OB-GYN KNOWLEDGE AND PRACTICE PATTERNS REGARDING MAJOR DEPRESSIVE DISORDER AND THE EFFECT OF PERCEIVED NUMERIC ABILITY

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ABSTRACT

Ob-gyns are often the first line of contact for a woman concerning her physical and mental health. One of the most common complaints addressed by ob-gyns includes symptoms of depression. This study explored ob-gyns' knowledge and practices regarding Major Depressive Disorder (MDD), physician communication of anti-depressant information, and perceived numeric ability.

Surveys were sent to 220 members of the American College of Obstetricians and Gynecologists. Response rate was 66%. Few (40%) ob-gyns indicated using standardized screening tools for depression. The majority (89%) of ob-gyns do not employ the DSM-IV to confirm a diagnosis of MDD, or before prescribing anti-depressants. Perceived numeric ability was associated with physicians' use of the DSM-IV, but not their likelihood to communicate persuasively. Physicians are providing patients with balanced treatment information and are not using numeric formats in an influential manner. More research is needed to assess the role of numeric ability in depression care.

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through the ups and downs, and sacrificing his weekends to have study dates at Starbucks.

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INTRODUCTION

For United States adults aged 15 to 44, major depression is the leading cause of disability (The World Health Organization, 2004). With prevalence rates between 8-16% (Kessler, Berglund, Demler, Jin, Koretz, Merkikangas, et al., 2003; Vesga-Lopez, Blanco, Keyes, Olfson, Grant, & Hasin, 2008), Major Depressive Disorder (MDD) is twice as common in women as their male counterparts (American Psychiatric Association, 2000). The recognition of major depression is a significant factor in women's health and many women seek psychological care from their obstetrician-gynecologist (ob-gyn) for signs and symptoms of depression (Stevens & Diehl, 2003). However, less than 50% attain a diagnosis and sufficient treatment for the disorder (Farr, Bitsko, Hayes, & Dietz, 2010). This may be due in part to the fact that many physicians are not utilizing validated measures to screen for depression, such as the Beck Depression Inventory (BDI), or Patient Health Questionnaire (PHQ), and alternatively rely on their own clinical opinion (Leddy, Haaga, Gray, & Schulkin, 2011a). It is important for physicians to implement standardized screening tools in practice (over invalidated measures) as research has found this enhances a clinicians' ability to recognize and treat depression by 67% (Gilbody, Sheldon, & House, 2008). The present study will examine the use of validated screening tools for depression and ob-gyns' use of the DSM-IV when making a depression diagnosis or beginning treatment for the disorder.

Many ob-gyns who indicate diagnosing depression use anti-depressant medication as their preferred therapy (Williams, Rost, Dietrich, Ciotti, Zyzanski, & Cornell, 1999; Coleman, Carter, Morgan, & Schulkin, 2008). However, little is known about the information physicians relay to their patients regarding anti-depressants. This includes the risks and benefits associated with these medications, and the numeric format in which this information is relayed. Different numeric formats have been shown to have significant effects on medical decision-making (Covey, 2007; Peters, Hart, & Fraenkel, 2011; Schwartz, Woloshin, Black, & Welch, 1997), thus investigation into this topic is important. For example, pharmaceutical companies commonly present numerical information in the relative risk format to exaggerate the effectiveness of a medication, however use the absolute risk format to downplay the side effects. Utilizing these persuasive communication patterns to relay drug information can also affect decision-making. However, little is known about physicians' tendency to be persuasive (e.g. presenting numerical information in terms of the relative risk) when discussing anti-depressant medication with their patients.

One factor that may impact physicians' communication of information of the risk of anti-depressants is their own ability to understand numeric risk information. Research on this topic is scarce, though current literature has noted that physicians high and low in numeric ability communicate with their patients differently; those high in numeric ability are more likely to explain screening results in quantitative versus qualitative form (Anderson, Obrecht, Chapman, Driscoll, & Schulkin, 2011). This study will further investigation of risk communication by examining whether ob-gyns' perceived numeric ability affects their communication of differing numeric formats, benefits and side effects

of a treatment, or the use of persuasive number formats when providing information about anti-depressants.

The purpose of this research is to investigate the depression care provided by ob-gyns, women's' primary healthcare providers. Using a national sample of ob-gyns, we will examine aspects of depression care where previous research is lacking: 1) assessment of which depression screening tools are used by ob-gyns and the frequency of consulting the DSM-IV, 2) how ob-gyns communicate the risks and benefits of anti-depressant medication to patients, and 3) whether ob-gyns' perceived numeric ability affects the depression care provided to their patients. This investigation will further what is known about depression screening and risk communication by ob-gyns. These results may inform what efforts are made to improve these aspects of care.

CHAPTER 2

OB-GYNS AND DEPRESSION CARE

For many women, consulting their ob-gyn is the first and most frequent line of contact when issues arise concerning their own health (Leddy, Lawrence, & Schulkin, 2011b). While many women visit their ob-gyn for concerns related to physical health, others also consult these physicians for matters related to mental health. Studies have reported that ob-gyns believe that their patients' mental health is an important topic to discuss, and that assessment and treatment of mental health concerns are significant themes in practice (Leddy et al., 2011b). Thus, ob-gyns are in an exceptional position to provide psychological care to women in need (Leddy et al., 2011a). Falling within the realm of both primary care and mental health, one of the most common complaints by women to their ob-gyns includes symptoms of depression (Stevens & Diehl, 2003).

The DSM-IV-TR (American Psychiatric Association, 2000) characterizes Major Depressive Disorder (MDD), by the presence of at least one Major Depressive Episode (MDE), which is not better accounted for by another disorder (e.g., Schizoaffective Disorder), and not superimposed on another disorder (e.g., Schizophrenia, Schizophreniform Disorder, Delusional Disorder, or Psychotic Disorder NOS). As well, there cannot be a history of a Manic, Mixed, or Hypomanic Episode (American Psychiatric Association, 2000). Common symptoms presenting in MDD include: sadness or depressed mood, difficulties concentrating, fatigue, sleep disturbances, excessive

weight gain or weight loss, and loss of interest in previously pleasurable activities (Zieve & Merrill, 2012).

Ob-gyns' Screening for MDD

The prevalence rate of major depression has been reported between 8% and 16% in the female population (Kessler et al., 2003; Vesga-Lopez et al., 2008). As well, adolescents have lifetime prevalence rates around 11% (Merikangas, He, Swanson, Avenevoli, Cui, Benjet et al., 2010), and research has found depression rates at 30% postpartum (Stevens & Diehl, 2003). Despite the relative commonality of MDD, and physicians' beliefs that it is important to properly manage, ob-gyns' are minimally screening for depression (Morgan & Schulkin, 2006; Stevens & Diehl, 2003).

One study found that 44% of ob-gyns reported always screening for depression; however 15% reported never screening for the disorder, irrespective of applicable signs or symptoms (LaRocco-Cockburn, Melville, Bell, & Katon, 2003). Dietrich and colleagues (2003) found ob-gyns were screening for depression at much lower rates; only 9% to 12% of the sample indicated frequently inquiring about depression in their patients, or using a screening questionnaire to identify the disorder.

Ob-gyns have indicated substantial variation in depression screening for women of different ages. Low rates of screening have been identified in the adolescent population, with only 34% of ob-gyns in one study reporting routine screening of these patients for symptoms of depression (Morgan & Schulkin, 2006). For pregnant women, one study found that only 8% were screened for a psychological disorder during their initial prenatal visit, despite 24% having a previous mental health diagnosis, and 18%

being perceived as high risk for development of a mental health disorder (Stevens & Diehl, 2003). Throughout the course of their prenatal care, only 10% were eventually diagnosed with depression or anxiety, and a mere 23% were screened postpartum.

Compared with adolescents and pregnant patients, Leddy and colleagues (2011a) noted that ob-gyns were screening postpartum women at much higher rates (about 75%), however they were not relying on standardized assessment measures, such as the Beck Depression Inventory (BDI), or the Patient Health Questionnaire (PHQ). Instead, these physicians were more likely to trust their own clinical judgment and indicated that they prefer what they are comfortable with: symptom review and physical examination (Leddy et al., 2011a), as an alternative to standardized screening measures. Previous studies have suggested that this method of screening is inadequate, as the accurate diagnosis of depressive symptoms requires the use of a valid, structured screening tool (Evins & Theofrastous, 1997; Klinkman, Coyne, Gallo & Schwenk, 1998). Furthermore, research has noted that the use of validated screening tools (as compared to informal, invalidated measures) increases a clinicians' ability to recognize and treat depression up to 67% (Gilbody et al., 2008).

Coinciding with a decreased use of standardized screening tools, research has also found that ob-gyns are infrequently utilizing the DSM when making a diagnosis of depression. One study reported that only 11.4% of ob-gyns indicated using this instrument (Leddy et al., 2011a). The use of the DSM is an important tool for confirming a mental health diagnosis, and employing it in practice can aide in physicians' management of depression.

Prior research has identified ob-gyns' preference for invalidated depression screening measures. However, past research has not assessed the screening behavior of physicians indicating use of standardized tools. It is still unknown which standardized screening measures ob-gyns are regularly using to assess and confirm a diagnosis of depression. Adequate screening and diagnosis are an integral part of depression care, thus it is important to investigate physicians' practice patterns related to this topic.

CHAPTER 3

IMPACT OF PHYSICIAN EXPERIENCE ON SCREENING: THE AVAILABILITY HEURISTIC

A physicians' experience with a disorder can impact their likelihood of screening (Leddy et al., 2011a) and diagnosing (Poses & Anthony, 1991) the disorder in future patients. For instance, one study found that having personal experience with postpartum mental health conditions (i.e. through a friend, family member, or self) increased the likelihood of a physician screening for the disorder in future patients (Leddy et al., 2011a). The impact of experience on future behavior is likely due to the availability heuristic, which states that the ease with which one can recall past experience can affect probability and prevalence estimates of future occurrences (Tversky & Kahneman, 1974). An example of the availability heuristic can be displayed by the fact that people frequently incorrectly believe that more words in the English language begin with "r" than have "r" as the third letter. Individuals perceive the former to be true because it is easier to recall words that begin with "r" (i.e., radio, rocket), than words that have "r" as the third letter (i.e., word, bird; Tversky & Kahneman, 1973).

Research has established that the availability heuristic plays a role in decision-making (Higgins, 1996; Wyer & Srull, 1989). One aspect in which the availability heuristic can impact physicians is through influencing their ideas about prevalence estimates and probabilities. Poses and Anthony (1991) directly demonstrated the availability heuristic in a medical context by examining the relationship between the

number of diagnoses of a condition (bacteremia), and physicians' estimates of bacteremia in a new patient. They found that physicians' diagnosing a greater number of patients with bacteremia also had higher estimates of the new patient having the disorder. Though past research has recognized the influence of experience on screening and diagnosis, no studies have directly addressed this relationship in regards to major depression prevalence information. As well, no studies have specifically assessed ob-gyns knowledge of this information in the child/adolescent population.

