ACTION: APPROVED
APPROVAL DATE: March 18, 2017
EXPIRATION DATE: March 17, 2018
REVIEW TYPE: Expedited Review

References

- Abbott, M. W., & Williams, M. M. (2006). Postnatal depressive symptoms among pacific mothers in auckland: Prevalence and risk factors. *Australian and New Zealand Journal of Psychiatry, 40*(3), 230-238.
- Abiodun, O. A. (2006). Postnatal depression in primary care populations in nigeria. *General Hospital Psychiatry, 28*(2), 133-136.
- Adeponle, A., Groleau, D., Kola, L., Kirmayer, L. J., & Gureje, O. (2017). Perinatal depression in nigeria: Perspectives of women, family caregivers and health care providers. *International Journal of Mental Health Systems, 11*(1), 27.
- Adewuya, A. O., Egunranti, A. B., & Lawal, A. M. (2005a). Prevalence of postnatal depression in western nigerian women: A controlled study. *International Journal of Psychiatry in Clinical Practice, 9*(1), 60-64.
- Adewuya, A. O., Egunranti, A. B., & Lawal, A. M. (2005b). Prevalence of postnatal depression in western nigerian women: A controlled study. *International Journal of Psychiatry in Clinical Practice, 9*(1), 60-64. 10.1080/13651500510018211 Retrieved from <https://doi.org/10.1080/13651500510018211>
- Afolabi, O., Bunce, L., Lusher, J., & Banbury, S. (2017). Postnatal depression, maternal–infant bonding and social support: A cross-cultural comparison of nigerian and british mothers. *Journal of Mental Health, , 1-7*.
- American Psychological Association. (2015). Postpartum depression. *Washington, DC*,
- American Psychological Association. (2018). Postpartum depression. Retrieved from <http://www.apa.org/pi/women/resources/reports/postpartum-depression.aspx>
- Anderson, C. (2010). Using the edinburgh postnatal depression scale to screen for symptoms of depression among latina, african american and caucasian adolescents.
- Bass, J. K., Ryder, R. W., Lammers, M., Mukaba, T. N., & Bolton, P. A. (2008). Post-partum depression in kinshasa, democratic republic of congo: Validation of a concept using a mixed-methods cross-cultural approach. *Tropical Medicine & International Health, 13*(12), 1534-1542.
- Beck, C. T. (2001). Predictors of postpartum depression: An update. *Nursing Research, 50*(5), 275-285.

- Bina, R. (2008). The impact of cultural factors upon postpartum depression: A literature review. *Health Care for Women International*, 29(6), 568-592. 10.1080/07399330802089149 Retrieved from <https://doi.org/10.1080/07399330802089149>
- Butovskaya, M. L., Vasilyev, V. A., Lazebny, O. E., Burkova, V. N., Kulikov, A. M., Mabulla, A., . . . Ryskov, A. P. (2012). Aggression, digit ratio, and variation in the androgen receptor, serotonin transporter, and dopamine D4 receptor genes in african foragers: The hadza. *Behavior Genetics*, 42(4), 647-662.
- Chibanda, D., Mangezi, W., Tshimanga, M., Woelk, G., Rusakaniko, P., Stranix-Chibanda, L., . . . Shetty, A. K. (2010). Validation of the edinburgh postnatal depression scale among women in a high HIV prevalence area in urban zimbabwe. *Archives of Women's Mental Health*, 13(3), 201-206.
- Cox, J. L., Holden, J. M., & Sagovsky, R. (1987). Detection of postnatal depression: Development of the 10-item edinburgh postnatal depression scale. *The British Journal of Psychiatry*, 150(6), 782-786.
- Cox, J., Holden, J., & Henshaw, C. (2014). *Perinatal mental health : The edinburgh postnatal depression scale (EPDS) manual* RCPsych Publications. Retrieved from <http://lib.myilibrary.com?ID=585075>
- Crittenden, A. N., & Marlowe, F. W. (2008). Allomaternal care among the hadza of tanzania. *Human Nature*, 19(3), 249.
- Crittenden, A. N., & Marlowe, F. W. (2013). Cooperative child care among the hadza: Situating multiple attachment in evolutionary context. *Attachment reconsidered* (pp. 67-83) Springer.
- Crittenden, A. N., Sorrentino, J., Moonie, S. A., Peterson, M., Mabulla, A., & Ungar, P. S. (2017). Oral health in transition: The hadza foragers of tanzania. *PloS One*, 12(3), e0172197.
- Doll, L. M., Hill, A. K., Rotella, M. A., Cárdenas, R. A., Welling, L. L., Wheatley, J. R., & Puts, D. A. (2014). How well do men's faces and voices index mate quality and dominance? *Human Nature*, 25(2), 200-212.
- Eberhard-Gran, M., Eskild, A., Tambs, K., Opjordsmoen, S., & Ove Samuelsen, S. (2001). Review of validation studies of the edinburgh postnatal depression scale. *Acta Psychiatrica Scandinavica*, 104(4), 243-249.

