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Babies and Biomedicine: Knowledge System Negotiation in the Domain of Infant Care

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BABIES AND BIOMEDICINE:

KNOWLEDGE SYSTEM NEGOTIATION IN THE DOMAIN OF INFANT CARE

by

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ABSTRACT

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Under the Supervision of Professor Benjamin Campbell

In 2011, the city of Milwaukee launched a controversial public service campaign intended to minimize infant deaths by highlighting the dangers of cosleeping. In Wisconsin, about 28% of mothers bedshare with their infants, with the highest rates among women of color, averaging about 40% (Wisconsin Department of Health Services 2014). These data suggest that multiple knowledge systems might exist in the domain of infant care. This thesis proposes that Milwaukee's current campaign is based in biomedicine, the predominant knowledge system surrounding infant care. Yet, its target demographic (cosleeping families) may not subscribe as strictly to a biomedical system of knowledge, and in turn may be more likely to reject the campaign.

It was hypothesized that mothers who accepted other fundamentals of a biomedical knowledge system would also be more likely to reject cosleeping behaviors and more likely to accept Milwaukee's safe sleep message. Similarly, I expected women who did not exhibit strictly biomedical-endorsed behaviors to be more likely to cosleep and less likely to accept the anti-cosleeping message.

To test these research questions, a survey was administered to Milwaukee-area mothers in order to assess 1) a respondent's behaviors relating to biomedicine and

infant care, 2) a respondent's attitudes and behaviors regarding bedsharing, and 3) whether Milwaukee's campaign was successful in changing any attitudes surrounding cosleeping.

Neither research hypothesis (relating to either bedsharing behavior or ad campaign reception) could be accepted. No relationship was found between biomedical adherence and bedsharing behaviors, attitudes, or likelihood of Milwaukee's advertisements to change minds. However, a mother was less likely to bedshare if she believed it to be dangerous or if Milwaukee's safe sleep campaign changed her mind. Attitudes towards bedsharing were strongly predicted by whether the advertisements changed minds.

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INTRODUCTION

Milwaukee, WI has one of the highest rates of infant mortality in America. The most recent published data indicate that for every 1000 babies that were born in 2009-2011, ten died before the age of one, and that number increases to fifteen deaths per 1000 in Milwaukee's African American community (Herzog 2014; City of Milwaukee Health Department 2015). Public health officials calculate Milwaukee's infant mortality rates on three-year rolling averages because individual years can fluctuate. The most recent preliminary data for 2014 shows a total of eighty-four infant deaths out of a total of 9,984 births (City of Milwaukee Health Department 2015). All of these figures contrast sharply with the national infant mortality rate of just under six deaths per 1000 births (Xu *et al.* 2016).

While a host of variables may contribute to this problem (premature births, poverty, drug addiction), the city has focused heavily on bedsharing's role.[1] Although cosleeping deaths make up only about 15% of total infant deaths in Milwaukee, Mayor Tom Barrett justifies the focus by pointing out that "cosleeping deaths are the most preventable form of infant death in this community" (City of Milwaukee Health Department 2015; Herzog 2011).

[1] For the purposes of this thesis, the terms *cosleeping* and *bedsharing* will be used interchangeably, describing when an infant shares a sleeping surface with an adult. Some scholars do delineate between cosleeping and bedsharing, describing cosleeping instead as "the practice of placing the infant in the parents' room for sleep" (Mentzer 2014). However, most of the public discourse in Milwaukee (including by the Health Department and the Milwaukee Journal Sentinel) provides no distinction between the two terms. Therefore, this thesis will follow suit, so as to provide consistency between local sources.

In 2011, Milwaukee's Health Department launched an aggressive and controversial public service campaign intended to reduce infant deaths by highlighting the dangers of cosleeping. The advertisements themselves depict babies (both white and African-American) sleeping in adult beds near large, menacing knives. The message above reads: "Your baby sleeping with you can be just as dangerous" (see Appendix A for images).

Despite the campaign, cosleeping-related infant deaths have not significantly declined (Toner 2013), indicating that the efforts have not been effective. Even Dr. Geoffery Swain, who serves as the medical director for Milwaukee's Health Department, concedes that "…people [thought] initially that this [would] be easy to fix…but these are habits that people have been into for generations and it's difficult to change people's behaviors…" (Toner 2013). The apparent failure of this campaign to reduce infant mortality may stem from several factors, none of which are mutually exclusive. While other possibilities exist, the most logical are 1) people do not place trust in these ads, and thus do not heed them, or 2) the ads worked but cosleeping itself is not the defining variable in sleep mortality. Although there is lively discussion in anthropological circles regarding the evolutionary basis and benefits of cosleeping (see works by Dr. James McKenna, for example), this thesis will focus primarily on the reception of the ad campaign itself.

Despite the fact that the American Academy of Pediatrics discourages the practice, about 28% of all Wisconsin mothers say they bedshare with their infants, with the highest rates among non-white women (averaging about 40%) (American Academy of Pediatrics 2011; Wisconsin Department of Health Services 2014). Studies in other

American cities have indicated that cosleeping mothers are aware of doctor recommendations regarding sleep environments, yet disagree that cosleeping is necessarily inherently dangerous (Chianese *et al.* 2009; Moon *et al.* 2010). In fact, these data suggest that multiple knowledge systems might exist in the domain of infant sleep environments, and more broadly in the domain of infant care.

Milwaukee's campaign is based in the authoritative biomedical knowledge system, which will be discussed in detail later. If women do not strictly follow biomedicine (and thus don't heed doctor advice), it could help predict the outcome of the campaign. Thus, we need a better understanding of the knowledge systems to which Milwaukee mothers subscribe, and how that knowledge is used and disseminated.

In order to explore this issue, I administered a survey that asks about habits and attitudes regarding aspects of infant care (including bedsharing). Data from this questionnaire may help to ascertain whether cosleeping mothers also reject other biomedical recommendations regarding infant care; this information can then be extrapolated to determine whether a respondent adheres to a biomedical system of infant care, or to alternative ones.

BACKGROUND

Knowledge Systems and Authoritative Knowledge

Within a culture or society, knowledge systems often exist as explanatory devices or philosophies that inform behavior and beliefs. In a specific knowledge system, “certain kinds of realities… are taken as ‘known’ by members of certain… subcultures,” who then apply this knowledge to their behavior (Holzner & Marx 1979). Essentially, followers of a specific knowledge system modify their behaviors and decisions based on the dogma of said system. These "known realities" are often deeply entrenched in society or subcultures, with “sets of interlocking institutions and roles” that promote knowledge production, organization and dissemination (Holzner & Marx 1979). Sometimes knowledge is distributed horizontally and sometimes it is distributed hierarchically, based on both efficacy and structural superiority (Jordan 1992).

In any domain (medicine, spirituality, technology, diets/nutrition, etc.), multiple knowledge systems often exist (think pharmaceuticals vs. homeopathic remedies in the medical domain). As Brigitte Jordan explains, “in many situations, equally legitimate parallel knowledge systems exist and people move easily between them… “ (Jordan 1997). Sometimes, however, “…one kind of knowledge gains ascendance” (Jordan 1997).

When one knowledge system is legitimized over others, it is considered authoritative. Not only do people unquestioningly accept its authority, but they also “actively and unselfconsciously [engage] in its routine production and reproduction”; alternative knowledge systems are simultaneously de-legitimized (Jordan 1997). Thus,

the prominent authoritative system becomes "natural" within the society that perpetuates it, regardless of whether it is objectively "true" or "correct." Brigitte Jordan best clarifies this by stating:

> I see knowledge…as a state that is collaboratively achieved within a community of practice. By authoritative knowledge, I mean, then, the knowledge that *participants agree* counts in a particular situation, that *they* see as consequential, on the basis of which *they* make decisions and provide justifications for courses of action. It is knowledge that within a community is considered legitimate, consequential, official, worthy of discussion, and appropriate for justifying particular actions by people engaged in accomplishing the tasks at hand (Jordan 1992).

As an example of a knowledge system that has gained staggering authority, Brigitte Jordan (1992) presents American medical care. For years, Americans moved fluidly between types of knowledge, from faith healers to homeopaths to physicians. But in America today, most institutions accept only biomedicine as the "proper" way to treat disease - all other knowledge systems are marginalized. This ascendance will be discussed in detail below.

Biomedicine's Rise in America

The term "biomedicine," while often broadly used to describe Western medicine in general, is more accurately defined as clinical practice based on principles of natural science like biology and physiology (Quirke & Gaudilliere 2008). Before the twentieth century, biomedical practitioners struggled achieve recognition and status. As Paul Starr (1982) explains, "from a relatively weak, traditional profession of minor economic

significance, medicine has become a sprawling system of hospitals, clinics, health plans, insurance companies, and myriad other organizations employing a vast labor force… In America, no one group has held so dominant a position… as has the medical profession" (p. 4).

While of course no single event allowed for biomedicine's ascent in America's health arena, there are a few variables that most certainly influenced the transition; most resulted in the increase in social distance between physician and patient, and a decrease in distance between practitioners. Starting in the mid-nineteenth century, physicians formed professional groups like the American Medical Association (AMA) (Starr 1982). Despite heavy disagreements within the organizations, eventually enough influence was exerted to standardize education and training requirements for prospective physicians. This, along with professional certification, allowed for more uniform treatment and expertise, and reproduced the same authority from one professional generation to the next – authority was less dependent on individual character, and instead related to the efficacy of the profession as a whole (*ibid.*).

Additionally, the rise of medical specialization created a network of hospitals and private practices wherein doctors relied upon each other for referrals – in essence, each referral bolstered the authority of the profession as a whole (*ibid.*). Finally, when more diagnostic technologies came available, they were distributed almost exclusively to biomedical physicians. Along with laws governing who can receive and dispense controlled substances like medications, these technologies consolidated authority within the medial domain. When only doctors had access to sought-after technologies, the public was compelled to acknowledge and perpetuate biomedical authority (*ibid.*).

Most Americans, however, remained unaffected by this new trend until the mid-twentieth century (Lock & Nguyen 2010). What really seemed to cement biomedicine's authority within the population at large was the growth of government-sponsored public health initiatives. A better understanding of disease transmission meant that public heath programs increasingly utilized key aspects of biomedical knowledge. The public was increasingly encouraged to undergo regular health checkups, and some were required to pass medical examinations in order to acquire or keep jobs (Starr 1982). In 1922, the AMA voiced its support for preventative exams, and public health programs followed suit: these institutions were so intertwined that "the public health sponsorship of preventative medical examinations was, in effect, unpaid advertising for the medical profession" (Starr 1982 p.192).

Eventually, "medicine was gradually integrated into an extensive network of formal practices whose function was to regulate the health and moral behavior of entire populations" (Lock & Nguyen 2010). As physicians, professional organizations, private industry, and the State united behind biomedicine, they formed those "interlocking institutions" so often associated with complex and authoritative knowledge systems. Indeed, Starr (1982) acknowledges that "[biomedicine's] authority spills over its clinical boundaries into arenas of moral and political action for which medical judgment is only partially relevant and often incompletely equipped" (p. 5). In Milwaukee, biomedicine's political influence can be exemplified by the city's anti-cosleeping ads: medical recommendations are the basis for a government-based advertising campaign and other related public health policies.

Although biomedicine is authoritative in America today, it is not entirely without critique. Starting in the 1970s, some sociologists and anthropologists began to criticize key aspects of biomedicine, including its tendency to use one representation of the body as "normal" (Lock & Nguyen 2010). Any deviation from that representation, then, is considered pathological and subject to biomedical intervention. Feminist anthropologists pointed out that this attitude encouraged the "medicalization" of several life events, like birth and menopause, that are unique to women *(Ibid.).* As we will see later, biomedicine also holds authoritative knowledge in the domain of American birth.