Late childhood and adolescence is an especially critical time period for development. Ob-gyns frequently provide care for females this age; one study reported 72.6% of ob-gyns see adolescent patients either monthly or weekly (Goldstein, Chapin, Lara-Torre, & Shulkin, 2009). Thus, research on practices with females this age is an important aspect of assessing ob-gyns' depression care. Additionally, ob-gyns have the ability to play a unique role in a woman's care across the lifespan by establishing a relationship with a woman during this time. The services provided to patients in this population vary, and often include primary care. Despite a high percentage of ob-gyns indicating seeing adolescent patients, there is a lack of research regarding their practices with these individuals. Research is especially scarce on topics related to ob-gyns' knowledge and treatment of adolescents' mental health. The present study will investigate ob-gyns' prevalence estimates of MDD in children/adolescents, with the belief that ob-gyns' experience with mental health topics will contribute to these estimates through reliance on the availability heuristic.

Recommendations for Screening in Primary Care

Research has indicated that the use of standardized screening measures increases a physicians' ability to detect and treat depression (Gilbody et al., 2008). Despite this conclusion, guidelines concerning mental health screening in primary care are absent from most national organizations. For example, the American College of Obstetricians and Gynecologists (ACOG) does not specify a stance for or against screening of depression in ob-gyn practice. However, their guidelines state that when a woman is identified as depressed, the physician must provide follow-up care or refer her for care outside of the practice (American College of Obstetricians and Gynecologists, 2010). The U.S. Preventative Services Task Force (USPSTF) takes a different view on screening, and states that all adult patients should be screened for depression as long as "staff-assisted depression care supports" are available to ensure accurate diagnosis (USPSTF, 2010). However, this organization does not take a stance on screening of adolescents, a population frequently seen by ob-gyns. As well, these organizations do not regulate which screening measure(s) physicians need to employ. This can be problematic since physicians' tend to prefer the use of informal screening measures (Leddy et al., 2011a), which are less effective in diagnosing depression (Gilbody et al., 2008).

Despite the fact that specific standardized screening tools are not regulated by these organizations, one, which is recommended, is the Patient Health Questionnaire-2 (PHQ-2). The PHQ-2 was developed from the Patient Health Questionnaire-9 (PHQ-9) and is composed of the first two questions of the PHQ-9, which ask about the frequency of depressed symptoms and anhedonia (e.g. loss of pleasure). This tool is brief (takes less

than 5 minutes to administer) and has been validated in a primary care sample, which makes it a potentially valuable diagnostic tool for primary care physicians (Arroll, Goodyear-Smith, Crengle, Gunn, Kerse, & Fishman et al., 2010).

Although ob-gyns are making attempts to adequately diagnose and treat symptoms of depression, research has found that their depression care could be improved. Ob-gyns have indicated that prescribing anti-depressant medication is their preferred next step to treatment after diagnosing depression (Coleman et al., 2008). Unfortunately, these physicians have also indicated that they would continue with this prescribing behavior, despite improperly diagnosing a false case of depression (Coleman et al., 2008). In one study, almost 30% of physicians incorrectly diagnosed depression in a negative vignette, and of these, nearly 50% of physicians specified their next step in treatment would be to prescribe applicable medication (Coleman et al., 2008). This behavior is not surprising, as past research has stated that prescribing anti-depressants is the favored therapeutic treatment in more than half (52%) of ob-gyns (Williams et al., 1999). Though research has highlighted ob-gyns' preference for prescribing anti-depressant medication, little is known about how they communicate treatment information (specifically that regarding the risks and benefits) to their patients. As well, it is unknown whether other factors, such as a physicians' perceived numeric ability, affect the selection of information relayed to a patient. Research into this topic has the potential to highlight further variances in physician communication patterns based on differences in perceived numeric ability.

CHAPTER 4

PHYSICIAN COMMUNICATION OF DRUG INFORMATION TO PATIENTS

When communicating information about a treatment to patients, ob-gyns have many pieces of information they can integrate and convey. Presenting both benefits and side effects of a medication to make the most informed treatment decisions has been recommended (Fried, Tinetti, Towle, O'Leary, & Iannone, 2011). Some researchers have reported that benefits and side effects of anti-depressants are pieces of information frequently provided by a physician (Young, Bell, Epstein, Feldman, & Kravitz, 2006), while others have noted that the physician-patient dialog concerning this information is lacking (Sleath, Tulsky, Peck, & Thorpe, 2007). For example, in one study, physicians discussed information regarding the effectiveness of an anti-depressant medication in 38% of consultations, and the side effects of the medication in 85.3% of consultations (Young et al., 2006). However, another study found that when discussing anti-depressants with Veterans, physicians rarely initiated discussion of benefits and side effects of the medication; discussion of benefits were initiated by physicians in 10% of patient encounters, and adverse effects in only 5% (Sleath et al., 2007).

In addition to relaying diverse information about a medication, a physician can also alter their method of communicating this information. Research has found that physicians utilize different approaches when discussing the benefits and risks associated with a treatment (Epstein & Peters, 2009; Stevenson, Barry, Britten, Barber, & Bradley,

2000). As well, physicians' communication can be changed based on different factors, such as their personal views about the treatment. For instance, research has shown that physicians tend to apply persuasive techniques to influence patients' decisions regarding a treatment regimen (Epstein & Peters, 2009). When favoring a treatment, physicians may present their preferred treatment first, or emphasize the benefits of the preferred treatment through verbal descriptions or an altered tone of voice (Epstein & Peters, 2009). Physicians will also modify their presentation when discussing a treatment that is not considered favorable. One study found that instead of relaying positive aspects of a medication, physicians presented the possibility of side effects associated with the treatment. The presentation of side effects was employed to deter a patient from taking a medication the physician did not believe was beneficial (Stevenson et al., 2000).

Numeric Formats for Risk Information

Prescribing of medications is one context in which a physician's comprehension and use of numeric information is essential. When making a treatment decision about a new drug, patients often want to know information about the drug, such as the likelihood that the drug will be an effective form of treatment, or the possibility that they will experience various side effects. When presenting information about risks and benefits, health communicators have many formats from which to choose. The most common numeric formats include the absolute risk (reduction or increase) and relative risk (reduction or increase). Since there are multiple numeric formats one can utilize, physicians must be able to properly decipher the relevant and misleading information that each one presents (Gigerenzer, Gaissmaier, Kurz-Milcke, Schwartz & Woloshin, 2007).

Absolute risk is defined simply as the baseline risk of a treatment (Gigerenzer et al., 2007). The absolute risk reduction (ARR) associated with engaging in a treatment can be calculated by subtracting the absolute risk of the treatment group from the absolute risk of the control group (Gigerenzer et al., 2007). For instance, if a treatment reduces the number of people who die from 6 to 4 in 1,000, the ARR is 2 in 1,000 or .2%.

The same piece of information can also be presented in a relative risk reduction (RRR) format, which is given in terms of the relative number of people saved or lost by participating in that treatment (Wegwarth & Gigerenzer, 2011). For the same treatment that reduces the number of people who die from 6 to 4 in 1,000, the RRR is 33.3% (4/6). Relative risk reduction is a common way of presenting information to physicians (e.g., via industry through pharmaceutical companies), as well as from physician to patient (Gigerenzer et al., 2007; Wegwarth & Gigerenzer, 2011), and can often be misleading. Despite the tendency for this numeric format to display exaggerated information, physicians have indicated a preference for results presented as RRR, compared with other formats (Bucher, Weinbacher, & Gyr, 1994; Cranney & Walley, 1996).

The format in which numerical information is presented (e.g., percentage vs. frequency, absolute risk reduction vs. relative risk reduction, etc.) can have significant effects on the medical decision making of both physicians and patients (Covey, 2007; Peters, Dieckmann, Dixon, Hibbard, & Mertz, 2007a; Peters et al., 2011; Schwartz et al., 1997). As an example, consider the differences between absolute and relative risk reduction, discussed above. Individuals presented with beneficial treatment information in terms of the RRR would likely be mislead to believe the treatment was considerably more effective than when viewing the same information in terms of the ARR. Thus,

individual's viewing the positive information in the relative format would likely be more inclined to make a decision to accept a treatment when presented in this manner.

The tendency to accept the RRR as more effective is supported by multiple studies (Covey, 2007; Misselbrook & Armstrong, 2001). For example, Covey (2007) demonstrated the robust finding that presenting medical information in terms of the RRR creates a tendency for people to be more impressed, or persuaded, than when presented as an ARR. Another study found that when patients were presented with the relative risk reduction associated with taking a treatment, most (92%) would accept the treatment, however when presented with absolute risk this statistic dropped to 75% (Misselbrook & Armstrong, 2001).

CHAPTER 5

OVERVIEW OF STATISTICAL LITERACY

One's ability to use and understand numerical information, often referred to as statistical literacy or numeracy, is essential to daily life; however, nearly 50% of the general population has some level of difficulty with fairly simple numeric information (Lipkus, Samsa, & Rimer, 2001; Schwartz et al., 1997). It is estimated that approximately 80 million adults in the U.S. have limited health literacy (Berkman, Sheridan, Donahus, Halpern, & Crotty, 2011), a deficit in numeric skills used in health care decisions. This limited ability is associated with a lower degree of comprehension and less frequent utilization of health information (Peters, Hibbard, Slovic, & Diekmann, 2007b). In one study, Williams and colleagues (1995; as cited in Peters et al., 2007b) found that 26% of the sample surveyed lacked the ability to understand commonly presented information, such as when an appointment was scheduled. A recent review reported that individuals with low health literacy also struggle with correct interpretation of labels (e.g., prescription and nutrition), properly taking medications, and have poorer overall health status (particularly among the elderly; Berkman et al., 2011). Also noteworthy, research has found that low health literacy is associated with a greater number of hospitalizations and increased use of emergency care, decreased mammography screening, and influenza vaccinations (Berkman et al., 2011).

Physicians' Statistical Literacy

Although the impact of statistical literacy on patients' decisions has been thoroughly examined (see Reyna, Nelson, Han & Dieckmann, 2009 for review), much less is known about physicians' statistical literacy skills. A few studies have been conducted and the corresponding results suggest that physicians are not always able to carry out numerical tasks that are relevant to medical practice (Anderson, Gigerenzer, Parker, & Schulkin, 2012; Anderson et al., 2011; Hanoch, Miron-Shatz, Cole, Himmelstein, & Federman, A., 2010; Rao, 2008; Sheridan & Pignone, 2002). For example, one study asked physicians to perform basic operations, such as the conversion of a percentage to a concrete number, the reverse conversion (a concrete number to a percentage), and a question on basic familiarity with chance outcomes. The researchers found that only 72% could answer all three seemingly simplistic questions correctly. Additionally, physicians struggled most with converting 1 in 1,000 to a fraction; 25% could not perform this rudimentary operation (Wegwarth & Gigerenzer, 2011, pg. 145).