- Emery, P. C., Wilson, K. G., & Kowal, J. (2014). Major depressive disorder and sleep disturbance in patients with chronic pain. *Pain Research and Management*, *19*(1), 35-41.
- Finan, P. H., Goodin, B. R., & Smith, M. T. (2013). The association of sleep and pain: An update and a path forward. *The Journal of Pain*, *14*(12), 1539-1552.
- Gavin, N. I., Gaynes, B. N., Lohr, K. N., Meltzer-Brody, S., Gartlehner, G., & Swinson, T. (2005). Perinatal depression: A systematic review of prevalence and incidence. *Obstetrics & Gynecology*, *106*(5, Part 1), 1071-1083.
- Gelaye, B., Addae, G., Neway, B., Larrabure-Torrealva, G. T., Qiu, C., Stoner, L., . . . Williams, M. A. (2017). Poor sleep quality, antepartum depression and suicidal ideation among pregnant women. *Journal of Affective Disorders*, *209*, 195-200.
- Gelaye, B., Rondon, M. B., Araya, R., & Williams, M. A. (2016). Epidemiology of maternal depression, risk factors, and child outcomes in low-income and middle-income countries. *The Lancet Psychiatry*, *3*(10), 973-982.
- Gibson, J., McKenzie-McHarg, K., Shakespeare, J., Price, J., & Gray, R. (2009). A systematic review of studies validating the edinburgh postnatal depression scale in antepartum and postpartum women. *Acta Psychiatrica Scandinavica*, *119*(5), 350-364. 10.1111/j.1600-0447.2009.01363.x Retrieved from <http://dx.doi.org/10.1111/j.1600-0447.2009.01363.x>
- Goodman, J. H. (2005). Postpartum depression beyond the early postpartum period. *Journal of Obstetric, Gynecologic & Neonatal Nursing*, *33*(4), 410-420.
- Hagen, E. H. (1999). The functions of postpartum depression. *Evolution and Human Behavior*, *20*(5), 325-359.
- Hagen, E. H. (2002). Depression as bargaining: The case postpartum. *Evolution and Human Behavior*, *23*(5), 323-336.
- Hagen, E. H. (2003). The bargaining model of depression. *Genetic and Cultural Evolution of Cooperation*, , 95-123.