In the contemporary health sphere, a small but significant population rejects some or all aspects of biomedicine, as evidenced by the current anti-vaccination movement and interest in "complementary and alternative medicine," abbreviated CAM (Omer *et al.* 2012; Kimmerle *et al*. 2012). In fact, distrust in vaccines is closely associated with a broader distrust in doctor expertise, and consequently in biomedicine as a whole (Kata 2012). Some evidence indicates that the Internet plays a major role in promoting these alternative medical models, suggesting that changing environments can affect how knowledge is produced, consumed, and reproduced (Kimmerle *et al*. 2012; Betsch 2011; Kata 2010; Kata 2012). This may prove useful in understanding how mothers apply different types of knowledge to infant care.

Authoritative Knowledge, Birth, and Infant Care

The anthropological idea of authoritative knowledge has been widely applied to the field of obstetrics and gynecology, spanning both cultures and continents (Davis-Floyd & Sargent 1997). In contrast with other cultures and countries, American's

prevailing knowledge system sees pregnancy and childbirth as medical events, and therefore relies almost entirely on biomedicine (Jordan 1997; Davis-Floyd & Sargent 1997; Browner & Press 1996; Low & Tumbarello 2012). In essence, American medical professionals hold and produce birthing knowledge while the populace at large perpetuate and reproduce this standard.

However, to my knowledge little interest has been shown in discussing knowledge systems applicable to infant care and pediatrics. Because of Western biomedicine's authority in obstetrics and other areas of health (Kingfisher & Millard 1998), it is reasonable to assume that its authority would extend to parental attitudes regarding infant care (vaccines, breastfeeding, bedsharing, etc.) Indeed, Mentzer (2014) argues that infant sleep in particular is medicalized. In most popular advice literature for parents, books about sleep are often co-authored by doctors, and almost all include some form of endorsement from the medical community.

There are data to suggest, however, that multiple knowledge systems do exist in the domain of infant care despite biomedicine's authority. For example, in other U.S. cities work has been done in the African American community, where bedsharing is quite common, approaching 50% in some areas. Often, caregivers will cite numerous reasons for bedsharing, including tradition, convenience, and comfort for the baby (Chianese *et al*. 2009; Joyner *et al.* 2010; Moon *et al.* 2010).

Mothers in one study did not believe that there was a significant link between SIDS and cosleeping, and instead "…believed that SIDS occurred randomly ('God's will') and that the only way to prevent it was vigilance" (Moon *et al.* 2010). Other research found that "clinicians' advice against bed sharing did not influence parents'

decision, but advice to increase safety when bed sharing would be appreciated" (Chianese *et al.* 2009). Thus, perhaps working within their knowledge framework ("if you must bedshare, here's how to eliminate risk factors") rather than outside it ("bedharing is wrong") would be more effective when trying to combat infant mortality.

The Infant Care Crisis in Milwaukee

In Milwaukee, WI, infant mortality rates are some of the highest in the nation (Herzog 2014). Preliminary 2014 data for Milwaukee suggests that for every 1000 babies that were born, more than ten died before the age of one, while the national average for 2013 was only 5.96 infant deaths per 1000 babies born (City of Milwaukee Health Department 2015; Xu *et al.* 2016). Even more alarming is the disparity between ethnicity: Milwaukee's African American babies died at a rate of 15.2 per 1000 live births, while white infants only died at a rate of 5.2 per 1000 live births. Hispanic infants had the lowest mortality rate of only 4.0 per 1000 live births (City of Milwaukee Health Department 2015).

Amidst the complex variables affecting infant mortality, a single aspect of infant care has become a controversial public health concern in Milwaukee, almost political in nature. In 2011, Mayor Tom Barrett, along with the city's health department, unveiled an advertising campaign intended to discourage bedsharing between parents and babies, and thus minimize cosleeping-related deaths (Stephenson 2011). Despite the publicity it received and the resources devoted to it (Dennis 2011; Stephenson 2011) the city has yet to see a significant decline in deaths related to unsafe sleep environments (Toner 2013).

Bedsharing, while discouraged by authoritative organizations like the American Academy of Pediatrics (AAP), is still a prominent practice among mothers in Wisconsin, averaging 28.4%. Broken down by ethnicity, we see that 23.9% of white mothers, 38.1% of black mothers, and 40.0% of Hispanic mothers bedshare with their infants (Wisconsin Department of Health Services 2013). The stark contrast in cosleeping rates between white mothers and non-white mothers suggests that culture, and with it differing knowledge systems, may play a role in infant sleep practices.

The Cosleeping Controversy

While The American Academy of Pediatrics asserts that infants should never share sleep surfaces with anyone (American Academy of Pediatrics 2011a), other experts and organizations insist that cosleeping is natural, safe, and beneficial (McKenna 1996; McKenna & McDade 2005; Ball & Klingaman 2008; Quillin & Glenn 2004). Viewing the practice from both an evolutionary and biomedical perspective will provide insight into how researchers can so heartily disagree.

Bedsharing from an Evolutionary Perspective

It is widely accepted by anthropologists that bedsharing is the most likely evolutionary model for infant and mother sleep habits. Modern hunter-gatherers universally cosleep with their infants, as do the majority of individuals living in non-industrialized societies (Richard *et al.* 1998). Because hunter-gatherers live in what's close to our ancestral environment, many anthropologists consider some of their behaviors (like sleeping, subsistence, etc.) akin to those of our hominin ancestors.

Additionally, the fact that much of the world's population engages in bedsharing suggests a sleep habit that is evolutionarily conserved, and one to which our species has adapted. Thus, the benefits and risks of cosleeping are best understood in an evolutionary context.

Viewing cosleeping from a physiological and evolutionary perspective explains some of its benefits, like lactation promotion. Accumulation and maintenance of milk supply is achieved through frequent suckling and stimulation; cosleeping allows for these actions to take place with greater frequency, thus stimulating oxytocin and prolactin release (Matthiesen *et al.* 2001; Ball & Klingaman 2008). Infants may use their hands to "explore and stimulate their mother's breast" before latching, which increases oxytocin levels, facilitating milk ejection (Matthiesen *et al.* 2001; Ball & Klingaman 2008).

Bedsharing provides more opportunities for the infant to stimulate the breast before feeding, and it therefore promotes lactation. Indeed, mothers who bedshare have a higher rate of successful feedings to attempted feedings, indicating that solitary sleeping may strain a breastfeeding relationship (Ball & Klingaman 2008). Other studies have corroborated this finding, showing that infants who bedshare nurse more frequently than those who do not, regardless of cot or crib usage (Baddock *et al.* 2006; Sobralske & Gruber 2009). Based on this evidence, it seems likely that bedsharing plays a role in milk production. Unlike industrialized populations, our hunter-gatherer ancestors had no other option *but* to breastfeed; therefore, it was extremely important that a mother produce enough milk to sustain her child. Thus, cosleeping likely represents an adaptive mode of lactation promotion.

If practiced safely, many experts contend that cosleeping can be beneficial for both mother and baby, especially when paired with breastfeeding. Bedsharing, in essence, is a way for the baby to be in the "driver's seat" of the mother-infant dynamic; it allows for on-demand breastfeeding instead of delayed or even withheld feedings in solitary sleepers (Miller & Commons 2010). Thus, mothers who both breastfeed and bedshare actually tend to sleep more than those who breastfeed, but do not bedshare (Quillin & Glenn 2004; Ball & Klingaman 2008; Miller & Commons 2010).

Just as breastfeeding and cosleeping continually encourage the other, they are also "a combination that lead[s] to a reduction in sleep loss and fatigue" (Quillin & Glenn 2004). Cosleeping also promotes a rapid parental response to infant distress or crying. Immediate consoling has been shown to actually decrease the frequency of crying and future expressions of distress, which also allows for less interrupted sleep (Miller & Commons 2010).

Researchers also suggest that cosleeping, especially in subsistence societies, is a protective behavior. Breastfeeding mothers instinctually arrange themselves in a protective position around their sleeping infants (Ball & Klingaman 2008). From an evolutionary perspective, this behavior might have once discouraged predation of young hominins. Today, bedsharing still helps regulate a baby's internal processes, including body temperature, heart rate, and breathing (Baddock 2006; Sobralske 2009; McKenna 1996). If an infant suffers from frequent sleep apneas, a "mechanical breathing teddy bear" is placed next to him (McKenna & McDade 2005). When sharing a sleep surface with the breathing stuffed animal, infants not only experience fewer apneas, but they also move closer to it (KcKenna & McDade 2005). Clearly, this stuffed toy replicates a

mother's breathing. If an infant needs this constant sensation to reduce apneas, it stands to reason that infant sleep is not only adapted to, but also reliant upon, cosleeping behavior.

Today when an infant dies in a shared sleep environment, there are often many risk factors at play, yet medical professionals tend to blame the tragedy on the act of bedsharing. In reality, the majority of cosleeping deaths are correlated with other factors present in *modern* sleep environments: heavy bedding, soft sleep surfaces, maternal smoking, parental intoxication, and/or cosleeping on a couch (McGarvey *et al*. 2006; Schaefer 2012; Sobralske 2009; McKenna 1996). In Milwaukee itself, 68% of bedsharing deaths between 2005-2008 were associated with infant inhalation of second-hand smoke, and 25% of deaths were associated with parental alcohol use in 2008 (Milwaukee Health Department 2014). A mismatch between our evolutionary environment and modern ones can help explain why bedsharing recommendations are fraught with contradictions, and why there are both clear benefits and risks.

Bedsharing from a Biomedical Perspective

Of course, many pediatricians would dispute the benefits to cosleeping, or at least would disagree that the benefits outweigh the risks. The American Academy of Pediatrics (AAP), a professional organization of pediatricians, serves as one of the preeminent biomedical authorities on infant care in America. It produces and publishes reports and policy statements meant to influence not only those in the professional biomedical community but also policy makers and members of the general public. In fact, on its website the AAP states that it "advocates for the health of all children, and

works with government, communities and other national organizations to shape many child health and safety issues" (American Academy of Pediatrics 2015). As we see again, this network of institutions is central to the biomedicine's authority and influence on infant care.

In a 2011 policy statement, the AAP gave clear recommendations against bedsharing with infants under one year of age. Most of the recommendations are "Level A", which are based on "good and consistent scientific evidence." This means that there are consistent findings between at least two adequate case-control studies or meta-analyses, and that the "conclusion is unlikely to be strongly affected by the results of future studies" (American Academy of Pediatrics 2011a). In the accompanying technical review, the AAP asserts that bedsharing is always dangerous, but that "there are specific circumstances in which bed-sharing is particularly hazardous, and it should be stressed to parents that they avoid [them] at all times" (American Academy of Pediatrics 2011b). These risk factors (smoking, alcohol consumption, excessively soft bedding) are again associated with modern life and environments, and are not consistent with the vast majority of our evolutionary history

It does not appear that the disparity between evolutionary-based studies and those cited by the AAP will be resolved any time soon. This controversy between professionals is paralleled by disagreements between parents, and illustrates again that multiple knowledge systems might exist in the domain of infant care.

RESEARCH FOCUS

In order to determine whether cosleeping mothers are less likely than non-cosleeping mothers to adhere to the authoritative biomedical system of infant care. To put this in quantitative terms, one would expect cosleeping moms to be more likely to reject other fundamentals of biomedicine like vaccinations, regular checkups, etc. Similarly, one might also expect that mothers who utilize “alternative” care practices like herbal remedies and prayer would be more likely to bedshare.