Physicians are confronted daily with tasks that involve the interpretation of numerical information, thus their understanding of statistical information is essential for successful practice. Physicians will commonly encounter viewing and assessing medication dosages, treatment effectiveness, risk and side effect rates, and test results. A discrepancy in their ability to comprehend these routine figures can affect their treatment-related decision-making, and in turn, the care a patient receives.

Consider a woman who has decided to undergo a routine mammogram, which comes back with a positive result. The woman would be interested in knowing whether the results are certain, and if not certain, what is the actual likelihood of her having

cancer? One would expect that an ob-gyn who provides breast care would know the correct response to this question, however, researchers found that when asked about this topic, only 21% of gynecologists could provide the correct answer ("Out of 10 women with a positive mammogram, about 1 has breast cancer"), and an alarming majority (60%) believed that the answer choices of 9 out of 10 would have breast cancer, or 81% would have breast cancer, thus grossly overestimating the actual figure (Anderson et al., 2012; Gigerenzer et al., 2007; Wegwarth & Gigerenzer, 2011).

Physicians have also been found to be misinformed about information pertaining to prevalence statistics. In one study, physicians were questioned about the false positives, false negatives, and predictive power associated with HIV screening tests. Five out of nineteen physicians incorrectly stated that it would be impossible to get a false negative result ("unless during the window period"), and thirteen of nineteen gave the incorrect statement that false positives do not occur (Gigerenzer, Hoffrage & Ebert, 1998). The most uncertainty and physician response variance was presented when asked about the prevalence of HIV in low-risk heterosexual men; sixteen out of twenty physicians indicated some degree of uncertainty, ignorance, or a belief that this statistic could not be computed (Gigerenzer et al., 1998). Four physicians indicated that information regarding prevalence is of little to no use, and one physician even reported the notion that "statistics don't help us in the individual case- and we also have no precise data" (Gigerenzer et al., 1998, p. 9).

Few studies have assessed physicians' ability to comprehend and preform statistics that are presented in a manner, which directly corresponds to numeric information encountered in everyday practice. A recent study performed this assessment

in ob-gyns' and results showed a wide variation in abilities (Anderson et al., 2012). A group of practicing ob-gyns was given the Obstetrician-Gynecologist Statistical Literacy Questionnaire (OGSLQ), designed to assess their literacy on clinically relevant numerical facts and concepts. These included basic statistics (e.g., the number of women with cancer in the US), risk of various health outcomes, understanding of statistical terms (e.g., prevalence, incidence, etc.), and numerical relations (e.g., conversion between relative and absolute risk reductions). Results showed a substantial difference in numeric ability across physicians, regardless of their experience in practice with the topics presented. Individuals indicating they discussed the topic of breast mammography with a patient at least once a month were less likely to provide the correct positive predictive value information for mammography screening. Only 56% who discuss the topic at least once a month could provide the correct response, compared with 91% for whom the topic was not relevant (Anderson et al., 2012). Additionally, only 36% correctly answered all five numerical relation questions, and 7% were unable to correctly answer any of the four numerical concept questions. For example, 79% of physicians overestimated the prevalence of HIV, despite familiarity in practice with the issue (Anderson et al., 2012).

Research is scarce on whether an association exists between ob-gyns' statistical literacy and their communication of information; only one study has assessed this potential finding. Differences in physicians' objective and subjective numeracy, and their communication of genetic screening results were assessed. The researchers found that the manner in which the ob-gyn communicated information varied based on their numeracy level (Anderson et al., 2011). Physicians perceiving themselves as more numerically inclined (measured by high scores on the Subjective Numeracy Scale) were more likely

to explain screening results to their patients in quantitative form (e.g., actual numeric information) versus using qualitative data (e.g., terminology such as "good") to explain results. Additionally, of the physicians surveyed, approximately one-third provided numerical information to their patients, and frequency format was most commonly used (Anderson et al., 2011). Research has found that doctors use the presentation of benefits and side effects to influence patients' decisions (Epstein & Peters, 2009; Stevenson et al., 2000), but it is unknown whether they use the presentation of different numeric formats persuasively as well.

Number Formats and Low Statistical Literacy

Individuals with low numeracy skills have shown to be significantly more influenced by the format in which numeric information is presented. Furthermore, the deficit in statistical literacy has been found to affect numerous health-related decisions, such as patients' inability to determine the benefits of prevention screening (Schwartz et al., 1997), a tendency to weigh the short-term costs and benefits rather than those in the distant future (Benjamin, Brown, & Shapiro, 2006), and an inability to follow health care regimens (Peters et al., 2007b). Since a deficit in numeric ability can affect a broad range of health-related decisions, it is important that individuals low in numeric ability be presented with information they can easily comprehend. If a physician neglects to account for a patient's numeric deficit, they may present their patient with non-transparent numeric information (e.g. the relative risk reduction), which a patient may easily misinterpret.

Peters and colleagues (2011) found that individuals who lacked numeric ability, and were presented with risk information in a percentage format, viewed a medication as less risky than when given the same risk information in a frequency format. Contrarily, their counterparts, who were skilled in numeric ability, perceived similar risks of the medication when information was presented in both the percentage and frequency formats. This finding draws awareness to the potential to persuade an individual's health related decision when numeric ability is not being considered and taken into account.

CHAPTER 6

REGULATION OF COMMUNICATION OF DRUG INFORMATION

Much of the information about medicine obtained by consumers and physicians is garnered through broadcast media and print advertisement (Gigerenzer et al. 2007). The Food and Drug Administration (FDA) is responsible for regulating this presentation of information for medications. This includes the content of the information consumers view, as well as the format in which it is presented. As of 2004, the FDA had separate requirements for direct-to-consumer (DTC) information presented through broadcast media, such as a television commercial, and that presented in print advertisements (Huh & Cude, 2004).

Print advertisements require a "brief summary" of risk, which includes information about the product label, any information deemed risk-related, and any promotional material (Gelland & Lyles, 2007). Television ads do not require this "brief summary", as long as they provide consumers with an alternate means of acquiring this information, such as a website address. Unfortunately, websites are not regulated in a manner that corresponds to print and television. This enhances the opportunity to mislead consumers, by not providing meaningful transparent information regarding the risks and benefits of a medication (Huh & Cude, 2004), and rather, providing it in a more persuasive numeric format. Approximately 38% of individuals use the Internet as a primary source for acquiring information after viewing a commercial about a particular

medication. Given this statistic, a lack of regulation is especially problematic (Gelland & Lyles, 2007).

In an attempt to regulate the presentation of risk and benefit information in a fair and balanced manner, the FDA enacted a "fair balance" requirement (Huh & Cude, 2004). This was created as a means of reducing the possibility of misleading consumers through an inappropriate presentation of increased benefit (compared with risk) information. A recent study examined the "fair balance disclosure" provision, and assessed information presented on 60 prescription websites. Two types of analysis were conducted; evaluation of the type of information provided, and the way in which consumers could access the relevant information (Huh & Cude, 2004). Significant differences were found in both the way benefit and risk information was presented, as well as the ease with which consumers could access this information. Almost one-half of the websites (48.3%) that included both risk and benefit information, presented the benefits in a larger font size (Huh & Cude, 2004). Additionally, 82% (49/60) of the websites had benefit information available on the homepage, compared to only 48% (29/60) displaying risk information in the same manner (Huh & Cude, 2004).

Additional guidelines (beyond those outlined by the FDA) for the presentation of health-related numeric information have been outlined by the Medicine Benefit Risk Foundation (Berry, 2006). These guidelines state that minimally, diverse information about a treatment, such as the positive and negative aspects, should be presented to a patient (Berry, 2006). Furthermore, research has stated that the "less is more" approach to presenting patients with important medical information is the most appropriate method, particularly for individuals low in numeracy (Peters et al., 2007a). This presentation

format is designed to ease the cognitive processing required to make a decision, as well as emphasize the meaning of relevant information (Peters et al., 2007a).

It is largely understood that the presentation of numeric information in terms of relative risk is less transparent than other formats (e.g., absolute risk or number needed to treat) and inflates the effectiveness of a treatment (Covey, 2007; Gigerenzer et al., 2007). Research has suggested that to properly interpret the risk of a treatment, information should be presented in a graphic or visual display, as compared with just text (Lipkus, 2007; Waters, Weinstein, Colditz, & Emmons, 2006).

The Drug Facts Box

The "drug facts box" is a 1-page summary of descriptive and quantitative information relevant to a particular medication, and was designed to replace the present "brief summary" mandated by the FDA. In addition to verbal descriptions, it utilizes tables and is a means to relay important information about a medication in a balanced and easily understood manner. The drug facts box has been shown to improve understanding of this often-difficult information, and over 90% of consumer study participants have rated it as "very important" or "important" to include in drug ads (Schwartz, Woloshin, & Welch, 2009; Woloshin, Schwartz, & Welch, 2004). Furthermore, the drug facts box has been shown to be effective in diverse situations, such as with individuals who have not received training on how to use the tool, and for various classes of medications (Schwartz, Woloshin, & Welch, 2007), which is critical for use in the general population.

In a study comparing the presentation of information via the FDA's "brief summary" and the drug facts box (Schwartz et al., 2009), participants viewing the drug

facts box had more accurate knowledge overall about the side effects of a medication; 51% were able to correctly answer questions related to side effects versus only 16% of the control group viewing the "brief summary" (Schwartz et al., 2009). Additionally, those who used the drug facts box demonstrated better comprehension of side effects; 92% of the drug facts box users compared with 42% of the "brief summary" users correctly stated that a particular drugs' side effects were small, very small, or nonexistent (Schwartz et al., 2009).[1] Similar results were found with accuracy of benefit information; participants viewing the facts box were more accurate with their perceived magnitude of the actual effectiveness of the drug. A greater number of participants viewing the "brief summary" (46%) incorrectly believed one drug (that was only moderately effective in treating heartburn) was "extremely" or "very" effective, compared with only 16% of the facts box participants (Schwarz et al., 2009).

Despite the evidence that numeric formats persuade decision makers, there are currently no regulations regarding the format in which numeric information is presented to consumers. Presently, the FDA is considering mandating the use of particular numeric formats over others (personal communication), as a means of ensuring numeric transparency. This regulation has the potential to impact a multitude of individuals, and increase informed decisions related to health care.

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[1] This was deemed correct because the boxes reported no life-threatening side effects, and the side effects presented occurred at the same rate as the placebo.

CHAPTER 7

RESEARCH RATIONALE

The aim of this study was to investigate practice patterns regarding the screening, diagnosis, treatment, and management of Major Depressive Disorder among ob-gyns. Additionally, the research sought to examine physician communication of the risks and benefits of anti-depressant medication, and the effect of perceived numeric ability on depression care provided by ob-gyns.