- Hahn-Holbrook, J., & Haselton, M. (2014). Is postpartum depression a disease of modern civilization? *Current Directions in Psychological Science*, 23(6), 395-400.
- Halbreich, U., & Karkun, S. (2006). Cross-cultural and social diversity of prevalence of postpartum depression and depressive symptoms. *Journal of Affective Disorders*, 91(2), 97-111.
- Hanlon, C., Medhin, G., Alem, A., Araya, M., Abdulahi, A., Hughes, M., . . . Prince, M. (2008). Detecting perinatal common mental disorders in ethiopia: Validation of the self-reporting questionnaire and edinburgh postnatal depression scale. *Journal of Affective Disorders*, 108(3), 251-262.
- Hanson, C., Cox, J., Mbaruku, G., Manzi, F., Gabrysch, S., Schellenberg, D., . . . Schellenberg, J. (2015). Maternal mortality and distance to facility-based obstetric care in rural southern tanzania: A secondary analysis of cross-sectional census data in 226 000 households. *The Lancet Global Health*, 3(7), e395.
- Hanson, M., & Gluckman, P. (2016). Commentary: Developing the future: Life course epidemiology, DOHaD and evolutionary medicine. *International Journal of Epidemiology*, 45(4), 993-996.
- Haroz, E. E., Ritchey, M., Bass, J. K., Kohrt, B. A., Augustinavicius, J., Michalopoulos, L., . . . Bolton, P. (2017). How is depression experienced around the world? A systematic review of qualitative literature. *Social Science & Medicine*, 183, 151-162.
- Henrich, J., Heine, S. J., & Norenzayan, A. (2010). Most people are not WEIRD. *Nature*, 466(7302), 29.
- Hewlett, B. S. (1991). Demography and childcare in preindustrial societies. *Journal of Anthropological Research*, 47(1), 1-37.
- Hewlett, B. S., & Lamb, M. E. (2002). 11 integrating evolution, culture and developmental psychology: Explaining caregiver-infant proximity and responsiveness in central africa and the USA. *Between Culture and Biology: Perspectives on Ontogenetic Development*, 8, 241.
- Hill, K., & Hurtado, A. M. (2017). *Ache life history: The ecology and demography of a foraging people* Routledge.

- Hrdy, S. B. (2016a). Variable postpartum responsiveness among humans and other primates with “cooperative breeding”: A comparative and evolutionary perspective. *Hormones and Behavior*, 77, 272-283.
- Hrdy, S. B. (2016b). Variable postpartum responsiveness among humans and other primates with “cooperative breeding”: A comparative and evolutionary perspective. *Hormones and Behavior*, 77, 272-283.
- Hrdy, S. B. (1999). *Mother nature: Natural selection and the female of the species* Chatto & Windus.
- Hrdy, S. B. (2011). *Mothers and others* Harvard University Press.
- Jolley, S. N., & Betrus, P. (2007). Comparing postpartum depression and major depressive disorder: Issues in assessment. *Issues in Mental Health Nursing*, 28(7), 765-780.
- Jones, N. B. (2016). *Demography and evolutionary ecology of hadza hunter-gatherers* Cambridge University Press.
- Juma, M. (2017, June 19,). Minister orders 100 beehives for hadza community annually. *Daily News* Retrieved from <http://dailynews.co.tz/index.php/home-news/51274-minister-orders-100-beehives-for-hadza-community-annually>
- Katz, J., Crean, H. F., Cerulli, C., & Poleshuck, E. L. (2018). Material hardship and mental health symptoms among a predominantly low income sample of pregnant women seeking prenatal care. *Maternal and Child Health Journal*, , 1-8.
- Khalifa, D. S., Glavin, K., Bjertness, E., & Lien, L. (2015). Postnatal depression among sudanese women: Prevalence and validation of the edinburgh postnatal depression scale at 3 months postpartum. *International Journal of Women's Health*, 7, 677.
- Kramer, K. L. (2005). Children's help and the pace of reproduction: Cooperative breeding in humans. *Evolutionary Anthropology: Issues, News, and Reviews*, 14(6), 224-237.
- Lawrie, T. A., Hofmeyr, G. J., De Jager, M., & Berk, M. (1998). Validation of the edinburgh postnatal depression scale on a cohort of south african women. *South African Medical Journal*, 88(10), 1340-1344.
- Marlowe, F. (2010). *The hadza: Hunter-gatherers of tanzania* Univ of California Press.