A secondary research question involves the reception of Milwaukee’s safe sleep advertising campaign, again based on biomedicine-related behaviors. Thus, I would expect that moms resistant to the campaign’s message (meaning the campaign did not change their minds) would also be more likely to reject fundamentals of biomedicine and embrace “alternative” care practices.

Toward this end, an anonymous survey was devised for distribution among Milwaukee-area mothers. The questionnaire covers numerous aspects of infant care, ranging from breastfeeding, vaccinations, bedsharing, etc., and should provide a tool for determining a respondent’s likelihood of subscribing to a biomedical knowledge system.

Understanding how other variables correlate to cosleeping habits can provide insight into the efficacy of Milwaukee’s public health campaign, and might suggest how the city can more effectively combat infant mortality in the future.

METHODS

This research was reviewed and approved by the Institutional Review Board of University of Wisconsin-Milwaukee.

Subjects

The subjects selected to complete this survey each fulfilled the following requirements:

- Be female. While men and fathers certainly contribute to infant care decisions and may also cosleep with their babies, most studies on bedsharing center around mothers and maternal instincts. Also, because the association between bedsharing and breastfeeding is so strong, not allowing male respondents to participate can allow for a clearer picture of that relationship.
- Have raised at least one child from infancy. The questionnaire is designed to evaluate both attitudes *and* behaviors regarding bedsharing. If a parent adopted an older child, the respondent's attitudes regarding infant sleep environments cannot be compared to associated behavioral data.
- Live in southeastern Wisconsin. This study is heavily steeped in the backdrop of Milwaukee's "safe sleep" campaign, and thus should be specific to southeastern Wisconsin. Respondents should have had an opportunity to see the advertisements organically within the city. While conclusions drawn from this project may indeed be applicable to other

geographical areas, it's important to first determine Milwaukee mothers' relationships with bedsharing.

- Be at least 18 years of age. For both ethical and logistical reasons, it was important for all respondents to be legal adults able advocate for themselves and to give informed consent without the presence of a guardian.

Questionnaire

This is designed as a quantitative study based on responses to an anonymous questionnaire administered and completed in person. To view the survey in its entirety, please see Appendix B.

In an effort to make the survey accessible to women from most educational backgrounds, it is written at about a fifth-grade reading level. It was also available in Spanish. Although there is no clear delineation on the questionnaire itself, its contents can be roughly divided into 4 subject areas:

1. The first section asks for basic demographics, including age, sex, race, education level, and number of children.
2. The next section focuses on how the respondent informs her decisions about caring for her infant(s). Here, the she is asked to identify sources to which she refers when making childcare decisions. I will look for connections between these sources and a subject's knowledge navigation in order to determine sources correlate to the use of alternative knowledge systems.

3. Section three asks about behaviors and decisions related to infant care (including breastfeeding, vaccinations, and bedsharing), as well as the reasoning behind those decisions. Questions in this section are designed to determine whether respondents exhibit beliefs, attitudes or practices that diverge from the authoritative system.
4. Finally, the last section focuses on attitudes towards bedsharing in a broader sense, but also incorporates questions regarding Milwaukee's cosleeping campaign. These questions are meant to determine whether the advertisements were effectively distributed (ie. had the respondents seen them?), and whether they changed anyone's mind regarding cosleeping's safety. Two opportunities for qualitative responses closed out the questionnaire, providing space for respondents to share any more thoughts regarding the issue.

Data Collection

The goal was to administer surveys to women from diverse backgrounds, both ethnically and financially, in an effort to capture the diversity of Milwaukee mothers. Sampling from multiple populations optimized chances of receiving surveys that more accurately represent the demographics of mothers living in southeastern Wisconsin. To accomplish this, a variety of groups were contacted with requests for cooperation.

In an effort to represent low-income women, I reached out to Wisconsin WIC (The Supplemental Nutrition Program for Women, Infants, and Children). All Milwaukee-area WIC offices were contacted, and one, Seeds of Health WIC, agreed to allow data collection in its waiting area. Located near the intersection of Greenfield Ave.

and 35th St. on Milwaukee's south side, Seeds of Health serves primarily Hispanic and Latina women, although a portion of clients are black and white mothers as well. Because many clients struggle with English or exclusively speak Spanish, a native speaker assisted with a translation. Thus, both the consent form and questionnaire were available in English and Spanish. Both options were offered when the survey was administered, and great care was taken to communicate that participation was voluntary and in no way related to the benefits received from WIC. Seventy-two surveys were collected at this WIC location.

In contrast with low-income women living in the city, middle-class suburban moms were also courted. Some came from play groups or parenting groups like Mothers and More (based in in Milwaukee's southern suburbs), Menominee Falls Moms (based in Menominee Falls, west of Milwaukee proper), and the Family Club (based in Shorewood, a suburb on Milwaukee's East Side). Some mothers were also asked individually to participate, based on relationships with the researcher. Other parenting-themed groups (La Leche League, for example) were contacted but declined to participate. English surveys were offered and Spanish surveys were not requested. Eighteen surveys from this sample were included in this analysis.

Analysis

Data analysis focused mostly on bedsharing mothers and non-bedsharing mothers in the sample, although differences in the WIC vs. non-WIC samples were also considered. Some new variables were created using answers from the survey;

examples include *Number of sources, Age at first birth, Age at most recent (last) birth, Treat illness by exclusively using medicine prescribed by doctor or pharmacist*. A final variable, dichotomous *Bedshare Yes*/*No,* was determined using responses to the *Bedshare frequency* variable. Respondents who answered "Never" when asked how often they bedshare were sorted into *Bedshare No*, and all other responses were assigned to *Bedshare Yes*.

Statistical analysis occurred in both R/RStudio v3.0.2 and SPSS v24. Descriptive statistics were analyzed and recorded for the entire sample before determining differences between groups. Welch's t-test was used to determine significance between one continuous and one categorical variable, while both Fisher's exact test and Pearson's Chi-square test with Yates' continuity correction were used to determine significance between two categorical variables. Logistic regression was used to predict the outcome of a binary dependent variable and to control for certain demographic variables.

RESULTS

For tables and figures illustrating results of data analysis, please see Appendix C.

Descriptive and Demographic Data

A total of ninety people responded to the survey and were included in the analysis, sampled from two populations: WIC participants (N=72) and non-WIC participants, predominately sampled from suburban parenting groups (N=18). Descriptive statistics for demographic data can be found in Tables 2, 2a, 2b, 2c, and 3. The mean age of all respondents was 29.87 years, with the youngest respondent at 18 years of age and the oldest at 55 years. Age at first birth ranged from 13 years to 37 years, with a mean of 20.57 years. Mean age at most recent birth (last birth) was 26.78. Mean education level was 4.72, slightly above high school graduation. All education levels (from 1-7, described in Table 2a) were represented in the sample. Number of children ranged from 1-12, with a mean of 2.69. 46.7% of respondents self-identified as Hispanic, 12.2% as black, 36.7% as white, and 7.8% identified with another racial category. Some participants identified themselves as part of multiple racial categories, so race percentages may sum to over 100%.

Comparing Samples: WIC Participation

Welch's t-test was performed to compare continuous variables from the two study samples, WIC vs. non-WIC. Results can be found in Table 4. Significant differences were found regarding age, education level, number of kids, age at first birth,

and age at most recent (last) birth. The WIC sample was younger than the non-WIC sample, with a mean age of 29.08 compared to 33.00 ($p=0.017$). WIC participants had their first child at a younger age (mean = 18.96 years) than non-WIC respondents (mean = 26.56 years) ($p<0.001$). Similarly, age at last (most recent) birth followed the same trend, with a mean age of 25.96 years in the WIC sample and 29.83 years in the non-WIC sample ($p=0.023$). WIC participants had on average more children their non-WIC counterparts (means = 2.89 and 1.89, respectively; $p=0.008$). WIC participants achieved lower education levels, with a mean of 4.43 compared to 5.89 ($p<0.001$).

Categorical and dichotomous variables from WIC vs. non-WIC samples were compared using chi-square tests with continuity corrections as well as Fisher exact tests. Results can be found in Table 5. Significant differences were found in the variables of race, clubs/support groups as source for childrearing, internet/blogs/websites as source for childrearing, scientific studies as source for childrearing, WIC as a source for childrearing, feeding strategies, treating illness by exclusively using medicine prescribed by doctors or pharmacists, and responses regarding whether bedsharing is always dangerous. WIC respondents were more likely to identify as Hispanic compared to non-WIC respondents (58.3% vs. 11.1%; $p<0.001$), while less likely to identify as white (26.4% vs. 77.8%; $p<0.001$). The WIC sample was less likely to use clubs/support groups as a source for childrearing information than non-WIC (6.9% vs. 50%; $p<0.001$), was less likely to use the internet/blogs/websites (37.5% vs. 66.7%; $p = 0.034$), and less likely to scientific studies as a source for childrearing information (11.1% vs. 38.9%; $p=0.013$). WIC participants were less likely to exclusively breastfeed than non-WIC respondents (13.9% vs. 55.6%), while they were more likely

to exclusively formula feed (31.9% vs. 5.6%; p<0.001). WIC respondents were less likely to treat their child's illness by exclusively using medicine prescribed by a doctor or pharmacist, and therefore more likely to use alternative methods of treatment (40.28% vs. 72.22%; p=0.030). WIC respondents were more likely to answer "yes" when asked *Do you think it's **always** dangerous for a baby to sleep in bed with someone else?* (variable hereto referred to as "*Always dangerous*") (63.9% vs. 22.2%; p=0.003). Of note, the two samples did not show a significant difference in bedsharing behavior (p=0.102).

Comparison between Bedsharers vs. Non-Bedsharers

All respondents were also categorized into two groups based on bedsharing behavior: bedsharers (N=47, or 52.2% of total respondents) vs. non-bedsharers (N=43, or 47.8% of total respondents). Welch's t-test was performed to compare continuous variables between the two groups, as recorded in Table 6. No significant differences were found.

Categorical and dichotomous variables from the bedsharing vs. non-bedsharing groups were compared using chi-square tests with continuity corrections as well as Fisher exact tests, results of which can be found in Table 7. The only significant differences found between the groups were responses to two questions. Bedsharers were less likely to answer "yes" for the variable *Always dangerous* than their non-bedsharing counterparts (31.9% vs. 81.4%; p<0.001). Notable, though, is that nearly 32% of bedsharers do think the practice is dangerous, and yet still coslept with their most recent infant. When asked *Did Milwaukee's safe sleep advertisements change*

your mind about sleeping in the same bed as a baby? (Henceforth referred to as "*Change mind"*) bedsharers were less likely to answer "yes" (27.7% vs. 55.8%; p=0.025).

Predictive Models

Because bedsharing is at the heart of this project's research question, predictive analyses (logistic regressions) were run with it as a dependent variable, first to control for demographic variables in an attempt to ultimately find a parsimonious predictive model. Tables 8, 9, and 10 show results of logistic regressions controlling for age, education level, and race, respectively. In essence, each variable was tested with a demographic covariate (age, education level, and race) to determine any significance when controlling for that covariate. Because these tests were simply to see how variables might contribute to later predictions, attention was paid mostly to p-values, and less to odds ratios or each 2-variable model's goodness-of-fit. When all likely significant variables were determined, they were combined to produce predictive models, which were then subject to goodness-of-fit testing.

When controlling for age (Table 8), the Wald criterion identified three variables with significant predictive value for bedsharing: *WIC status (*p = 0.037), *Always dangerous* (p<0.001), and *Change mind* (p=0.015). *Doctor as source for childrearing* was the only variable to emerge slightly above significance, with a p-value of 0.070.