The hypotheses were as follows:

1) We hypothesized that, similar to the findings of Williams and colleagues (1999), few physicians (less than 25%) would indicate using standardized screening tools to assess for Major Depressive Disorder.
2) We hypothesized that, similar to findings by Leddy and colleagues (2011a), few physicians (less than 20%) would consult the DSM-IV to confirm a diagnosis of Major Depressive Disorder, or before prescribing anti-depressant medications to patients.
3) Based on past research citing the availability heuristic (Leddy et al., 2011a), we hypothesized that physicians who diagnose a greater number of patients with Major Depressive Disorder would be more likely to overestimate the national prevalence of the disorder in children and adolescents.

4) 4A. Similar to findings by Stevenson and colleagues (2000), we hypothesized that physicians would be more likely to communicate the side effects of a medication (than the benefits) when the medication is described as not safe and effective for a patient.

4B. Conversely, we hypothesized that physicians would be more likely to communicate the benefits (than the side effects) of a medication when the medication is described as safe and effective for a patient.

5) 5a. We hypothesized that physicians would use persuasive communication strategies, defined by use of the relative risk format. This format was defined as persuasive because it is less transparent than other numeric formats and exaggerates statistics. Thus, persuasive was defined as the selection of the relative risk reduction (and not the relative risk increase) of a medication described as safe, and the relative risk increase (and not the relative risk reduction) of a medication described as not safe.

5b. We hypothesized that physicians with high perceived numeric ability would be more likely to utilize persuasive communication than those with low perceived numeric ability.

CHAPTER 8

METHODS

Participants

Two hundred and twenty practicing ob-gyns who are affiliates of the American College of Obstetricians and Gynecologists (ACOG) were invited to participate in a study on Depression and Risk Communication. The study was approved by the Institutional Review Board of American University and was designed to be completed in less than 20 minutes. The individuals included in the study were members of the Collaborative Ambulatory Research Network (CARN), and had previously responded to a study on mental health. CARN is a group of Fellows and Junior Fellows of ACOG who have agreed to assist in completing three to four research questionnaires per year to evaluate ob-gyns' practices, knowledge, attitudes, and beliefs regarding various clinical concerns. CARN members participated voluntarily, and no compensation was offered.

The participants received an initial mailing containing a cover letter explaining the study, the questionnaire, and a paid return envelope. If the survey enclosed was not returned within the specified time period, the participant was incorporated into a list for a subsequent mailing, and sent another questionnaire to complete. There were a total of 3 mailings sent: the initial mailing, and up to 2 subsequent mailings based on participant response. Of the 220 ob-gyns sampled, 145 returned the survey, yielding an overall

response rate of 66%. Return of the completed survey indicated consent to participate in the study.

Survey

Demographics

The survey included a short demographic section with the following questions: each participant's year of birth, gender, state of practice, number of years in practice, type of practice, and practice setting. Additionally, physicians were instructed to indicate if they treat adolescent patients, and whether or not they consider themselves a generalist (e.g., primary care provider).

General Depression Questions

Physicians were asked to complete questions regarding their knowledge and practice patterns related to the treatment of depression. They indicated the number of patients they diagnose with MDD in a typical year, and if they used various standardized screening tools to make their diagnosis. The screening tools they could choose from included the Beck Depression Inventory (BDI) and the Patient Health Questionnaire (both the PHQ-2 and PHQ-9). They could also select "other" screening methods in which they were asked to indicate which screening tool they used, or "never" using screening tools. Physicians also specified whether or not they consulted the DSM-IV to confirm a diagnosis of MDD.

Anti-depressant Questions

Physicians were first asked to select whether or not they prescribed anti-depressants to their patients, and if they did not prescribe anti-depressants, to indicate

their rationale. For those that did not prescribe these medications, they could select "anti-depressants are not safe", "anti-depressants are not effective", "I do not have privileges to prescribe anti-depressants", "I refer patients for depression treatment with anti-depressants", or "other-please explain" as possible answers. For the physicians that indicated prescribing anti-depressant medication, they were asked what class of anti-depressants they most often prescribe. They were provided with the following answer choices: selective serotonin reuptake inhibitors, tricyclic antidepressants, benzodiazepines, and "other."

All physicians were asked which side effects deter them from prescribing anti-depressants from the following choices: nausea, dizziness, constipation, skin rash, feeling sleepy or having trouble sleeping, gaining or losing weight, feeling restless and sexual problems, including loss of libido. Finally, physicians indicated their beliefs about the effectiveness of anti-depressants in both pregnant and non-pregnant women (on a 0-10 scale, 0 signified not at all effective and 10 signifying very effective), and whether they consulted with the DSM-IV before prescribing anti-depressant medication.

Prior to use in the present study, all questions related to depression and prescribing behavior were field tested on a small sample of ob-gyns. Modifications were made from the original form to reflect feedback from the ob-gyns, with the primary revision being to simplify the questions.

Subjective Numeracy Scale (SNS)

The Subjective Numeracy Scale (SNS) is an eight-item scale, which assesses an individual's perceived ability with fractions, percentages, and basic numerical

calculations (e.g., calculating a 15% tip). By inquiring about perceived numeric ability, the SNS was designed to appear less intimidating to physicians than objective numeracy scales, such as the Lipkus Scale (Lipkus et al., 2001), which requires individuals to perform basic numerical calculations. The SNS has been shown to have a moderate correlation (rs= .63- .68) with a widely used objective scale, showing its strength as a means of estimating one's level of numeracy (Reyna et al., 2009).

To answer each question on the SNS, ob-gyns were provided with a 1-6 Likert scale: with "1" indicating "not good at all" and "6" indicating "extremely good". For analyzing purposes, each score was documented and then aggregated to create an overall subjective numeracy score. Please see Appendix A for a list of the demographic and depression questions, and the Subjective Numeracy Scale.

The Drug Facts Box

The "Drug Facts Box" was created to display a brief presentation of medical information in differing formats (Schwartz et al., 2007). The facts box used in the present study was designed in collaboration with a health communication expert. Additionally, it was developed through the use of a prior facts box designed and tested by Schwartz and Woloshin (Schwartz et al., 2007; Woloshin & Schwartz, 2011). The previous facts box displayed information concerning the helpfulness and side effects of a medication in terms of clinical trial results (Schwartz et al., 2007). The FDA is currently considering the use of a drug facts box to communicate drug information to patients. See Figure 2 for an example of the drug facts box.

The survey included two vignette questions, in which physicians were instructed to answer using the information provided in the facts box. The facts box included a total of 12 pieces of information from which to choose, and physicians were instructed to select up to four for each vignette. The choices varied in their format (frequency versus percentages, and absolute versus relative risk), whether they pertained to benefits or side effects, and presented information about clinical trial results (both placebo and the efficacy of the anti-depressant).

The first vignette stated, "Imagine that you have a depressed non-pregnant patient who is considering taking an anti-depressant. You believe that an anti-depressant will be safe and effective for this particular patient. You decide to use summarized information from a Cochrane Review to educate the patient on the advantages and disadvantages of taking anti-depressants. Which pieces of information from the Cochrane Review (displayed above) would you *most likely* use to explain the benefits or disadvantages of anti-depressants to this patient?"

Physicians were then told, "You now have another patient. For this patient, you believe that an anti-depressant will NOT be safe and effective. Again, you decide to use summarized information from a Cochrane Review to educate the patient on the advantages and disadvantages of taking anti-depressants. Would you show this patient different information than the patient in the question above?" Based on this prompt, physicians were asked to indicate a simple "yes" or "no" answer. If they indicating "yes", they completed the final question asking them to specify which pieces of information they would *most likely* use to explain the advantages or disadvantages to this patient.

As with the depression questions, the vignettes were field tested in a small group of ob-gyns. Based on physician feedback, each vignette was revised from the original format, with alterations made in both length and phrasing of key elements. Please see Appendix B for the drug facts box and the corresponding vignettes.

Data Analysis

Data were analyzed using a statistical software package, SPSS 20.0 (SPSS Inc., Chicago, IL). Significant findings are reported at $p < 0.05$. Because gender was correlated with age and perceived numeric ability, gender analyses were done controlling for age and perceived numeric ability, and vice versa. Descriptive and frequency data were computed for primary analysis.

Chi-square analyses were conducted to examine interrelationships of categorical variables. To identify predictors, subsequent logistic regression analyses were conducted on dichotomous dependent variables, and linear regression analyses on continuous dependent variables. Age and perceived numeric ability were analyzed as categorical variables in chi-square analyses and continuous variables in the regression analyses. ANOVAs were used to compare group means of continuous variables.

To create a categorical variable for age in chi-square analyses, respondent year of birth was subtracted from 2012 (current year) and regrouped into three relatively equal categories. The resulting groups were: physicians between the ages of 60 and 82 years old (hereon referred to as “older age group”), 49 and 59 years old (hereon referred to as “middle age group”), and 36 and 48 years old (hereon referred to as “younger age

group"). The re-coded groups consisted of 30.1%, 35.6%, and 34.3% of the total sample, respectively.

For analysis involving "low" and "high" perceived numeric ability, a categorical variable was created using a median split. The median perceived numeric ability score was 41, thus this provided the cutoff for the low (27 to 40) and high (41 to 48) groups used in data analysis. Forty-five percent of the sample was grouped into low perceived numeric ability, and the remaining 55% was grouped into high perceived numeric ability. Within male physicians, 62% were categorized as perceiving themselves high in numeric ability and 38% were categorized as perceiving themselves low in numeric ability. Within females, 49% were categorized as having high perceptions of their numeric ability and 51% were categorized as having low perceptions of their numeric ability. See Figure 1 for a graphical display of the percentage of male and female physicians grouped into each category.

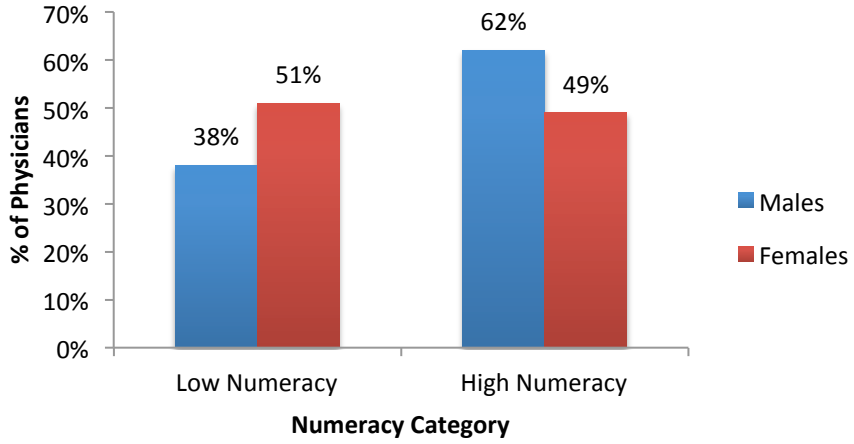

Figure 1- Gender Distribution of Perceived Numeric Ability Categories

A median split was also used to create a categorical variable for "few" or "many" annual MDD diagnoses. Physicians indicated diagnosing between 0 and 150 patients with

MDD in a typical year, with an average of 17.28 patients diagnosed (SD= 25. 15). The median number of patients diagnosed with MDD was 10. Using a median split, 56% of the sample was grouped into "few" diagnoses (10 or less diagnoses per year), while 44% was grouped into "many" diagnoses (11 or more diagnoses per year).