- Marlowe, F. W. (2004). Mate preferences among hadza hunter-gatherers. *Human Nature, 15*(4), 365-376.
- Marlowe, F. W. (2005). Who tends hadza children. *Hunter-Gatherer Childhoods: Evolutionary, Developmental and Cultural Perspectives*, , 177-190.
- Mathers, C. D., Fat, D. M., & Boerma, J. (2008). No title. *The Global Burden of Disease: 2004 Update. Geneva, Switzerland: World Health Organization*,
- Meehan, C. L., & Hawks, S. (2013). Cooperative breeding and attachment among the aka foragers. *Attachment reconsidered* (pp. 85-113) Springer.
- Mogil, J. S. (2012). Sex differences in pain and pain inhibition: Multiple explanations of a controversial phenomenon. *Nature Reviews Neuroscience, 13*(12), 859.
- Musyimi, C. W., Mutiso, V. N., Musau, A. M., Matoke, L. K., & Ndeti, D. M. (2017). Prevalence and determinants of depression among patients under the care of traditional health practitioners in a kenyan setting: Policy implications. *Transcultural Psychiatry, 54*(3), 285-303.
- Oates, M. R., Cox, J. L., Neema, S., Asten, P., Glangeaud-Freudenthal, N., Figueiredo, B., . . . Kammerer, M. H. (2004). Postnatal depression across countries and cultures: A qualitative study. *The British Journal of Psychiatry, 184*(46), s16.
- O'Hara, M. W. (2009). Postpartum depression: What we know. *Journal of Clinical Psychology, 65*(12), 1258-1269.
- O'hara, M. W., & Swain, A. M. (1996). Rates and risk of postpartum depression—a meta-analysis. *International Review of Psychiatry, 8*(1), 37-54.
- Pishgar, F., Soleyman-Jahi, S., Pishgar, F., Eftekhar Ardebili, H., Jamal, A., & Arab, A. (2016). Level of happiness and its determining factors in pregnant women: A cross-sectional study. *Journal of Reproductive and Infant Psychology, 34*(5), 431-441. 10.1080/02646838.2016.1222071 Retrieved from <https://doi.org/10.1080/02646838.2016.1222071>

- Purzycki, B. G., Apicella, C., Atkinson, Q. D., Cohen, E., McNamara, R. A., Willard, A. K., . . . Henrich, J. (2016). Cross-cultural dataset for the evolution of religion and morality project. *Scientific Data*, 3, 160099.
- Rohli, F., Haeusler, M., Saniotis, A., & Henneberg, M. (2016). Novel modules to teach evolutionary medicine: An Australian and a Swiss experience. *Medical Science Educator*, 26(3), 375-381.
- Robertson, E., Celasun, N., & Stewart, D. E. (2003). Risk factors for postpartum depression.
- Rosen, S., Ham, B., & Mogil, J. S. (2017). Sex differences in neuroimmunity and pain. *Journal of Neuroscience Research*, 95(1-2), 500-508.
- Sawyer, A., Ayers, S., & Smith, H. (2010). Pre- and postnatal psychological wellbeing in Africa: A systematic review. *Journal of Affective Disorders*, 123(1), 17-29.
- Sawyer, A., Ayers, S., Smith, H., Sidibeh, L., Nyan, O., & Dale, J. (2011). Women's experiences of pregnancy, childbirth, and the postnatal period in the Gambia: A qualitative study. *British Journal of Health Psychology*, 16(3), 528-541.
- Sorokowska, A., Pellegrino, R., Butovskaya, M., Marczak, M., Niemczyk, A., Huanca, T., & Sorokowski, P. (2017). Dietary customs and food availability shape the preferences for basic tastes: A cross-cultural study among Polish, Tsimane' and Hadza societies. *Appetite*, 116, 291-296.
- Stern, G., & Kruckman, L. (1983). *Multi-disciplinary perspectives on post-partum depression: An anthropological critique*//doi.org/10.1016/0277-9536(83)90408-2 Retrieved from <http://www.sciencedirect.com/science/article/pii/0277953683904082>
- Stewart depression Malawi*
- Stubbs, B., Vancampfort, D., Veronese, N., Thompson, T., Fornaro, M., Schofield, P., . . . Koyanagi, A. (2017). Depression and pain: Primary data and meta-analysis among 237 952 people across 47 low- and middle-income countries. *Psychological Medicine*, 47(16), 2906-2917.