When controlling for education level (Table 9), only *Always dangerous* (p<0.001) and *Change mind* (p=0.020) were significant. *WIC status* no longer provided significant

predictive value (p=1.89). *Doctor as source for childrearing* still lacked significance at p=0.08.

The logistic regression controlling for race (Table 10) again produced significance for *WIC status (*p=0.048*), Always dangerous* (p<0.001), and *Change mind* (p=0.008). As with the other regressions, the only other variable even close to significance was *Doctor as source for childrearing* (p=0.076).

Because no other variables emerged as significant even after controlling for common demographics (including other demographic variables), a predictive model for bedsharing was tested using these four covariates (*Always dangerous, Change mind, WIC status, Doctor as source for childrearing)* Surveys were removed from the sample if responses to the *Change mind* variable were categorized under N/A. 75 surveys remained in the final sample size in this regression. Results are shown in Tables 11a, 11b, and 11c. A test of the full model against a constant-only model was statistically significant (p<0.001). Overall prediction success was 72.0%. The Wald criterion demonstrated that only one variable in this model – *Always dangerous* – was a significant predictor of bedsharing (p=0.003). The Exp(B), or odds ratio, value indicates that a participant who responded "no" when asked *Do you think it's **always** dangerous for a baby to sleep in bed with someone else?* is 7.154 times more likely to bedshare with their infant.

In an effort to directly test the research hypothesis, variables associated with biomedicine and "alternative" care were included as covariates in a logistic regression to predict bedsharing behavior. Biomedical-associated variables were *Doctor as source for childrearing, Scientific studies as source for childrearing*, and *Treat illness by using*

medicine prescribed by doctor or pharmacist. “Alternative care” variables were identified as *Religion as a source for childrearing, Treat illness using herbs, Treat illness using traditional remedies, and Treat illness using religion*. Results are shown in Tables 12a, 12b, and 12c. A test of the full model against a constant-only model was not statistically significant (p=0.354), with overall prediction success only at 62.2%. The Wald criterion found no variable to have significant predictive value.

To determine whether attitudes towards bedsharing could be predicted more effectively than bedsharing behaviors were, a logistic regression was run using the same covariates as above, but with the dependent variable as *Always dangerous*. Results are shown in Tables 13a, 13b, and 13c. While the Wald criterion demonstrated that one variable (*Scientific studies as source for childrearing)* showed predictive value at p=0.026, the model as a whole was not significant (p=0.345, with prediction success of just 64.4%).

Another research question relates to the reception of the advertisement campaign itself, and whether it is possible to predict its likelihood to change minds based on adherence to a biomedical knowledge system. Logistic regression was run with the same covariates as the two regressions above, but this time the dependent variable was *Change mind*. Results are shown in Tables 14a, 14b, and 14c. Once again, responses categorized as N/A were removed from the sample, bringing its size down to 75 surveys. A test of the full model against a constant-only model was not statistically significant (p=0.459), with overall prediction success at only 61.3%. No variables were determined to have significant predictive value using the Wald criterion.

Finally, in an attempt to glean more understanding about Milwaukee's safe sleep campaign, a logistic regression was run to predict *Always dangerous* from *Change mind* while controlling for demographic variables including *race, age, education level,* and *WIC status*. Results are shown in Tables 15a, 15b, and 15c.The model was determined to be statistically significant ($p<0.001$), with an overall predictive value of 78.7% (75.8% for no and 81.0% for yes). Two variables were determined to have predictive value using the Wald criterion. Answering "no" for *Change mind* ($p<0.001$) reduced the likelihood of answering "yes" to *Always dangerous* with an odds ratio of 0.053, while a non-WIC respondent is also less likely to answer "yes" to *Always dangerous* ($p=0.010$, $Exp(B) = 0.082$).

DISCUSSION

Regarding Representative Demographics

It is unlikely that the sample collected in this study accurately represents Milwaukee as a whole. Unfortunately, Milwaukee County does not collect detailed demographic data regarding mothers, but comparisons can be made with Wisconsin's Pregnancy Risk Assessment Monitoring System (PRAMS). These reports use data collected from randomly sampled Wisconsin mothers who gave birth two to three months before completing the survey (Wisconsin Department of Heath Services 2014). Respondents were asked about general demographics like age, race, education level, etc. as well as behaviors relating to heath outcomes during pregnancy, birth, and the postpartum period. Data from Wisconsin PRAMS reports are analyzed on a three-year rolling average, and the most recently published report from 2014 includes data from 2009-2011 (Wisconsin Department of Health Services 2014). Although this project's survey was administered in 2015, general demographic data is unlikely to have changed significantly enough to disregard the comparisons made below.

This project's sample is not wholly representative of WI mothers due to a limited sampling region. Racially, Hispanic respondents were the largest racial group of the sample at 46.7%, followed by white (36.7%), black (12.2%), and respondents identifying as another racial category (7.8%). Compared to Wisconsin's PRAMS report, whose respondents were 73.4% white, 10.3% Hispanic, 10.3% black, 5.8% other (Wisconsin Department of Health Services 2014), this project had a disproportionately high number

of people of Hispanic decent and low number of white people. Of course, this is likely to be more representative of the Milwaukee neighborhoods from which data was collected.

As seen in Table 2c, this project's data (with categories adjusted to match those in PRAMS) shows education levels mostly align with those reported in PRAMS. However, my sample shows a slight difference in percentage of people who did not yet receive a high school diploma, and a slight difference in percentage who graduated college. Given that my sample had a disproportionately high number of WIC participants, however, these data are not surprising.

Because my survey encouraged any mother (or grandmother raising grandchildren) to participate (not just those who just recently gave birth), comparing age with PRAMS data would not be valid. Instead, age at first birth would allow for a more accurate comparison between samples. Although PRAMS does not consider this variable, data from the National Center for Health Statistics can help. Their most recent report analyzes data from 2006, where Wisconsin's average maternal age at first birth was 25.3 years (Mathews & Hamilton 2009). Data from this project indicate that the mean age at first birth is just 20.6 years. It is possible this difference can be explained by a combination of high numbers of WIC participants and a high percentage of Hispanic respondents.

It is clear that at least demographically, my data differ from demographics of Wisconsin mothers as a whole. Yet, because Milwaukee does not publish similar data on mothers, I cannot comment with certainty on how my data represent the city. Thus, extrapolating any results to apply to Milwaukee as a whole should be done with caution.

Looking at cosleeping, the variable at the heart of this project, we see that just 28.4% of all mothers in the PRAMS study reported bedsharing with their infants (Wisconsin Department of Health Services 2014). Yet, 52.2% of this project's respondents reported bedsharing at least occasionally with their infants. This difference may indeed be due to a different demographic makeup of the samples, given other studies that show women are more likely to bedshare if they are non-white and low-income (Lahr *et al.* 2006). However, it is also possible that PRAMS respondents under-reported bedsharing behavior because the study may not have been perceived as anonymous – women were mailed surveys, meaning that researchers knew names and addresses of all respondents (Wisconsin Department of Health Services 2014). This project's survey was entirely anonymous with no names involved, so women may have felt more comfortable admitting that they practiced behaviors against doctor and health department recommendations.

Tables 4 and 5 provide a comparison between the study's two samples. Although the main purpose of this project is not to identify differences between WIC and non-WIC respondents, it is informative to see how demographics and behaviors break down. Unsurprisingly, we see many demographic differences between the samples. WIC participants had a lower mean age than non-WIC mothers, despite the fact that a few WIC respondents were grandmothers raising grandchildren (and thus advanced in age). This trend is also shown with age at first birth.

WIC participants had significantly less education overall than non-WIC respondents, both in *Education level* and dichotomous *Higher education* variables. This is consistent with other data confirming a positive relationship between income (WIC is

by its nature a low-income population) and education level (U.S. Bureau of Labor Statistics 2016).

Racial makeup of each sample was also significantly different; the WIC sample had significantly more Hispanic mothers, while more white mothers comprised the non-WIC group. Given the location of the WIC office where surveys were distributed, the racial makeup of WIC respondents is to be expected. Seeds of Health WIC is located in a predominately Hispanic neighborhood in Milwaukee's South Side (located near the cross streets of Layton Blvd. and Greenfield Ave.). Given Milwaukee's notorious reputation for long-segregated neighborhoods, it should come as no surprise that more low-income respondents were people of color, while other respondents (mostly from affluent suburban parenting groups) were predominately white.

Feeding methods differed significantly between the two samples as well, with fewer WIC participants exclusively breastfeeding, and more WIC participants using exclusively formula. Despite WIC's claims that its participants are more likely to breastfeed than "eligible nonparticipants" (USDA Food and Nutrition Services 2013), some researchers have disputed this assertion, actually finding "a negative association between WIC participation and breastfeeding initiation rates" as seen here (Jensen 2012; Thulier & Mercer 2009; Schwartz *et al*. 1995).

No significant difference was shown between WIC and non-WIC participants in regard to infant vaccination and regular doctor checkups This is consistent with findings that, despite persistent vaccination and healthcare disparities between income levels in the U.S., children of WIC participants are much more likely to be vaccinated than their

peers (Smith *et al.* 2009; Brenner *et al.* 2001). Indeed, this may have artificially inflated vaccination rates in this study.

Interestingly, there was also no significant difference between the samples for either bedsharing frequency or bedsharing as a dichotomous yes/no variable. This indicates that, in this particular case, common bedsharing predictors like income and race do not play as influential of a role. Even among low-income populations, WIC participants are unique and not entirely representative in their childrearing behaviors. The previously discussed studies done by Smith *et al.* (2009) and Brenner *et al.* (2001) already indicate a difference in vaccination behaviors and frequency of doctor visits, while Jensen (2012) notes that rates of breastfeeding in WIC participants differ from WIC-eligible non-participants. Additionally, WIC participation is associated with lower infant mortality rates (Devaney & Schirm 1993), although no data was found to indicate that those results are related to sleep environments – it is probably more likely that lower infant mortality rates in WIC programs is most influenced by better nutrition in addition to prenatal care and counseling.

Another possible influence over bedsharing behaviors among WIC participants is the phenomenon of self-selection to the program. Devaney & Schirm (1993) provide a reminder that "WIC participants are a self-selected group of women who may choose to participate in the WIC program for underlying reasons that may independently lead to lower infant death rates" or, in this case, lead to more receptivity to suggestions of biomedicine and medical authority. Perhaps participants' initial decision to accept aid from a biomedicine-based program influences their decisions and attitudes towards bedsharing.

Overall, though, most differences between these particular WIC and non-WIC samples are consistent with expectations and findings from other studies. Of course, the one that does not (bedsharing) is the variable most important to my research and overall hypothesis.

Bedsharing: Biomedical and Alternative Care Variables

The main hypothesis being tested in this study relates to bedsharing, not WIC participation. I suggest that women who more strictly adhere to a biomedical system of knowledge are less likely to cosleep with their infants because they are more receptive to the message propagated by the biomedical-based establishment. Thus, we would expect more women who exhibit childrearing behaviors based in biomedicine to answer "Never" when asked it how often they bedshare.

Five variables from this survey were thought to indicate strong adherence to biomedicine:

1) Doctor as source for childrearing
2) Scientific studies as source for childrearing
3) Treat child's illness using medicine prescribed by doctor or pharmacist
4) Attend regular doctor checkups
5) Vaccination of child

After data collection was complete, however, results showed that nearly all respondents attended regular doctor checkups and vaccinated their children, so these were not considered further. The other three variables that remained showed no relationship with bedsharing behavior in chi-square tests, as evidenced in Table 7.