To assess physicians' persuasive communication, "persuasive" was defined as selecting vignette box D, and not selecting vignette boxes H or L in the first vignette, and selecting vignette boxes H or L and not selecting vignette box D for the second vignette. Vignette Box D displayed the relative risk reduction associated with taking a medication. Vignette Box H presented the likelihood of increased dry mouth in terms of the relative risk increase and vignette box L presented the likelihood of increased sexual problems, also in terms of the relative risk increase. Figure 2 presents an illustration of the drug facts box and the highlighted information determined to be persuasive.

The combination of vignette boxes described above was deemed the most persuasive, as research has shown that information presented in relative terms is less transparent, and will often lead individuals to substantially overestimate the effects of a treatment (Covey, 2007; Gigerenzer et al., 2007). Persuasive was analyzed as a dichotomous variable; the individuals following the pattern deemed persuasive were categorized as persuasive (1) and those that did not follow the pattern were categorized as not persuasive (0).

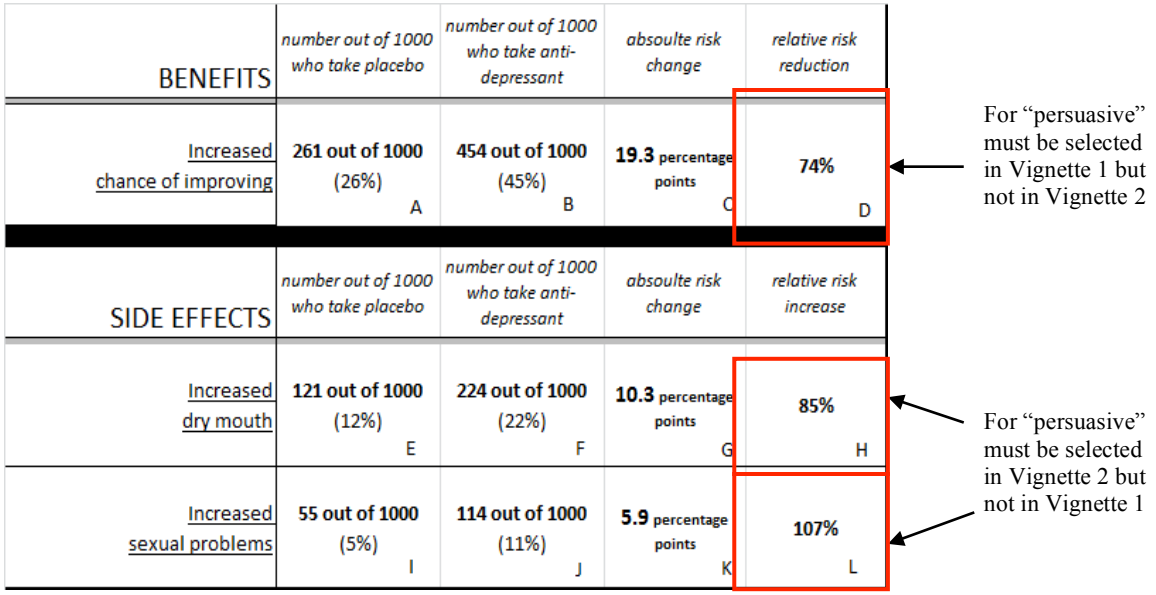

Figure 2- The Drug Facts Box

CHAPTER 9

RESULTS

Demographic Information

Respondents were 42% male, and 58% female. Males and females differed significantly in age, ($F(1, 141) = 43.79$, $p<.001$), with female physicians (M= 49 years old, SD = 8.37) being significantly younger than male physicians (M = 59 years old, SD = 9.32). Most physicians indicated primarily practicing obstetrics and gynecology (76%) or solely gynecology (16%), with none indicating practicing obstetrics solely, and 8% indicating another practice type (e.g., Urogynecology, MFM, etc.).

The majority of the sample reported having a private practice (76%), while some practice in a University (10%) or other (14%) setting. Fifty-seven percent considered themselves a "generalist" or "primary care provider", and ninety-two percent of respondents indicated treating adolescent patients. Table 1 presents a list of the demographic variables and their corresponding response rates.

Table 1 Demographic Variables of Responding Physicians

Demographic variable	Percent (%)
Gender	
Male	42
Female	58

Demographic variable	Percent (%)
Practice Setting	
Private (solo or group)	76
University	10
Other (e.g. community)	14
Type of Practice	
Obstetrics and Gynecology	76
Gynecology only	16
Obstetrics only	0
Other specialist (e.g. MFM, Urogynecology, etc.)	8
Generalist/Primary Care Provider	
Yes	57
No	43
Treat Adolescent Patients	
Yes	92
No	8

Physicians' Perceived Numeric Ability

The distribution of scores on the Subjective Numeracy Scale showed a range of 27 to 48, with an average collective score of 40.40 out of a highest possible 48. The average perceived numeric ability score for men was 40.98 (SD= 5.114), and for women was 39.93 (SD=4.776). Since gender and age were significantly related, a univariate ANOVA assessing the relationship between gender and perceived numeric ability was run using age as a covariate. Results revealed a significant difference in male and female physician's perceptions of their numeric ability (judged by total SNS scores). Male physicians perceived their numeric ability as significantly higher than female physicians ($F(1, 137) = 5.03$, $p = .03$).

Physicians' Knowledge and Practice Regarding Depression

Sixty percent of ob-gyns indicated never using a diagnostic screening tool to assess for MDD. The remaining forty percent (n = 58) that indicated actively using a screening tool frequently use the BDI (45%), less frequently use the PHQ-9 (20%) and PHQ-2 (5%), and the majority (46%) indicated using a screening tool not listed. Figure 3 presents the distribution of preferred screening tool among the 40% of physicians indicating tool use. The remaining 60% who do not use tools are also displayed.

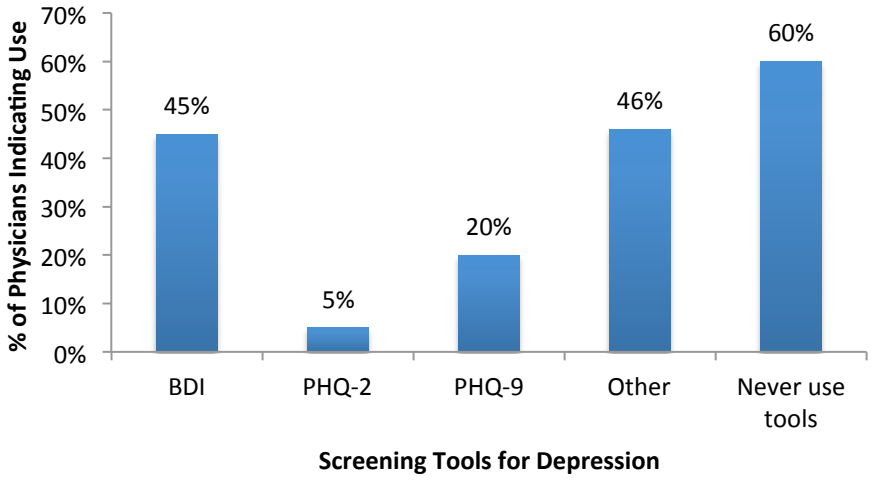

Figure 3- Distribution of Preferred Screening Tool

A logistic regression was conducted to see if gender, age, perceived numeric ability, or "few" or "many" annual MDD diagnoses significantly predicted the use of screening tools. Ob-gyns' indicating using the BDI, PHQ-2, PHQ-9 or a screening tool not listed were grouped into "use tools" and compared with those indicating never using tools. Results found that "few" or "many" annual diagnoses was the only significant predictor of ob-gyns' tool use (Nagelkerke $R^2 = 0.04$, $\beta = 0.755$, $p = 0.05$). Physicians

with “few” annual diagnoses were less likely to utilize standardized tools than those with “many” annual MDD diagnoses.

Further analyses were conducted to examine the use of each screening tool separately. Analysis of the BDI indicated that age was the only significant predictor for using this screening tool (Nagelkerke $R^2 = 0.06$, $\beta = 0.049$, $p = 0.03$). None of the variables significantly predicted the use of the PHQ- 2 or PHQ-9, or identification of never using tools, or using “other” tools not listed.

Only 11% of respondents indicated that they consult the DSM-IV to confirm a diagnosis of MDD. Eighty-six percent of respondents indicated prescribing anti-depressant medications, and of those respondents, only 11% indicated consulting the DSM-IV before engaging in this prescribing behavior.

A logistic regression analysis was conducted to assess whether gender, age, or perceived numeric ability predicted the consultation of the DSM-IV to confirm a diagnosis of MDD. Results revealed that none of the variables were significant predictors. The same analysis was run with the use of the DSM-IV before prescribing anti-depressant medication as the outcome variable. The result of this analysis also found that none of the three variables were significant predictors.

Chi- square analyses were conducted to assess whether gender, age or perceived numeric ability were significantly related to (but did not predict) the use of the DSM-IV. When analyzing each age group separately, results revealed significant differences by perceived numeric ability in the consultation of the DSM-IV for diagnosis of MDD; in the middle age group, high numerate individuals (3.6%) were less likely than low

numerate individuals (20%) to use the DSM-IV for confirming a diagnosis of MDD, χ^2 (2, 54)= 6.39, p= 0.04.

Chi-square analysis of DSM-IV consultation before prescribing anti-depressant medication produced significant differences in age, when assessing "low" and "high" perceived numeric ability separately. Among physicians with low perceived numeric ability, the middle age group (50%) was more likely than both the older age group (0%) and the younger age group (0%) to consult the DSM-IV before prescribing anti-depressant medication, χ^2 (2, 19)= 8.38, p= 0.02. A significant relationship between perceived numeric ability and DSM-IV consultation before prescribing anti-depressants was also observed when analyzing the age groups separately. Among respondents in the middle age group, low numerate physicians (50%) were more likely to indicate consulting the DSM-IV before prescribing these medications than high numerate physicians (0%), χ^2 (1, 14)= 5.83, p= 0.02.

The majority of physicians indicating prescribing anti-depressant medications most frequently prescribe SSRI's (97%). For physicians that did not indicate prescribing anti-depressants, almost all (19/20) specified that they refer patients to outside sources for the treatment of depression. The one remaining physician that did not provide this rationale did not specify any answer for not prescribing anti-depressants.