- Tesfaye, M., Hanlon, C., Wondimagegn, D., & Alem, A. (2010). Detecting postnatal common mental disorders in addis ababa, ethiopia: Validation of the edinburgh postnatal depression scale and kessler scales. *Journal of Affective Disorders*, 122(1), 102-108.
- Uwakwe, R. (2003). Affective (depressive) morbidity in puerperal nigerian women: Validation of the edinburgh postnatal depression scale. *Acta Psychiatrica Scandinavica*, 107(4), 251-259.
- Volk, A. A., & Atkinson, J. A. (2013). Infant and child death in the human environment of evolutionary adaptation. *Evolution and Human Behavior*, 34(3), 182-192.
- Wells, J. C., Nesse, R. M., Sear, R., Johnstone, R. A., & Stearns, S. C. (2017). Evolutionary public health: Introducing the concept. *The Lancet*, 390(10093), 500-509.
- Wilson, K. G., Eriksson, M. Y., Joyce, L. D., Mikail, S. F., & Emery, P. C. (2002). Major depression and insomnia in chronic pain. *The Clinical Journal of Pain*, 18(2), 77-83.
- Winking, J., Gurven, M., Kaplan, H., & Stieglitz, J. (2009). The goals of direct paternal care among a south amerindian population. *American Journal of Physical Anthropology*, 139(3), 295-304.
- Wisner, K. L., Chambers, C., & Sit, D. K. (2006). Postpartum depression: A major public health problem. *Jama*, 296(21), 2616-2618.
- Wittkowski, A., Gardner, P. L., Bunton, P., & Edge, D. (2014). Culturally determined risk factors for postnatal depression in sub-saharan africa: A mixed method systematic review. *Journal of Affective Disorders*, 163, 115-124.
- World Health Organization. (2018). WHO | united republic of tanzania. Retrieved from <http://www.who.int/gho/countries/tza/en/>
- World Health Organization, United Nations Population Fund, & Key Centre for Women's Health in Society. (2009). *Mental health aspects of women's reproductive health: A global review of the literature* World Health Organization.

Yim, I. S., Stapleton, L. R. T., Guardino, C. M., Hahn-Holbrook, J., & Schetter, C. D. (2015). Biological and psychosocial predictors of postpartum depression: Systematic review and call for integration. *Annual Review of Clinical Psychology, 11*

Yim, I. S., Tanner Stapleton, L. R., Guardino, C. M., Hahn-Holbrook, J., & Dunkel Schetter, C. (2015). Biological and psychosocial predictors of postpartum depression: Systematic review and call for integration. *Annual Review of Clinical Psychology, 11*(1), 99-137. 10.1146/annurev-clinpsy-101414-020426 Retrieved from <https://doi.org/10.1146/annurev-clinpsy-101414-020426>

Curriculum Vitae

Kristen N. Herlosky
University of Nevada, Las Vegas
Department of Anthropology

EDUCATION

University of Nevada, Las Vegas *Anticipated*
Graduation: Spring 2021
Doctoral Student in Anthropology (biocultural and medical)

University of Nevada, Las Vegas *Anticipated*
Graduation: Spring 2018
M.A. in Anthropology (biocultural)

University of Nevada, Las Vegas Spring 2015
B.A. in Anthropology
Minor in Marriage Family Therapy and Sociology

TEACHING

UNLV College of Urban Affairs
Marriage and Family Therapy 350 Spring 2015

- Concepts: Human Sexual Behavior; Human Health Studies; Reproductive Studies
- Enhance student understanding of these topics through supplemental instruction and small-group discussion sessions

Clark County School District
Substitute Teacher/ Guest Teacher Spring 2017-
Summer 2018

- In the absence of the full-time classroom teacher, provides instruction, encourages student's progress, and manages the learning environment; I am currently working at Bridger Middle School, Title I funded school in North Las Vegas. Also, I am the preferred substitute for Coronado High School Special Education classes.