Additionally, some variables were thought to represent “alternative” care practices and indicate a less strict adherence to biomedicine:

1) Religion as a source for childrearing

2) Treat illness using herbal remedies

3) Treat illness using traditional remedies

4) Treat illness using religion

Similar to the biomedical variables above, none of the “alternative” variables showed a relationship with bedsharing behavior, also evidenced in Table 7.

Analyses of all variables were run to control for general demographic variables like race, age, and education level. Tables 8-10 illustrate that, with each demographic control, none of these biomedicine-related or alternative care-related variables showed significant predictive power ($p>0.05$). Nonetheless, a logistic regression, whose results are recorded in Table 12, was run to test a predictive model incorporating all biomedical and alternative variables. Unsurprisingly, this model itself was not significant, nor did any of the above variables show significant predictive value.

In an attempt to ascertain whether adherence to other biomedical-based behaviors were simply associated with bedsharing attitudes instead of the behavior itself, another logistic regression was completed using the same covariates but a dependent variable of *Always dangerous*. Like the regression above, no significant predictive value was shown, indicating that given my sample, neither behaviors nor attitudes towards bedsharing could be predicted by biomedicine-related or alternative care-related variables.

To determine whether biomedical-based behaviors were related to the reception of Milwaukee's ad campaign, a final logistic regression was run using the same covariates as above with a dependent variable of *Change mind*. No significance was determined here either, confirming that for this sample, biomedical and alternative care variables were not appropriate predictors of bedsharing behavior, attitudes, or even reception of Milwaukee's anti-cosleeping campaign.

However, for all three demographic controls and the first predictive model the variable *Doctor as a source for childrearing* emerges as a trend – not considered significant, but with p-values ranging 0.070 to 0.080. This could be interpreted as confirmation of my initial hypothesis, but more likely it simply suggests that doctors themselves (and not exclusive adherence to biomedical practice) can influence bedsharing behavior. In fact, results from Colson *et al.* (2013) support this idea. The study found that women who spoke with doctors who had a negative view of bedsharing were less likely to do it themselves, while women whose doctors were neutral about bedsharing were more likely to practice it (Colson *et al.* 2013). It is reasonable to assume that, due to Milwaukee's high rates of infant mortality, that most doctors in this region have negative attitudes towards cosleeping.

Thus, a lack of predictive and associative significance between biomedical/alternative variables and bedsharing does not allow me to accept my original hypothesis that propelled and informed this research.

Other Possible Predictors of Bedsharing Behaviors and Attitudes

However, when controlling for each demographic variable, two covariates consistently emerged showing associations with, and predictive value for, bedsharing. They were responses to the following questions:

1) Is bedsharing always dangerous?

2) Did Milwaukee's safe sleep advertisements change your mind about bedsharing?

For both variables, respondents who answered "no" were more likely to cosleep. To further investigate, predictive analyses were run to predict an answer to the A*lways dangerous* variable from the *Change mind* variable while controlling for WIC status, age, education level and race. In the model, those who changed their minds after seeing Milwaukee advertisements were more likely to answer "yes" to the question "Is bedsharing always dangerous?"

On the face of it, it seems like the safe sleep campaign may, in fact, have been effective with this sample. More research will be required to better understand its widespread effects within the community, but it seems clear that the advertisements did change the minds of some of the survey respondents, which resulted in both a change of attitudes and reported behavior.

Study Implications and Limitations

Final results imply that instead of an authoritative biomedical knowledge system influencing bedsharing behaviors and attitudes, Milwaukee's ad campaign may have actually been the influence. Indeed, the City of Milwaukee has deployed numerous resources, programs, and advertisements in an attempt to improve the health of infants

and reduce its staggering infant mortality rate. Preliminary data from 2014 indicates that mortality is down 3%, although no data are available yet to link that small decline to bedsharing behaviors (City of Milwaukee Health Department 2015). The city releases more detailed mortality data in a Fetal Infant Mortality Report that includes three-year rolling averages, but the most recent FIMR only provides data from 2009-2011 (Ngui *et al.* 2014). Because the safe sleep campaign launched in 2011, we must wait for the next FIMR to determine whether any changes have been observed in bedsharing-related deaths, and to determine whether this study's findings make sense in light of those data.

An interesting discrepancy does arise, however, when looking for a relationship between *Always dangerous* and bedsharing behaviors – 32% of cosleepers responded that bedsharing is always dangerous. This is indeed confusing, given that risk perception researchers often utilize the behavior modification hypothesis, which suggests that "perceptions of personal risk cause people to take protective action" (Brewer *et al.* 2004). Yet, this does not seem to explain the 32% of mothers who cosleep despite perceiving it to be dangerous. It is possible that women perceive different levels of danger and risk associated with the same behavior, and thus behave differently. Two women might agree that bedsharing is dangerous, but they may differ on just how dangerous it is. Or, some may simply be more willing to take the risk. Risk of traffic accidents may provide a comparison: most people would agree that there is always some inherent danger to driving a car, yet they also are unlikely to view it at a level high enough to discourage driving entirely. This implies that more research would

be helpful in determining how perception of risk level influences bedsharing behaviors in Milwaukee.

It is also possible that the 32% of women who coslept with their most recent infant did so before seeing Milwaukee's advertisements. Unfortunately, there is no way to interpret this survey data to determine whether a respondent's attitude changed before or after deciding to bedshare with her most recent infant. Even controlling for when the child was born would be problematic; although the ad campaign launched in 2011, the mother could have first seen the advertisements any time between then and when she took the survey. Future studies should make sure not only to ask about changed minds, but also to consider when attitudes shifted in relation to actual bedsharing behavior.

Another limitation to this study was already identified when discussing WIC participants as a unique and potentially unrepresentative sample compared to their eligible yet non-participant peers. Additionally, due to the location of the one participating WIC office, this study's conclusions are fairly limited to an even more specific subpopulation of WIC participants: those who live on Milwaukee's South Side and who are predominately Hispanic, not black or white.

Of course, we must consider the possibility of under-reporting of bedsharing behaviors and misreporting of attitudes, especially among the WIC sample. Despite all efforts taken to ensure respondents understood the goals of the study, the fact still remains that this researcher, as a middle-class, highly-educated white woman, was perceived as part of the "establishment." It is possible that responses were given based on what respondents perceived the researcher "wanted" to hear. Nor can we rule out

the possibility that WIC surveys were filled out at the WIC location, both in waiting rooms and sometimes even during appointments (if a respondent hadn't completed the survey by the time her name was called, she was allowed to take the survey with her to finish). Despite my reassurances that this survey was in no way associated with WIC, that it was anonymous, and that it would never be seen by WIC employees, it does not eliminate the pressure to answer in a way that is seen as "correct" by the WIC and biomedical establishments.

Finally, the construction of the survey itself limits analysis to mostly behavioral variables. This was originally done intentionally, as behaviors are concrete demonstrations of adherence to knowledge systems. However, given the almost ubiquitous behaviors of vaccination and attending regular doctor appointments in this sample, inquiring about attitudes may have been more effective in determining how strongly a respondent valued fundamentals of a biomedical knowledge system. For example, instead of asking *Do you vaccinate your child*? it may have been more informative to ask *Do you agree that it is important to vaccinate your child?* and to provide a 5-point scale (1. strongly disagree / 2. somewhat disagree / 3. neutral / 4. somewhat agree / 5. strongly agree). This would also have facilitated analysis and determination of biomedical adherence, given that it would be easy to quantify biomedical adherence by synthesizing numerical scales. Any future research involving adherence to knowledge systems might benefit from this manner of survey design.

CONCLUSION

The primary motivator for this study was to understand how (or if) adherence to a biomedical system of knowledge influenced bedsharing behaviors in Milwaukee. Similarly, a secondary research question emerged relating to the reception of Milwaukee's safe sleep advertising campaign. Due to biomedicine's authority in our society and its adamant "no tolerance" policy in relation to cosleeping, I hypothesized that mothers who accepted other fundamentals of a biomedical knowledge system would also be more likely to reject cosleeping behaviors and more likely to accept Milwaukee's safe sleep message. Similarly, I expected women who did not exhibit strictly biomedical behaviors to be more likely to cosleep and less likely to accept the anti-cosleeping message.

After associative and predictive analyses, neither research hypothesis (relating to either bedsharing behavior and ad campaign reception) could be accepted. No relationship was found between biomedical adherence and bedsharing behaviors, attitudes, or likelihood of Milwaukee's advertisements to change minds. Thus, the research hypothesis was rejected.

Instead, the only relationship found was the ability to predict a respondent's belief that bedsharing was always dangerous from whether Milwaukee's ad campaign changed her mind. It was also found that a surprising portion (32%) of mothers who perceived bedsharing as always dangerous also reported bedsharing with their infants, implying that further research should be conducted to determine relative levels of perceived risk and danger relating to cosleeping.

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APPENDIX A: Images

Image 1. Milwaukee's 2011 safe sleep campaign advertisement. City of Milwaukee Health Department.

Image 2. Milwaukee's 2011 safe sleep campaign ad.vertisement. City of Milwaukee Health Department.

APPENDIX B: Questionnaire

1. Age _____ Sex _____ Race or Ethnicity _____

City/State where you live _____

Please select your highest level of education:

_____ Did not graduate middle school or junior high

_____Graduated middle school or junior high _____ Some high school

_____ High school diploma/GED _____ Some college

_____ College graduate _____ Graduate/Professional degree

2. How many children have you raised from the time they were babies? _____

Please list the years your babies were born:

3. Check all the sources that you have used to help you make decisions about caring for your most recent baby:

_____ Your own instincts or experience _____ Books/magazines

_____ Doctor _____ Internet/blogs/websites

_____ Family and friends _____ Scientific studies

_____ Clubs or support groups _____ WIC

_____ Religion or religious texts (ie. Church, Bible, Torah, Qur'an, etc.)

_____ Other (please explain: _____)

4. How do (or did) you feed your most recent baby before they were weaned?

_____ Only breast milk

_____ Both breast milk and formula

_____ Only formula

5. Did you (or will you) vaccinate your most recent child? (Does your child get shots recommended by the doctor?)

_____ Yes _____ No

If you answered No, please check the reason(s) why you chose not to vaccinate:

_____ I think it is dangerous and/or unhealthy

_____ I can't afford it

_____ I don't think it's very important

_____ It's against my religion

_____ Other (please explain:_____)

6. When your children are sick, what do you do to make them better? (You can check more than one option.)

_____ Using herbs and herbal remedies

_____ Using traditional treatments that have been passed down through your family or friends

_____ Taking medicine recommended by your child's doctor

_____ Praying or going to religious services (church, etc.)

_____ Other (please explain:_____)

7. Does your most recent child have regular check-ups with the doctor?

_____ Yes _____ No

If you answered No, please check the reason(s) why not:

_____ I don't think it's very important

_____ I can't afford it

_____ I don't have time

_____ I can't find transportation there

_____ I don't think the doctor knows best

_____ Other (please explain:_____)

8. When your most recent baby was younger than 1 year old, how often did he or she sleep in a bed with you or someone else? (This includes both naps and nighttime.)

_____ Never

_____ Less than once a month

_____ Once a month

_____ 2-3 times a month

_____ Once a week

_____ 2-6 times a week

_____ Almost every day

9. Do you think it ***can be*** dangerous for a baby to sleep in bed with someone else?

_____ Yes _____ No

10. Do you think it's ***always*** dangerous for a baby to sleep in bed with someone else?

_____ Yes _____ No

11. Have you seen advertisements (on billboards, in magazines, etc.) that say it's dangerous to share a bed with a baby?

_____ Yes _____ No

If you answered Yes:

Did these advertisements change your mind about sleeping in the same bed with a baby?