Most physicians (79%) indicated sexual problems, including loss of libido, as the biggest deterrent to prescribing anti-depressant medication, followed by gaining or losing weight (57%), and feeling sleepy, or having trouble sleeping (50%). Few physicians selected constipation (7%) or skin rash (11%) as deterrents to prescribing anti-

depressants. Figure 4 presents the percent of physicians indicating each side effect as a possible deterrent to prescribing anti-depressant medication.

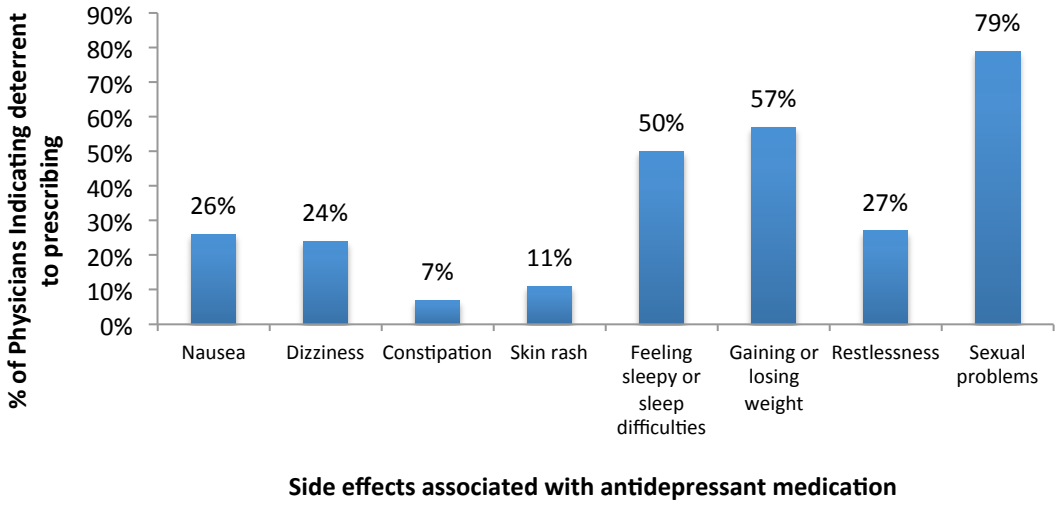

Figure 4- Side Effects Deterring Physicians' Prescribing of Anti-Depressant Medication

On a scale of 0 to 10 ("0" being "not effective" and "10" being "very effective"), ob-gyns' average effectiveness rating of anti-depressants for pregnant women was 7.37 (SD= 1.68), and for non-pregnant women was 7.67 (SD= 1.42). A linear regression was conducted to assess whether gender, age, or perceived numeric ability predicted ob-gyns' beliefs of the effectiveness of anti-depressant medications. For both pregnant and non-pregnant women, ob-gyn gender was the only significant predictor of beliefs about the effectiveness of anti-depressant medications (Negelkerke $R^2 = 0.07$, $\beta = 0.27$, $F= (1,126) = 9.53$, $p = 0.002$, and Nagelkerke $R^2 = 0.07$, $\beta = 0.26$, $F= (1,134) = 9.58$, $p = 0.002$, respectively. In both groups of women, female ob-gyns rated anti-depressant medications as more effective than male ob-gyns.

When asked to estimate the rate of MDD in children and adolescents at any point in time, physicians provided estimates ranging from 2% to 70%, with the average estimate of 15.58% (SD= 10.74). Those who indicated a rate lower than 11.2% (the national average of the disorder in adolescents; Merikangas et al., 2010) were categorized into an "underestimated" group, and any physician indicating a rate above the national average was categorized into an "overestimated" group. Fifty-two percent of the total sample was categorized into the "underestimated" group, and 48% into the "overestimated" group.

A logistic regression was conducted to assess whether the average number of patients an ob-gyn diagnoses with MDD annually would significantly predict their likelihood to under or overestimate of the national prevalence of the disorder. Gender, age, and perceived numeric ability (subjective numeracy score) were also included as predictors to assess the influence of these variables. Results found that gender was the only significant predictor for estimating the national prevalence of MDD (Nagelkerke $R^2 = 0.08$, $\beta = 0.97$, $p = 0.04$). Female ob-gyns were significantly more likely than male ob-gyns to overestimate the prevalence of MDD.

Physicians' Choice of Treatment Information

Out of the 145 physicians partaking in the survey, 136 completed the vignette questions pertaining to the drug facts box. The first vignette asked the physician to indicate which piece(s) of information about a medication they would present to a patient when they (the physician) believed the treatment was safe and effective for the patient in question. The second vignette asked them to choose from the same information

presented, with the alteration that the medication was not believed to be safe and effective for the patient.

When analyzing the choice of benefit and side effect information in the vignettes, benefit information was considered to be the selection of any combination of boxes A, B, C and D, while the choice of side effect information was any combination of boxes E, F, G, H, I, J, K or L.

Of the 136 physicians who completed the vignettes, 84 (58%) indicated they would provide the same information to the patient regardless of the safety and effectiveness of the medication[2]. For the first vignette, 65 physicians (48%) selected more side effects than benefits, 43 physicians (32%) selected an equal number of side effects and benefits, and 28 physicians (21%) selected more benefits than side effects. Thus, in the first vignette, only 21% of physicians followed the pattern hypothesized, and choose more benefits than side effects when the medication was described as safe and effective.

In the second vignette, 64 physicians (47%) selected more side effects than benefits, 57 physicians (42%) selected an equal number of side effects and benefits, and 15 physicians (11%) selected more benefits than side effects. Thus, more than double the number of physicians followed the selection pattern hypothesized, and selected more side effects than benefits when the medication was described as not safe and effective. Figure 5 displays the various selection patterns of information pertaining to each vignette.

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[2]A physician could have chosen to provide 3 benefits and 1 side effect for the first vignette, thus supporting the direction of hypothesis 4b. However, if they did not choose to change the information displayed, they would have also provided the same 3 benefits and 1 side effect for the second vignette. This would then indicate providing information that supports hypothesis 4a. Overall, the selection made by a single physician could both support and negate the hypothesis, relative to the vignette being analyzed.

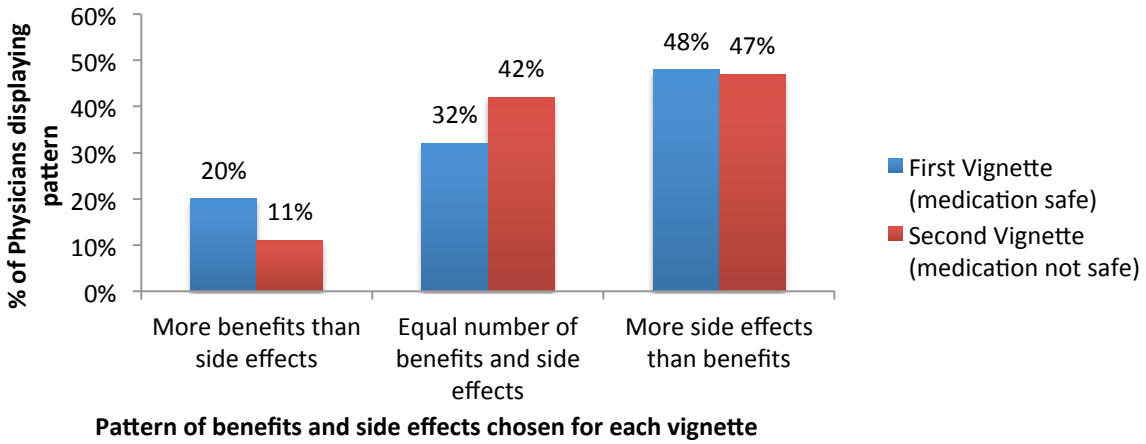

Figure 5- Selection Patterns for Vignettes

The responses of the physicians displaying behavior opposite of what was hypothesized were further analyzed. Of the physicians that choose more side effects than benefits for the first vignette, 55% chose box B, which presented the benefit of taking the medication in a transparent clinical trial format (the number out of 1,000 who take the anti-depressant and experience beneficial results). The next most commonly selected benefit was Box D, which displayed the exaggerated benefit of taking the medication in a relative term. For the side effects, boxes F and J were chosen equally, with 60% of physicians indicating that they would present each of these pieces of information. Box F presented the likelihood of experiencing increased dry mouth, and box J presented the increased likelihood of sexual problems, in the same transparent clinical trial statistic.

Those displaying behavior opposite of what was hypothesized in the second vignette (11%) most frequently presented the benefit box B (73%). Additionally, benefit boxes A and C were also presented by 67% of physicians. Box A presented placebo information related to taking the medication described in the vignettes, while box C

presented the absolute risk change (in terms of percentage points) associated with taking the medication described. The side effects most frequently presented were boxes G and K, each selected by 13% of physicians. Boxes G and K both presented the absolute risk change (in percentage points) associated with suffering dry mouth sexual problems, respectively.

Relationship Between Physicians' Perceived Numeric Ability and Persuasive Communication

A logistic regression was used to test the hypothesis that physicians' perceptions of their numeric ability would predict the use of persuasive communication. In addition to the level of perceived numeric ability ("low" and "high"), gender, and age were also included in the analysis as predictors to assess any influence of these variables. Results found that none of the variables significantly predicted the use of persuasive communication. It is noteworthy to mention that two-thirds of the group deemed persuasive was composed of physicians perceiving their numeric ability as high, versus low.

CHAPTER 10

DISCUSSION

The present study sought to assess various physician practice patterns related to the screening, diagnosis, and treatment of Major Depressive Disorder. Additionally this research evaluated physicians' presentation of material related to anti-depressant medication and the influence of physicians' perceived numeric ability on depression care.

Results supported the first two hypotheses; physicians were unlikely to use screening tools to assess for MDD (60%), and most (89%) indicated not consulting the DSM-IV to confirm a diagnosis of MDD, or before prescribing anti-depressant medications. The third hypothesis was rejected, as no significant effects were found between the number of diagnoses and the estimation of the national prevalence of MDD. In both facts box vignettes, physicians presented a greater amount of side effects than benefit information. This finding provides partial support for the fourth hypothesis, supporting hypothesis 4a, but rejecting hypothesis 4b. The fifth hypothesis was rejected, as there was not a significant association between ob-gyns' perceived numeric ability and use of persuasive communication.

Screening and Diagnosing MDD

Sixty percent of ob-gyns indicated never using a diagnostic screening tool to assess for MDD. This result is supported by past research stating ob-gyns under-utilize diagnostic screening tools (Goldman et al., 1999; Williams et al., 1999), and coincides

with rates of diagnostic tool use seen previously in the ob-gyn population (Leddy et al., 2011a). Analysis of physicians indicating using any screening tool revealed that having "few" MDD diagnoses annually significantly predicted not utilizing standardized screening tools. These physicians may not believe that utilizing tools is beneficial to their practice, as they do not diagnose many cases of MDD. However, having few diagnoses may mean that these physicians are less familiar with the diagnostic criteria, and should be more reliant on standardized measures to improve their ability to recognize depression. One study found a large incongruence between physicians' diagnosis of depression and a diagnosis of depression based on a standardized depression screening tool; 75.3% of patients were depressed using the tools' criteria, yet only 31% of cases were diagnosed by the physician (Ani, Bazargan, Hindman, Bell, Farooq, Akhanjee, et al., 2008).