UNLV Department of Anthropology
Physical Anthropology Laboratory Summer 2018

- Lab teacher for summer session III
- Instructor for concepts related to the human evolution, fields of osteology and forensic science, mechanisms of inheritance, comparative analysis, and processes of human growth and aging

RESEARCH EXPERIENCE

Citi Certified: Biomedical IRB, Social/ Behavioral IRB

UNLV Department of Anthropology

Metabolism, Anthropometry, and Nutrition Lab

- Field Site director in Northern Tanzania for NSF Grant “Spatial Navigation and Cognition”
 - PI: Alyssa N. Crittenden, Ph.D & Elizabeth Cashden, Ph.D
- MA graduate project: “Postpartum Maternal Health among the Hadza”
 - Advisor: Alyssa N. Crittenden, Ph.D
- Research Assistant on a project related to reproduction and postpartum health,
 - PI: Daniel Benyshek, Ph.D
- Hadza Nutritional Data Entry
 - PI: Alyssa N. Crittenden, Ph.D

UNLV Department of Nursing

Graduate Research Assistant

- Assist on data entry and literature review on project related to health in transition among immigrants to the US
 - PI: Reimond Serafica, Ph.D, MSN, RN
- Manuscript drafting and statistical analysis for project related to cardiovascular disease risk among college students
 - PI: Dieu-My T. Tran, Ph.D, RN, CNE
- Assist on data entry and literature review on project related on graded immersion exercise and neuroendocrine physiology
 - PI: Rebecca Benfield, Ph.D, CNM

PROFESSIONAL TALKS

1. **Herlosky K**, Benyshek D, Crittenden A. Postpartum Maternal Mood among the Hadza: Utilization of the Edinburgh Postnatal Depression Scale and Supplemental Qualitative Interviews. Invited presentation presented at: CSN/ Archaeo-Nevada Society Conference; May 4, 2018; Las Vegas, NV.
2. **Herlosky K**, Benyshek D, Crittenden A. Maternal Breastfeeding Practices and Infant Colostrum Consumption among Hadza Foragers. Podium presentation presented at: Society for Cross-Cultural Research; February 23, 2018; Las Vegas, NV.
3. **Herlosky K**, Benyshek D, Crittenden A. Maternal Breastfeeding Practices and Implications of Transition among Hadza Foragers. Podium presentation presented at: Graduate and Professional Student Association Research Forum; February 3, 2018; Las Vegas, NV.
4. **Herlosky K**, Benyshek D, Crittenden A. Postpartum Maternal Mood and the Edinburgh Postnatal Depression Scale. Podium presentation presented at: Graduate and Professional Student Association Research Forum; April 9, 2017; Las Vegas, NV.
5. **Herlosky K**, Benyshek D, Crittenden A. Postpartum Maternal Mood among Hadza Foragers. Podium presentation presented at: Society for Cross-Cultural Research; March 5, 2017; New Orleans, LA.
6. **Herlosky K**. Fieldwork and Anthropology. Invited guest lecture: College of Southern Nevada, Department of Anthropology; November 10, 2016.

PROFESSIONAL POSTERS

1. **Herlosky K.** Benyshek, D., Crittenden, A. Postpartum Maternal Health and the Edinburgh Postnatal Depression Scale among Hadza Foragers. Poster presentation at: American Association of Physical Anthropology; April 13, 2018; Austin, TX.