Do you think these advertisements will help make babies safer?

APPENDIX C: Figures and Tables

Table 1. Descriptive statistics for continuous variables

Variable	Mean	SD	Range
Age	29.87	7.834	18-55
Education level	4.72	1.446	1-7
Number of kids	2.69	1.813	1-12
Age at first birth	20.57	4.893	13-37
Age at last birth	26.78	6.711	16-46
Bedsharing frequency	2.79	2.165	1-7
Number of sources consulted about childrearing	4.49	1.775	1-9

Table 2a. Details of *Education level* variable

Education Level	Meaning	Frequency (N)	Percent
1	Did not graduate middle school or junior high	1	1.3
2	Graduated middle school or junior high	3	4.0
3	Some high school	10	13.3
4	High school diploma/GED	19	25.3
5	Some college	20	26.7
6	College graduate	13	17.3
7	Graduate/Professional degree	9	12.0

Figure 1. Histogram showing distribution of *Education level*

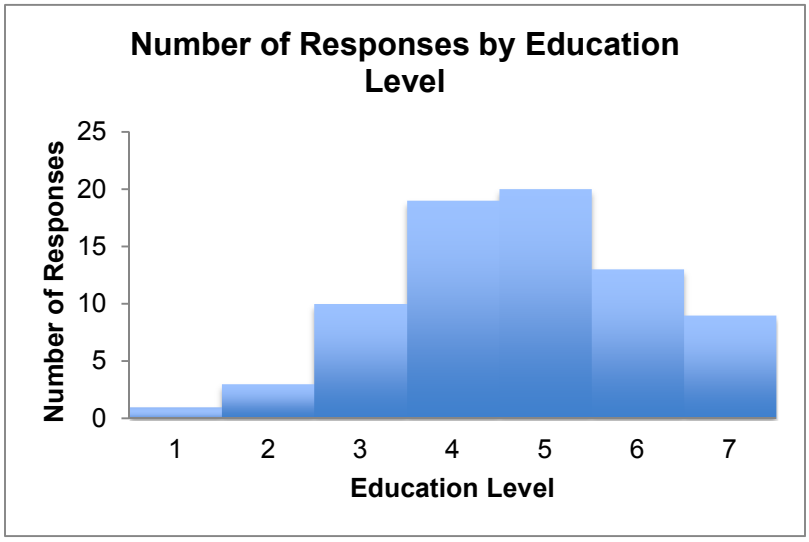

Table 2b. Details of *Bedsharing frequency* variable

Bedsharing Frequency	Meaning	Frequency (N)	Percent
1	Never	43	47.8%
2	Less than once a month	11	12.2%
3	Once a month	5	5.6%
4	2-3 times a month	10	11.1%
5	Once a week	2	2.2%
6	2-6 times a week	12	13.3%
7	Almost every day	7	7.8%

Figure 2. Histogram showing distribution of *Bedsharing frequency*

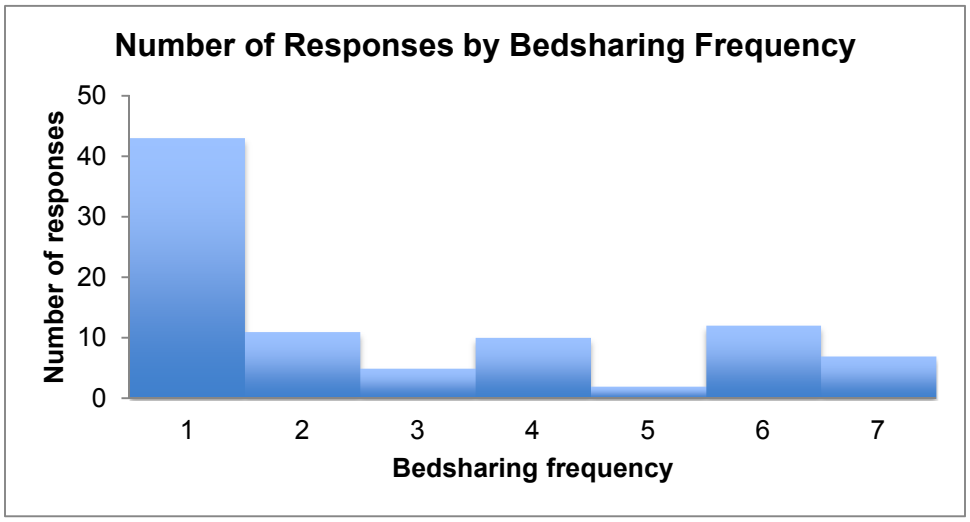

Table 2c. Comparison of respondent education levels between Wisconsin PRAMS report (Wisconsin Department of Health Services 2014) and project data.

Education level	Wisconsin PRAMS Report 2014	Project data
Less than High School	12.4%	18.3%
High School	26.5%	25.3%
Some College	27.1%	26.7%
College Graduate	33.8%	29.2%

Table 3. Descriptive statistics for categorical variables. *Race may sum to over 100%, as some participants identified themselves as part of multiple racial categories. ** Only the WIC population was included in analysis of variable *WIC as a source for childrearing*.

Variable		Frequency (N)	Percent
WIC	Yes	72	80.0%
	No	18	20.0%
Race*	Hispanic	42	46.7%
	Black	11	12.2%
	White	33	36.7%
	Other	7	7.8%
Higher Education	Yes	50	55.6%
	No	40	44.4%
Instinct as source for childrearing	Yes	84	93.3%
	No	6	6.7%
Doctor as source for childrearing	Yes	73	81.1%
	No	17	18.9%
Family and friends as source for childrearing	Yes	76	84.4%
	No	14	15.6%
Clubs or support groups as source for childrearing	Yes	14	84.4%
	No	76	15.6%
Religion as source for childrearing	Yes	20	22.2%
	No	70	77.8%
Books/magazines as source for childrearing	Yes	35	61.1%
	No	55	38.9%
Internet/blogs/websites as source for childrearing	Yes	39	43.3%
	No	51	56.7%
Scientific studies as source for childrearing	Yes	15	16.7%
	No	75	83.3%
WIC as source for childrearing**	Yes	47	65.2%
	No	25	34.7%
Feeding	Breastmilk only	20	22.2%
	Formula only	24	26.7%
	Both breastmilk and formula	46	51.1%
Vaccinate	Yes	88	97.8%
	No	2	2.2%
Treat illness using herbal remedies	Yes	17	18.9%
	No	73	81.1%

Treat illness using traditional remedies	Yes	27	30.0%
	No	63	70.0%
Treat illness using religion	Yes	19	21.1%
	No	71	78.9%
Treat illness using medicine prescribed by doctor	Yes	86	95.6%
	No	4	4.4%
Attend regular doctor checkups	Yes	89	98.9%
	No	1	1.1%
Bedshare	Yes	47	52.2%
	No	43	47.8%
Can bedsharing be dangerous?	Yes	85	94.4%
	No	5	5.6%
Is bedsharing always dangerous?	Yes	50	55.6%
	No	40	44.4%
Have you seen Milwaukee's anti-cosleeping ads?	Yes	85	94.4%
	No	5	5.6%
Did Milwaukee's safe sleep advertisements change your mind about bedsharing?	Yes	37	41.1%
	No	38	42.2%
	N/A	15	16.7%
Did Milwaukee's safe sleep advertisements make babies safer?	Yes	48	53.3%
	No	6	6.7%
	Unsure	10	11.1%
	N/A	26	28.9%

Table 4. Comparison between WIC vs. Non-WIC populations, Welch's t-test

Variable	WIC Mean	Non-WIC Mean	t-value	df	p-value	95% C.I.
	WIC (N=72)	**Non-WIC (N=18)**				
Age	29.08	33.00	2.502	40.71	0.017	0.754 – 7.079
Education Level	4.43	5.89	3.893	24.255	<0.001	0.686 – 2.231
Number of kids	2.89	1.89	-2.788	41.983	0.008	(-1.721) – (-0.275)
Age first birth	18.96	26.56	5.659	20.308	<0.001	4.801 – 10.399
Age last birth	25.96	29.83	2.395	29.834	0.023	0.571 – 7.186
Number of sources	4.35	5	1.199	22.13	0.243	-0.472 – 1.767
Bedshare frequency	2.74	3	0.512	30.304	0.612	-0.788 – 1.316

Table 5. Comparison between WIC vs non-WIC populations. Chi-square with continuity correction and Fisher's exact test

Variable		Frequency		Percentage		Chi-square value	df	p-value
		WIC (N=72)	Non-WIC (N=18)	WIC (N=72)	Non-WIC (N=18)			
Race Hispanic	**Yes**	42	2	58.3%	11.1%	11.03	1	<0.001
	No	30	16	41.7%	88.9%			
Race Black	**Yes**	11	0	15.3%	0.0%	N/A: Fisher's exact test run		0.112
	No	61	18	84.7%	100.0%			
Race White	**Yes**	19	14	26.4%	77.8%	14.237	1	<0.001
	No	53	4	73.1%	22.2%			
Race Other	**Yes**	5	2	6.9%	11.1%	N/A: Fisher's exact test run		0.624
	No	67	16	93.1%	88.9%			
Higher education	**Yes**	36	14	50%	77.8%	3.445	1	0.063
	No	36	4	50%	22.2%			
Instinct as source for childrearing	**Yes**	66	18	91.7%	100%	0.547	1	0.460
	No	6	0	8.3%	0%			
Doctor as source for childrearing	**Yes**	57	16	79.17%	88.89%	0.367	1	0.545
	No	15	2	20.83%	11.11%			
Family and friends as source for childrearing	**Yes**	62	14	86.1%	77.8%	0.259	1	0.611
	No	10	4	13.9%	22.2%			
Clubs or support groups as source for childrearing	**Yes**	5	9	6.9%	50%	17.176	1	<0.001
	No	67	9	93.1%	50%			
Religion as source for childrearing	**Yes**	18	2	25.0%	11.1%	0.904	1	0.342
	No	54	16	75.0%	88.9%			
Books/magazines as source for childrearing	**Yes**	24	11	33.3%	61.1%	N/A: Fisher's exact test run		0.056

	No	48	7	66.6%	38.9%			
Internet/blogs/websites as source for childrearing	**Yes**	27	12	37.5%	66.7%	N/A: Fisher's exact test run		0.034
	No	45	6	62.5%	33.4%			
Scientific studies as source for childrearing	**Yes**	8	7	11.11%	38.89%	6.125	1	0.013
	No	64	11	88.89%	61.11%			
Feeding	**Breastmilk only**	10	10	13.89%	55.56%	N/A: Fisher's exact test run		<0.001
	Formula only	23	1	31.94%	5.56%			
	Both breastmilk and formula	39	7	54.17%	38.89%			
Treat illness using herbal remedies	**Yes**	16	1	22.22%	5.56%	N/A: Fisher's exact test run		0.177
	No	56	17	77.78%	94.44%			
Treat illness using traditional remedies	**Yes**	24	3	33.33%	16.67%	N/A: Fisher's exact test run		0.251
	No	48	15	66.67%	83.33%			
Treat illness using religion	**Yes**	18	1	25.00%	5.56%	N/A: Fisher's exact test run		0.106
	No	54	17	75.00%	94.44%			
Treat illness using medicine prescribed by doctor or pharmacist	**Yes**	69	17	95.83%	94.44%	N/A: Fisher's exact test run		1
	No	3	1	4.17%	5.56%			
Treat illness exclusively using medicine prescribed by doctor or pharmacist	**Yes**	29	13	40.28%	72.22%	4.690	1	0.030
	No	43	5	59.72%	27.78%			
Attend regular doctor checkups	**Yes**	71	18	98.61%	100.00%	N/A: Fisher's exact test run		1
	No	1	0	1.39%	0.00%			
Vaccinate	**Yes**	71	17	98.61%	94.44%	N/A: Fisher's exact test run		0.362
	No	1	1	1.39%	5.56%			
Bedshare	**Yes**	34	13	47.22%	72.22%	2.675	1	0.102
	No	38	5	52.78%	27.78%			