Further analyses of each tool separately revealed that ob-gyn age significantly predicted the use of the BDI; being an older physician significantly predicted the likelihood to use this tool. One explanation for this finding is that out of the depression screening tools provided on the survey, the BDI has been available for use in clinical settings the longest. It is possible that older physicians are more familiar with this tool, and have had more experience with the measure than younger physicians. Alternatively, younger physicians may be more inclined to use standardized tools, which have been developed more recently. Tools that are less familiar may appear intimidating, thus a physician may view the tool as discouraging, or even faulty in comparison to other tactics they rely on. Researchers have stated that lack of familiarity, knowledge (Goldman et al., 1999; Williams et al., 1999), and inadequate training with diagnostic criteria (Leddy et

al., 2011a; Schmidt et al., 1997) are common rationalizing factors for not using standardized screening measures.

Unfortunately, while in residency, ob-gyns receive little to no training on the management of depression, which may also explain a lack of tool use. One study showed that 80% of ob-gyns indicated never receiving training, and 60% had never completed a continuing education course on the topic of treating clinical depression in women (Schmidt et al., 1997). Therefore, ob-gyns may feel more confident basing a diagnosis on past in-practice experience, compared with consulting an unfamiliar measure. Recent literature has highlighted an increase in mental health training while in residency (Coleman et al., 2005), which is promising for the next generation of physicians and their patients.

To most adequately make a diagnosis, a physician should consult the DSM; however, results from the present study, in conjunction with past literature, show that this aid in treatment is also highly underutilized by the ob-gyn population (Leddy et al., 2011a). Only 11% of physicians indicated consulting the DSM-IV to confirm a diagnosis of MDD and before prescribing anti-depressant medications. These rates are almost identical to past research using the same population (Leddy et al., 2011a), which alludes to a continuing trend of ob-gyns not providing adequate depression care.

Ob-gyns are likely not using the DSM for similar reasons for which they do not use standardized screening tools: lack of knowledge and inadequate training. As stated previously, many physicians have a preference for relying on their own clinical judgment for diagnosis (Leddy et al., 2011a). As an alternative to the use of the DSM-IV, symptom

review and physical examination or observation have been cited as a preferred diagnostic method for physicians (Leddy et al., 2011a).

Unfortunately, basing a mental health diagnosis on unstandardized measures can have consequences for patient care. For example, physicians who base their diagnosis on their subjective examination may improperly believe that the symptoms being displayed by the patient are not adequate for a diagnosis, or may disappear spontaneously (Goldman, Nielsen, & Champion, 1999). In these instances a physician may think a diagnosis is not warranted, when the use of a diagnostic tool could demonstrate otherwise. It thus seems beneficial to improve physician use of diagnostic tools as a means of providing better treatment for patients.

Physicians may not be utilizing resources such as standardized screening tools and the DSM, because of a perceived lack of applicability (Goldman et al., 1999) or efficiency in the primary care setting. To overcome this diagnostic deficit, and improve patient treatment practices, a physician could utilize tools that are more user-friendly for primary care. For example, the PHQ-2 would be advantageous as a screening measure, and the primary care version of the DSM (DSM-IV-PC, Goldman et al., 1999) could be used for diagnosis confirmation. The PHQ-2 is one of the shortest standardized screening tools for depression. As well it has been recommend and validated for use in a primary care population (Arroll et al., 2010). Research has reported that lack of time is a primary barrier to use of diagnostic screening tools (LaRocco-Cockburn et al., 2003); therefore the use of the PHQ-2 appears to be a superior solution for time management. The results of the present study found that this tool was scarcely used by physicians, with only 5% of ob-gyns selected using this measure. The PHQ-2 was the shortest and therefore most

efficient screening tool listed on the survey; however it was the least utilized by ob-gyns. Instead, the longer version of this assessment (PHQ-9), and the BDI were utilized by 11% and 46% of the sample, respectively. This result suggests that time may not be as critical to ob-gyns as other barriers that have yet to be identified by the current literature.

Another explanation for not using the PHQ-2 is that primary care physicians may be unaware that this valuable tool exists. The Committee on Quality Health Care in America, Institute of Medicine (2001) reported that it can take up to 17 years for a diagnostic tool to become used in the clinical atmosphere. The PHQ-9 was validated in 2001 and the PHQ-2 in 2003, therefore these measures may not yet be widespread in clinical practice. To the author's knowledge, research has yet to assess ob-gyns' knowledge on the availability of screening tools for depression. It is important for research to investigate physicians' awareness of standardized screening measures for MDD, and other possible barriers to screening and diagnosing MDD, as this could lead to an improvement in current practice patterns.

The DSM-IV-PC is another viable option for improving the management of depression in primary care. The DSM-IV-PC is a shortened version of the DSM-IV-TR, and was created specifically for use in the primary care setting (compared with that of the psychiatric setting). As well, the brief format used in the DSM-IV-PC makes it a more accessible and resourceful aide for primary care providers. The utilization of this tool could be especially beneficial, as research into educational intervention for PCPs has shown mixed effectiveness for physicians' management of depression in practice (Gask & Goldman, 1993; Lin, Simon, Katzelnick & Pearson, 2001). In theory, the use of the PHQ-2 and the primary care version of the DSM-IV would be an ideal fix to diagnostic

discrepancies created by a reliance on a physicians' own judgment. However, more research is needed to assess alternative solutions and the usefulness of these measures in ob-gyn practice.

Prescribing Anti-Depressant Medication

Although indicating deterrents, such as the risk of developing sexual problems, including loss of libido, 86% of ob-gyns specified prescribing anti-depressant medication to their patients. Of those physicians, 97% most frequently prescribe SSRI's, and in general, believe anti-depressants are effective for both pregnant and non-pregnant patients. Furthermore, ob-gyn gender was found to significantly predict the effectiveness ratings of anti-depressants for both pregnant and non-pregnant women; female ob-gyns rated the anti-depressant medications as more effective than male ob-gyns.

Despite a lack of standardized tool use for screening and diagnosing MDD, and dwindling confidence surrounding the proper prescribing of anti-depressants (Williams et al., 1999), ob-gyns and other primary care physicians are continuing to partake in this as a progression in the treatment of their patients. This tendency to prescribe could be due to the emerging trend described by Goldman and colleagues (1999), which states that the "gatekeeper" role taken by primary care physicians has suffered increasing pressure. This has amplified the incidence of ob-gyns' diagnosing and treating depression themselves, and in turn they are relying less on referring symptomatic patients to mental health specialists. In the present study, only 19 physicians indicated they did not prescribe anti-depressant medication, and instead refer patients outside of the practice for treatment of depression. This lack of referral is surprising, as research has found that both knowledge

of diagnostic criteria and knowledge of treatment options were limiting factors for ob-gyns' ability to provide superior care for their patients with depression (Williams et al., 1999). Physicians' engagement in prescribing behavior, despite not utilizing validated tools can be consequential for their patients. It is important to understand the strategies physicians use to make a diagnosis of depression to further enhance the care a patient receives.

Estimation of the Prevalence of MDD

It was hypothesized that, based on the availability heuristic, ob-gyn in-practice diagnosis of MDD would significantly predict the estimate of the national prevalence of MDD. Results did not support this hypothesis; however found that ob-gyn gender was a significant predictor of the estimation of MDD. Specifically, female physicians were more likely to overestimate the prevalence of the disorder than male physicians. It is possible that the availability heuristic is playing a role in this gender difference, albeit different than originally hypothesized. The availability heuristic argues that the ability to judge probabilities is influenced by retrieving examples from memory (Peters et al., 2006a). Thus, when recent personal experience is involved, it is easier to retrieve information. This personal experience often aggregates to reflect an individual's greater likelihood to overestimate the occurrence of a particular event. In the context of the present study, reliance on the availability heuristic could lead female physicians to overestimate the prevalence of a MDD in children and adolescents, based solely on the rate in which they encounter MDD in both their personal lives (i.e., through themselves, family members, or friends) and daily practice.

Reliance on both the availability heuristic and past experience has implications for physicians' treatment and practice patterns. This notion, in combination with the avoidance of screening tools and the DSM-IV can become especially challenging for properly managing depression. A number of individuals may be lacking, or incorrectly receiving, a diagnosis and treatment for a disorder they may or may not have. Research by Goldman and colleagues (1999), has further supported this idea, and found that the continued evasion of diagnostic criteria can lead to inaccurate diagnosis.

Facts Box

When assessing physicians' selection of information to relay to a patient regarding a medication, results showed that physicians indicated more side effects than benefits of the medication, regardless of the safety and effectiveness of the medication. Specifically, for the first vignette (safe), the increased utilization of side effect information (48% presented more side effects than benefits) by physicians opposed hypothesis 4b, and only a fraction of physicians (21%) selected information in support of the hypothesis. However, for the second vignette (not safe) 47% supported hypothesis 4a by relaying more side effect information and 11% opposed it by relaying more benefit information.

The greater amount of side effects (compared with benefits) presented in the first vignette is intriguing. This finding contradicts the notion that physicians would focus solely on using the positive aspects of a favored treatment to influence their patients' decisions. By choosing to select side effect information, physicians seem to be relaying a broader scope of available information to their patients. Instead of persuading a patient

into a treatment by presenting the benefits it may provide, it is possible that physicians are attempting to demonstrate a more thorough communication style.

The increased support of the hypothesis seen in the second vignette (presenting more side effects than benefit information when a medication is not safe and effective) coincides with past research (Stevenson et al., 2000). In this vignette, physicians may be choosing to relay more side effects because of the increased risk associated with taking a medication believed to be unsafe for the patient. They may not be presenting many benefits for fear that a patient would focus on the positive aspect of the medication, and not understand the consequences surrounding an unsafe treatment. In this scenario, describing more benefits than side effects, and thus presenting an unsafe medication in a more favorable light, has a greater implication than utilizing an oppositional pattern (to that of the hypothesis) in the alternative vignette. For example, one study, which assessed the presentation of this information through direct-to-consumer (DTC) advertising, found that presenting an increased number of benefits gave consumers a more thorough understanding of the positive aspects of the treatment, but not the risks associated with the treatment (Davis, 2007). Consequently, the subjects tended to overvalue the effectiveness of the medication (Davis, 2007).