PUBLICATIONS

1. **Herlosky K.**, Brodgon E., Franco C., & Crittenden A. (2015). Allomaternal care and the significance of naturalist observations among contemporary foragers: A commentary on Denham's "Allyawarra kinship, infant care, and alloparenting". *Mathematical Anthropology and Cultural Theory: An International Journal*, 8:2, 1-9.
2. Crittenden A, Samson D, **Herlosky K.**, Mabulla I, & Mabulla A.U. (2018, *in press.*) Forager Technocultural Sleep Adaptation.

AWARDS/ SCHOLARSHIPS

Ron Smith and Susan Thompson Scholarship , UNLV Foundation	Spring 2018
Edwards and Olswang Grant , Department of Anthropology UNLV	Fall 2017
Graduate and Professional Student Association , UNLV	Fall 2016 & 2017
Graduate and Professional Student Association , UNLV	Spring 2016 & 2017
Friends of World Anthropology Award , Department of Anthropology UNLV	Spring 2017
Rocchio Scholarship , Department of Anthropology, UNLV	Fall 2016
Angela Peterson Scholarship , Department of Anthropology UNLV	Spring 2016
Lambda Alpha Graduate Scholarship , Department of Anthropology UNLV	Spring 2016
Edwards and Olswang Grant , Department of Anthropology UNLV	Fall 2015
Rebel Achievement Scholarship , University of Nevada, Las Vegas	Fall 2011- Spring 2015
Millennial Scholarship , Department of the Treasury, Nevada	Fall 2011- Spring 2015
Dean's List , College of Liberal Arts, UNLV	2011-2014

LEADERSHIP INVOLVEMENT

American Association of Physical Anthropologist Meeting

Increasing Diversity in Evolutionary Anthropology Sciences (IDEAS) selected member, 2018

- Participate in multi-day workshops and discussion panels on improvements in diversity and promotion of inclusive practices among evolutionary and physical anthropology discipline

UNLV Volunteers

Site Leader for annual "Service Day"

- Site leader at Lake Mead Service Day clean up

- Delivering Hope and Service Event- twice monthly sandwich making for the Las Vegas Rescue Mission

Maternity Ward Volunteer

St. Elizabeth’s Hospital, Arusha, Tanzania

- Assist with delivery and postpartum care, mother/infant patient care, wellness check, vaccines, & paperwork

Alpha Gamma Delta Sorority

Executive Council positions held: Philanthropy Coordinator (2012), Vice President Operations (2013), Vice President Finance (2014)

- Collaborated with 100+ members to think of innovative ways to solve student issues
- Facilitated weekly member meetings & took minutes; facilitated communication between local chapter and headquarters
- Organizer and leader for \$10,000 donation to the Diabetes Research and Awareness AGD Foundation and food supplies for Second Chance Animal Rescue
- Partnered with other student organizations to orchestrate University-wide events and charities
- Facilitated overall budgeting and financial responsibilities for individual members and financially based position within organization

PROFESSIONAL EXPERIENCE

Contri Construction Company

February 2014-

December 2017

Administrative Assistant

- Front Desk Clerical Work
- Certified Payroll and Invoicing

103 Hot Pilates and Yoga

February 2017- Current

Receptionist and Team Member

- Front Desk Clerical Work and customer service
- Monitor studio and supplies

Clark County Parks and Recreation

2010- 2014

Program Assistant

- Manage front desk (year-round); assist with programming and scholarship administration
- Process money and checks, customer service, computer programming, Excel, filing (basic clerical work)

Southern Nevada Officials Association (seasonal work)

2011-Fall 2016

Volleyball Referee

- Officiate the local high school games for CCSD
- August 2016- February 2017
- August 2016- February 2017

Kemp Broadcasting: Hot 97.5, 106.9 the Q

Fall 2016-Spring 2017

Receptionist

- Front Desk Clerical Work and customer service

AFFILIATIONS

Lambda Alpha Honor Society, *UNLV*

Anthropology Society, *UNLV*

Graduate Women in Science, *Student Member*

Society for Cross-Cultural Research, *Student Member*