Can bedsharing be dangerous?	**Yes**	68	17	94.44%	94.44%	N/A: Fisher's exact test run	1
	No	4	1	5.56%	5.56%		
Is bedsharing always dangerous?	**Yes**	46	4	63.89%	22.22%	N/A: Fisher's exact test run	0.003
	No	26	14	36.11%	77.78%		
Did Milwaukee's safe sleep advertisements change your mind about bedsharing?	**Yes**	33	4	45.83%	22.22%	N/A: Fisher's exact test run	0.137
	No	28	10	38.89%	55.56%		
	N/A	11	4	15.28%	22.22%		
Did Milwaukee's safe sleep advertisements make babies safer?	**Yes**	40	8	55.56%	44.44%	N/A: Fisher's exact test run	0.0315
	No	6	0	8.33%	0.00%		
	Unsure	5	5	6.94%	27.78%		
	N/A	21	5	29.17%	27.78%		

Table 6. Comparison between bedsharing vs. non-bedsharing groups, Welch's t-test

Variable	Bedshare Y Mean	Bedshare N Mean	t-value	df	p-value	95% C.I.
	Bedshare Y (N=47)	**Bedshare N (N=43)**				
Age	29.06	30.74	-1.015	86.429	0.313	-4.965 – 1.604
Education Level	4.85	4.58	0.884	87.769	0.270	-0.336 – 0.876
Number of kids	2.48	2.91	-1.112	84.281	0.268	-1.195 – 0.338
Age first birth	21.11	19.95	1.098	82.790	0.275	-0.943 – 3.265
Age last birth	25.76	27.93	-1.494	80.488	0.139	-5.060 – 0.721
Number of sources	4.40	4.58	-0.476	85.185	0.635	-0.916 – 0.562

Table 7. Comparison between bedsharing and non-bedsharing groups, Chi-square with continuity correction or Fisher exact test. *Only the WIC population was included in analysis of variable *WIC as a source for childrearing*.

Variable		Frequency		Percentage		Chi-square	df	p-value
		Bedshare Y (N=47)	Bedshare N (N=43)	Bedshare Y (N=47)	Bedshare N (N=43)			
WIC	**Yes**	34	38	72.34%	88.37%	2.675	1	0.102
	No	13	5	27.66%	11.63%			
Race Hispanic	**Yes**	21	23	44.68%	53.49%	0.389	1	0.533
	No	26	19	55.32%	44.19%			
Race Black	**Yes**	7	4	14.89%	9.30%	0.237	1	0.626
	No	40	39	85.11%	90.70%			
Race White	**Yes**	19	14	40.43%	32.56%	0.308	1	0.579
	No	28	29	59.57%	67.44%			
Race Other	**Yes**	4	3	8.51%	6.98%	N/A: Fisher exact test		1
	No	43	40	91.49%	93.02%			
Higher education	**Yes**	28	22	59.6%	51.2%	0.348	1	0.555
	No	19	21	40.4%	48.8%			
Instinct as source for childrearing	**Yes**	43	41	91.5%	95.3%	0.096	1	0.756
	No	4	2	8.5%	4.7%			
Doctor as source for childrearing	**Yes**	35	38	74.47%	88.37%	1.999	1	0.157
	No	12	5	25.53%	11.63%			
Family and friends as source for childrearing	**Yes**	36	40	85.1%	83.7%	0.033	1	0.856
	No	7	7	14.9%	16.3%			
Clubs or support groups as source for childrearing	**Yes**	8	6	17.0%	14.0%	0.012	1	0.912
	No	39	37	83.0%	86.0%			
Religion as source for childrearing	**Yes**	9	11	19.15%	25.58%	0.23	1	0.632
	No	38	32	80.85%	74.42%			
Books/magazines as source for childrearing	**Yes**	19	16	40.4%	37.2%	0.009	1	0.923
	No	28	27	59.5%	62.8%			
Internet/blogs/websites as	**Yes**	17	22	46.8%	53.2%	0.233	1	0.629

source for childrearing	**No**	26	25	39.5%	60.5%			
Scientific studies as source for childrearing	**Yes**	10	5	21.28%	11.63%	0.891	1	0.345
	No	37	38	78.72%	88.37%			
WIC as source for childrearing*	**Yes**	19	27	55.9%	71.1%	1.193	1	0.275
	No	15	11	44.1%	28.9%			
Feeding	**Breastmilk only**	12	8	25.53%	18.60%			
	Formula only	12	12	25.53%	27.91%	0.623	2	0.732
	Both breastmilk and formula	23	23	48.94%	53.49%			
Treat illness using herbal remedies	**Yes**	11	6	23.40%	13.95%	0.765	1	0.382
	No	36	37	76.60%	86.05%			
Treat illness using traditional remedies	**Yes**	15	12	31.91%	27.91%	0.0339	1	0.854
	No	32	31	68.09%	72.09%			
Treat illness using religion	**Yes**	10	9	21.28%	20.93%	0.0477	1	0.827
	No	37	34	78.72%	79.07%			
Treat illness using medicine prescribed by doctor or pharmacist	**Yes**	44	42	93.62%	97.67%	N/A: Fisher exact test		0.618
	No	3	1	6.38%	2.33%			
Treat illness by exclusively using medicine prescribed by doctor or pharmacist	**Yes**	9	11	19.15%	25.58%	0.23	1	0.632
	No	38	32	80.85%	74.42%			
Attend regular doctor checkups	**Yes**	46	43	97.87%	100%	N/A Fisher exact test		1
	No	1	0	2.13%	0%			
Vaccinate	**Yes**	45	43	95.74%	100%	N/A Fisher exact test		0.495
	No	2	0	4.26%	0%			

Can bedsharing be dangerous?	**Yes**	42	43	89.36%	100.00%	N/A Fisher exact test		0.057
	No	5	0	10.64%	0.00%			
Is bedsharing always dangerous?	**Yes**	15	35	31.91%	81.4%	20.307	1	<0.001
	No	32	8	68.09%	18.6%			
Did Milwaukee's safe sleep advertisements change your mind about bedsharing	**Yes**	13	24	27.66%	55.81%	7.405	1	0.025
	No	24	14	51.06%	32.56%			
	N/A	10	5	21.28%	11.63%			
Did Milwaukee's safe sleep advertisements make babies safer	**Yes**	24	24	51.06%	55.81%	3.049	2	0.384
	No	5	1	10.64%	2.33%			
	Unsure	6	4	12.77%	9.30%			
	N/A	12	14	25.53%	32.56%			

Table 8. Possible predictors of bedsharing, controlled for age. N=90 unless otherwise stated. *Only the WIC population was included in analysis of variable *WIC as a source for childrearing*.

Variable		B	Wald	df	p-value	Exp(B)
WIC	No	1.248	4.370	1	0.037	3.484
Race			0.977	3	0.807	
	Black	0.319	0.833	1	0.702	1.376
	Hispanic	-0.332	0.504	1	0.510	0.717
	Other	0.045	0.669	1	0.947	1.046
Education level		0.171	1.233	1	0.267	1.187
Higher education	No	-0.476	1.150	1	0.283	0.621
Number of kids (N=89)		-0.109	0.653	1	0.419	0.896
Age at first birth (N=85)		0.077	2.324	1	0.127	1.080
Age at last birth (N=85)		-0.061	1.211	1	0.271	0.941
Number of sources consulted for childrearing decisions		-0.044	0.134	1	0.715	0.957
Instinct as source for childrearing	No	0.679	0.566	1	0.452	1.971
Doctor as source for childrearing	No	1.085	3.282	1	0.070	2.959
Family and friends as source for childrearing	No	-0.073	0.016	1	0.900	0.929

Clubs or support groups as source for childrearing	No	-0.392	0.419	1	0.517	0.675
Religion as source for childrearing	No	-0.364	0.506	1	0.477	1.440
Books/magazines as source for childrearing	No	-0.297	0.419	1	0.517	0.743
Internet/blogs/websites as source for childrearing	No	-0.327	0.574	1	0.449	0.721
Scientific studies as source for childrearing	No	-0.773	1.655	1	0.198	0.461
WIC as source for childrearing (N=72) *	No	0.621	1.527	1	0.217	1.860
Feeding method			1.236	2	0.539	
	Both breastmilk and formula	-0.088	0.029	1	0.864	0.916
	Only breastmilk	0.542	0.739	1	0.390	1.720
Vaccinate	No	21.097	0	1	0.999	1.453 E +9
Treat illness using herbal remedies	No	-0.650	1.329	1	0.249	0.522
Treat illness using traditional remedies	No	-0.197	0.180	1	0.672	0.821
Treat illness using religion	No	-0.050	0.522	1	0.924	0.951
Treat illness using medicine prescribed by doctor or pharmacist	No	1.062	.809	1	0.368	2.893
Treat illness by exclusively using medicine prescribed by doctor or pharmacist	No	-0.013	0.001	1	0.975	0.987
Attend regular doctor checkups	No	21.545	0	1	1	2.274 E +9
Can bedsharing be dangerous?	No	21.173	0	1	0.999	1.567 E +9
Is bedsharing always dangerous?	No	2.210	19.188	1	<0.001	9.118
Did Milwaukee's safe sleep advertisements change your mind about bedsharing? (N=75)	No	1.186	5.939	1	0.015	3.275
Did Milwaukee's safe sleep advertisements make babies safer? (N=64)			2.112	2	0.348	
	No	1.575	1.918	1	0.166	4.830
	Unsure	0.412	0.338	1	0.561	1.510

Table 9. Possible predictors of bedsharing, controlled for education level (run as categorical variable). N=90 unless otherwise stated. *Only the WIC population was included in analysis of variable *WIC as a source for childrearing*.

Variable		B	Wald	df	p-value	Exp(B)
WIC	No	0.915	1.728	1	0.189	2.496
Age		-0.035	1.284	1	0.257	0.965
Race			0.753	3	0.861	
	Black	0.498	0.350	1	0.554	1.645
	Hispanic	-0.154	0.092	1	0.762	0.857
	Other	0.131	0.039	1	0.843	1.140
Number of kids (N=89)		-0.085	0.405	1	0.525	0.919
Age at first birth (N=85)		0.029	0.246	1	0.620	1.030
Age at last birth (N=85)		-0.071	2.805	1	0.094	0.932
Number of sources consulted for childrearing decisions		-0.064	0.223	1	0.637	0.938
Instinct as source for childrearing	No	0.716	0.561	1	0.454	2.046
Doctor as source for childrearing	No	1.136	3.058	1	0.080	3.115
Family and friends as source for childrearing	No	-0.492	0.613	1	0.434	0.612
Clubs or support groups as source for childrearing	No	-0.164	0.054	1	0.817	0.849
Religion as source for childrearing	No	0.472	0.701	1	0.402	1.604
Books/magazines as source for childrearing	No	-0.039	0.007	1	0.934	0.962
Internet/blogs/websites as source for childrearing	No	-0.356	0.551	1	0.458	0.701
Scientific studies as source for childrearing	No	-0.421	0.443	1	0.506	0.656
WIC as source for childrearing (N=72) *	No	0.661	1.769	1	0.183	1.938
Feeding method			0.406	2	0.816	
	Both breastmilk and formula	0.019	0.001	1	0.971	1.019
	Only breastmilk	0.405	0.310	1	0.578	1.499
Vaccinate	No	21.429	0	1	0.999	2.026 E +9
Treat illness using herbal remedies	No	-0.647	1.188	1	0.276	0.524
Treat illness using traditional remedies	No	-0.174	0.128	1	0.720	0.840
Treat illness using religion	No	0.269	0.220	1	0.639	1.309
Treat illness using medicine prescribed by doctor or pharmacist	No	0.628	0.248	1	0.618	1.873
Treat illness exclusively by using medicine prescribed by doctor or pharmacist	No	-0.138	0.085	1	0.770	0.871
Attend regular doctor checkups	No				1	
Can bedsharing be dangerous?	No				0.999	
Is bedsharing always dangerous?	No	2.290	16.930	1	<0.001	9.876
Did Milwaukee's safe sleep advertisements change your mind about bedsharing? (N=75)	No	1.192	5.446	1	0.020	3.292

Did Milwaukee's safe sleep advertisements make babies safer? (N=64)			2.082	2	0.353	
	No	1.615	2.022	1	0.155	5.028
	Unsure	0.278	0.143	1	0.706	1.320

Table 10. Possible predictors of bedsharing, controlled for race. N=90 unless otherwise stated. *Only the WIC population was included in analysis of variable *WIC as a source for childrearing*.

Variable		B	Wald	df	p-value	Exp(B)
WIC	No	1.330	3.926	1	0.048	3.781
Education level		0.127	0.659	1	0.417	1.136
Higher education	No	-0.324	0.504	1	0.478	0.724
Number of kids (N=89)		-0.147	1.319	1	0.251	0.863
Age at first birth (N=85)		0.062	1.483	1	0.223	1.063
Age at last birth (N=85)		-0.047	1.841	1	0.175	0.954
Number of sources consulted for childrearing decisions		-0.047	0.146	1	0.702	0.955
Instinct as source for childrearing	No	0.518	0.288	1	0.591	1.679
Doctor as source for childrearing	No	1.075	3.153	1	0.076	2.931
Family and friends as source for childrearing	No	-0.129	0.045	1	0.831	0.879
Clubs or support groups as source for childrearing	No	-0.131	0.047	1	0.828	0.877
Religion as source for childrearing	No	0.296	0.309	1	0.578	1.344
Books/magazines as source for childrearing	No	-0.199	0.199	1	0.655	0.819
Internet/blogs/websites as source for childrearing	No	-0.344	0.625	1	0.429	0.709
Scientific studies as source for childrearing	No	-0.780	1.620	1	0.203	0.458
WIC as source for childrearing (N=72) *	No	0.642	1.586	1	0.208	1.901
Feeding method			0.597	2	0.742	
	Both breastmilk and formula	-0.047	0.008	1	0.928	0.954
	Only breastmilk	0.371	0.357	1	0.550	1.449
Vaccinate	No	21.025	0	1	0.999	1.353 E+9
Treat illness using herbal remedies	No	-0.751	1.689	1	0.194	0.472

Treat illness using traditional remedies	No	-0.230	0.239	1	0.625	0.795
Treat illness using religion	No	-0.060	0.013	1	0.910	0.942
Treat illness using medicine prescribed by doctor or pharmacist	No	1.090	0.851	1	0.356	2.976
Treat illness by exclusively using medicine prescribed by doctor or pharmacist	No	0.048	0.012	1	0.913	1.049
Attend regular doctor checkups	No	21.357	0	1	1	1.885 E+9
Can bedsharing be dangerous?	No	21.191	0	1	0.999	1.596 E+9
Is bedsharing always dangerous?	No	2.304	19.494	1	<0.001	10.017
Did Milwaukee's safe sleep advertisements change your mind about bedsharing? (N=75)	No	1.506	7.074	1	0.008	4.508
Did Milwaukee's safe sleep advertisements make babies safer? (N=64)			2.277	2	0.320	
	No	1.696	2.165	1	0.141	5.450
	Unsure	0.425	0.306	1	0.580	1.529

Table 11a. Results of logistic regression predicting bedsharing behavior from biomedical and alternative care variables: Test of model fit

Chi-square	df	p-value
20.287	4	<0.001

Table 11b. Results of logistic regression predicting bedsharing behavior from biomedical and alternative care variables: Classification table

		Predicted		
		Bedshare N	**Bedshare Y**	Percentage correct
Observed	**Bedshare N**	26	12	68.4
	Bedshare Y	9	28	75.7
	Overall percentage			72.0

Table 11c. Results of logistic regression predicting bedsharing behavior from biomedical and alternative care variables: Variables in the regression equation

		B	Wald	df	p-value	Odds ratio
Always dangerous	Yes	Ref	Ref	Ref	Ref	Ref
	No	1.968	9.056	1	0.003	7.154
Change mind	Yes	Ref	Ref	Ref	Ref	Ref
	No	0.288	0.212	1	0.646	1.333
WIC status	Yes	Ref	Ref	Ref	Ref	Ref
	No	0.058	0.006	1	0.937	1.060
Source doctor	Yes	Ref	Ref	Ref	Ref	Ref
	No	1.273	2.853	1	0.091	3.573
Constant		-1.245	8.132	1	0.004	0.288

Table 12a. Results of logistic regression predicting bedsharing behavior from biomedical and alternative care variables: Test of model fit

Chi-square	df	p-value
7.764	7	0.354

Table 12b. Results of logistic regression predicting bedsharing behavior from biomedical and alternative care variables: Classification table

		Predicted		
		Bedshare N	**Bedshare Y**	Percentage correct
Observed	**Bedshare N**	30	13	69.8
	Bedshare Y	21	26	55.3
	Overall percentage			62.2

Table 12c. Results of logistic regression predicting bedsharing behavior from biomedical and alternative care variables: Variables in the regression equation

		B	Wald	df	p-value	Odds ratio
Source doctor.	Yes	Ref	Ref	Ref	Ref	Ref
	No	1.115	3.260	1	0.071	3.051
Source scientific studies	Yes	Ref	Ref	Ref	Ref	Ref
	No	-0.933	2.084	1	0.149	0.393
Treat using medicine prescribed by doctor	Yes	Ref	Ref	Ref	Ref	Ref
	No	0.503	0.165	1	0.684	1.657
Source religion	Yes	Ref	Ref	Ref	Ref	Ref
	No	0.555	0.826	1	0.363	1.741
Treat using herbal remedies	Yes	Ref	Ref	Ref	Ref	Ref
	No	-0.531	0.789	1	0.374	0.588
Treat using traditional remedies	Yes	Ref	Ref	Ref	Ref	Ref
	No	-0.307	0.377	1	0.539	0.736
Treat Religion	Yes	Ref	Ref	Ref	Ref	Ref
	No	-0.296	1.324	1	0.636	0.743
Constant		1.104	1.324	1	0.250	3.015

Table 13a. Results of logistic regression predicting *Always dangerous* from biomedical & alternative care variables: Test of model fit

Chi-square	df	p-value
7.861	7	0.345

Table 13b. Results of logistic regression predicting *Always dangerous* from biomedical & alternative care variables: Classification table

		Predicted		
		Always dangerous N	**Always dangerous Y**	Percentage correct
Observed	**Always dangerous N**	13	27	32.5
	Always dangerous Y	5	45	90.0
	Overall percentage			64.4

Table 13c. Results of logistic regression predicting *Always dangerous* from biomedical & alternative care variables: Variables in the regression equation

		B	Wald	df	p-value	Odds ratio
Source doctor.	Yes	Ref	Ref	Ref	Ref	Ref
	No	-0.370	0.415	1	0.520	0.690
Source scientific studies	Yes	Ref	Ref	Ref	Ref	Ref
	No	-1.484	5.028	1	0.025	4.410
Treat using medicine prescribed by doctor	Yes	Ref	Ref	Ref	Ref	Ref
	No	-0.996	0.602	1	0.438	0.369
Source religion	Yes	Ref	Ref	Ref	Ref	Ref
	No	0.266	0.192	1	0.662	1.301
Treat using herbal remedies	Yes	Ref	Ref	Ref	Ref	Ref
	No	-0.117	0.039	1	0.843	0.889
Treat using traditional remedies	Yes	Ref	Ref	Ref	Ref	Ref
	No	0.310	0.383	1	0.536	1.363
Treat Religion	Yes	Ref	Ref	Ref	Ref	Ref
	No	-0.026	0.002	1	0.967	0.974
Constant		-1.218	1.613	1	0.204	0.296

Table 14a. Results of logistic regression predicting *Change mind* from biomedical & alternative care variables. Test of model fit

Chi-square	df	p-value
6.712	7	0.459

Table 14b. Results of logistic regression predicting *Change mind* from biomedical & alternative care variables. Classification table

		Predicted		
		Change mind N	**Change mind Y**	Percentage correct
Observed	**Change mind N**	18	20	47.5
	Change mind Y	9	28	75.7
	Overall percentage			61.3

Table 14c. Results of logistic regression predicting *Change mind* from biomedical & alternative care variables. Variables in the regression equation

		B	Wald	df	p-value	Odds ratio
Source doctor	Yes	Ref	Ref	Ref	Ref	Ref
	No	0.062	0.009	1	0.925	1.064
Source scientific studies	Yes	Ref	Ref	Ref	Ref	Ref
	No	1.035	2.215	1	0.137	2.814
Treat using medicine prescribed by doctor	Yes	Ref	Ref	Ref	Ref	Ref
	No	0.385	0.079	1	0.779	1.470
Source religion	Yes	Ref	Ref	Ref	Ref	Ref
	No	0.272	0.175	1	0.676	1.313
Treat using herbal remedies	Yes	Ref	Ref	Ref	Ref	Ref
	No	1.104	3.130	1	0.077	3.017
Treat using traditional remedies	Yes	Ref	Ref	Ref	Ref	Ref
	No	-0.026	0002	1	0.961	0.974
Treat Religion	Yes	Ref	Ref	Ref	Ref	Ref
	No	0.313	0.233	1	0.629	0.731
Constant		-1.725	2.699	1	0.100	0.178

Table 15a. Results of logistic regression *Always dangerous* from *Change mind* and other demographic variables: Test of model fit

Chi-square	df	p-value
38.172	7	<0.001

Table 15b. Results of logistic regression *Always dangerous* from *Change mind* and other demographic variables: Classification table

		Predicted		
		Always dangerous N	**Always dangerous Y**	Percentage correct
Observed	**Always dangerous N**	25	8	75.8
	Always dangerous Y	8	34	81.0
	Overall percentage			78.7

Table 15c. Results of logistic regression *Always dangerous* from *Change mind* and other demographic variables: Variables in the regression equation

		B	Wald	df	p-value	Odds ratio
Change mind	Yes	Ref	Ref	Ref	Ref	Ref
	No	-2.930	15.815	1	<0.001	0.053
WIC	Yes	Ref	Ref	Ref	Ref	Ref
	No	-2.497	6.658	1	0.010	0.082
Race	White	Ref	Ref	Ref	Ref	Ref
	Black	-2.257	2.760	1	0.097	0.105
	Hispanic	-1.152	1.797	1	0.180	0.316
	Other	-0.867	0.769	1	0.381	0.420
Education level		-0.340	1.418	1	0.234	0.712
Age		0.069	2.190	1	0.139	1.072
Constant		2.736	2.550	1	0.110	15.433