Overall, physicians presented both the possible benefits and side effects of a treatment, regardless of the descriptors. As well, they did not tend to utilize solely beneficial information to present the safe and effective medication favorably. However, physicians utilized an increased number of side effects to prevent the patient from an unsafe form of treatment. This choice of information is similar to the idea of libertarian paternalism (Thaler & Sunstein, 2003), which is an emerging trend in the health care

field. Libertarian paternalism argues that individuals in leadership roles (i.e. a physician) utilize strategies to influence an individual's (i.e. patient's) preference, while also leaving the ultimate decision to the individual (Epstein & Peters, 2009). Ethically, this may seem like a good option, however, within the realm of decision-making and constructing preferences, this can be extremely problematic (Epstein & Peters, 2009). When patients are not presented with balanced information they cannot make informed decisions about taking a medication (Berry, 2006). Furthermore, this can affect their well being by obstructing their ability to take a medication safely and properly (Berry, 2006).

Physicians' Perceived Numeric Ability and Persuasive Communication

In the present study, the average subjective numeracy score was 40, out of a highest possible 48. The average subjective score per question was 5.07 out of 6, which is similar to the average score (M = 4.9 out of 6) found in past research using a subjective numeracy measure in an ob-gyn sample (Anderson et al., 2011). Prior research has found that physicians tend to rate their own ability on subjective numeracy measures favorably (Anderson et al., 2011), and also tend to perform fairly well on objective measures (Schwartz & Woloshin, 2000). Similar to physicians, the general population tends to perceive their numeric ability highly, however, they display a deficit in their actual numeric ability. One study showed that only 2% of subjects could correctly answer all 3 objective numeracy questions correctly, despite 70% of the sample indicating they were good with numbers (Sheridan, Pignone, & Lewis, 2003).

In the present study, male physicians perceived their numeric ability as significantly higher than female physicians. A plethora of prior research has investigated

the possible differences in mathematical ability between genders (See Hyde, Fennema & Lamon, 1990 for a comprehensive review). Results of a meta-analysis conducted on studies published between 1963 and 1988 found that actual gender differences in mathematical ability are quite small (Hyde, Fennema & Lamon, 1990). These differences tend to emerge to favor males in high school and college, when class difficulty increases. As well, the magnitude of gender differences in mathematical ability has declined over the years (Hyde, Fennema & Lamon, 1990) and recent research suggests that perceived differences in math abilities are not always accurate reflections of actual disparities (Hargittai & Shafer, 2006). For example, even highly educated females perceive their numeric ability to be less than that of their male counterparts and less than their actual ability implies (Anderson et al., 2011).

It is possible that physician confidence is contributing to the gender difference in perceptions of numeric ability. Female physicians may be less confident in their mathematical ability than male physicians. Numerous studies of ob-gyns have reported gender differences in confidence levels related to multiple aspects of practice: ratings of adequate training (Stovall, Loveless, Walden, Karjane , & Cohen, 2007), ability to interpret scientific literature and counsel patients (Power, Zinberg, & Schulkin, 2006), and judging their own surgical skills (Einarsson & Sangi-Haghpeykar, 2009). In each of the above studies, male physicians provided higher ratings of their ability than females. Thus it seems as though female physicians are consistently less confident in their abilities (not just mathematical) than their male counterparts.

The results did not support the hypothesis that physicians perceiving their numeric highly would be more likely to utilize persuasive information. However,

noteworthy to mention was the finding that two-thirds of the persuasive group was composed of physicians perceiving their numeric ability as high. Relative risk was chosen as "persuasive" in the present study because it overestimates the magnitude of the statistic presented, and has been found to influence decisions (Gigerenzer, et al., 2008). As well, it is a form of communication commonly used by both the pharmaceutical industry and physicians (Berry, 2006). It is possible that physicians, particularly those with low perceptions of their numeric ability, did not fully comprehend the more advanced relative risk formats. Prior research has found that although physicians frequently experience the relative risk format in-practice, many do not know how to properly interpret the information it presents (Covey, 2007; Gigerenzer et al., 2008).

Although not significant, the tendency for high numerate physicians to use persuasive, non-transparent information provides more support for the regulation of numeric formats. It has been recommended that the numeric format presented to consumers relay the most important medical information clearly, while also reducing the inferences and calculations required (Peters et al., 2007a). The results of the present study found a variation in numeric format chosen by physicians. As the use of misleading information can misinform patients, the present study further demonstrates the need for numeric guidelines. If accepted, numeric regulations have the potential to positively aide patients' decision-making, and contribute to more informed health-relation decisions.

Physicians' Perceived Numeric Ability and Depression Care

Although perceived numeric ability did not significantly predict the use of the DSM-IV, analyses revealed a significant relationship between the variables. Among

physicians in the middle age group, those with high perceptions of their numeric ability were less likely than those with low perceptions of their numeric ability to use the DSM-IV to confirm a diagnosis of MDD, and before prescribing anti-depressant medications. Physicians perceiving their numeric ability as low may be more inclined to view the DSM-IV as a helpful aide. Conversely, physicians perceiving their numeric ability as high may be more confident in relying on their own judgment to diagnose MDD, and may not believe the DSM is as beneficial to diagnosis as their own previous experience.

Current literature has begun to explore differences in numeric ability concerning comprehension and communication of numerical information. Additionally, findings from the present study demonstrate the effect perceived numeric ability could have in other areas of patient care. It is important that both patients and physicians understand that perceptions of numeric ability can affect health-related decision-making and practice.

CHAPTER 11

CONCLUSION

Despite believing the diagnosis and treatment of depression are important topics in patient care, ob-gyns are not adequately managing the disorder. The present study expanded on what was already known about ob-gyns' depression care, and revealed ob-gyns' tendency to favor the BDI as a validated screening tool, and to not consult the DSM before prescribing antidepressant medication. Additionally, we discovered that instead of presenting influential information about a treatment, physicians had a greater tendency to display information, which was complete (e.g., both benefits and side effects of a medication). As well, few physicians utilized persuasive numeric formats to relay important information about a treatment. Thus, it appears that physicians are engaging in more thorough communication strategies with their patients. In the health care setting, this finding potentially highlights an increase in informed decision making among physicians and patients.

Results of the present study found that among physicians in the middle age group, perceived numeric ability was significantly related to the consultation of the DSM-IV to confirm a diagnosis of MDD, and before prescribing anti-depressant medication. The effects of health illiteracy are widely documented in the patient domain, and are increasingly becoming apparent among physicians. However, research into the level and presence of this numeric deficit, and its corresponding effect on communication and decision-making is still lacking. The present study is a starting point for further

investigations into the role of both perceived and actual numeric ability in physician communication, decision-making, and treatment practices.

Limitations

One limitation to the present study could be the use of a selected sample. All of the physicians invited to participate had previously responded to a survey on mental health. Therefore, those that responded to the present survey could have been more interested in mental health related topics relevant to ob-gyn practice (e.g. depression), compared to those that did not respond. As well, non-responders could have also differed from responders in age, perceived numeric ability, and practice patterns regarding the management of major depression. While there is not a feasible way to identify if these possible differences are true, previous research has found no significant demographic differences between CARN and non-CARN members (Leddy et al., 2011a), nor responders and non-responders (Coleman, Laube, Hale, Williams, Power, & Schulkin, 2007; Leddy et al., 2011a).

Another limitation may be the use of a subjective measure of numeric ability. The Subjective Numeracy Scale (SNS) was used because physicians frequently view it as less intimidating than measures of objective numeracy. This occurs because the SNS does not ask an individual to complete various mathematical calculations. Rather, it assesses an individual's *perceived* numeric ability. In accordance with findings from the present study, previous research has found male physicians rate their numeric ability higher than female physicians (Anderson et al., 2011). However, literature on mathematical ability has found that gender differences are actually very small (Hyde, Fennema & Lamon,

1990). Thus, the inflation of subjective numeracy scores by male physicians could affect the interpretation and applicability of the results. The Subjective Numeracy Scale has been found to correlate well with objective measures (Reyna et al., 2009), which signifies its strength in measuring numeric ability. However, research is still undecided on whether subjective numeracy scales and objective numeracy scales are equivalent predictors of numeric ability, particularly in highly educated samples.

A third limitation pertains to the vignettes' lack of descriptive information concerning why the anti-depressant medication was believed to be either safe and effective, or not safe and effective for the patient. For example, the second vignette could have used a less aversive description (e.g., the medication was not safe because of food restrictions), or a more aversive description (e.g., it was recently recalled by the FDA) to describe the unsafe drug. The use of this type of descriptive information could have altered physicians' selections from those indicated in the present study. However, past research has shown that physicians tend to provide the side effects of a treatment to influence a patients' decision (Stevenson et al., 2000). Therefore it is likely that although they may not present the same information, they would follow a similar pattern (e.g., presenting more side effects than benefits).

The final limitation concerns the operational definition of physicians' "persuasive" tendencies. Although the facts box presented differing numeric formats, the use of the relative risk format was deemed to be the most persuasive. Research has found this format can be easily misinterpreted, and can also be used in a persuasive manner to skew an individual's views about a medication (Covey, 2007; Misselbrook & Armstrong, 2001). The use of this specific definition could be a barrier to creating a larger persuasive

sample. If operationalized differently (e.g., the inclusion of the effectiveness of the medication in the treatment group, without displaying the placebo results), more physicians may be included in the sample, and a larger difference in the relationship between numeric ability and choice of persuasive information could be found.

Future Directions

Despite research showing that depression cannot be adequately diagnosed without the use of standardized measures (Evins & Theofrastous, 1997; Klinkman et al., 1998), numerous studies have found that ob-gyns do not utilize standardized assessment tools. However, research into the behavior of the physicians who do use validated screening measures is still lacking. As well, the rationale behind ob-gyns' choice to use standardized tools, and the specific tool they employ is still unclear. The present study is a starting point for assessing this behavior among ob-gyns, however future research should focus on clarifying this issue.

Greater exploration into the effect of physicians' perceived, and actual, numeric ability is also warranted. Future research should explore the relationship between numeric ability and the choice to utilize diagnostic screening aides, rationale behind the standardized screening methods that are employed, and likelihood of treating a patient, versus referring the patient to a mental health provider. These questions highlight the potential for perceived numeric ability to affect the treatment a patient receives, thus the investigation into these topics should not be evaded.

Increased exploration of the use of the subjective numeracy scale is also necessary. The SNS assesses perceived numeric ability, and little is known about whether

the SNS is also a consistent indicator of actual numeric ability, particularly in the physician population. Future research should focus on the evaluation of this scale, and whether it is a suitable alternative to more intimidating objective measures. As well, it would be worthwhile to assess how physicians perceive their numeric ability when compared with that of other physicians. For example, would a physician that normally perceives their numeric ability highly be less inclined to do so when asked to compare themselves with other physicians? Research has yet to investigate whether the perceived numeric ability of others can affect an individual's perceptions of their own numeric ability.

Finally, future research should examine physicians' beliefs about the use of health information in differing formats. For example, are physicians aware of the different formats they can utilize and how these formats can be persuasive? Do they choose to utilize different formats strategically (i.e., if a treatment is considered to be extremely risky or especially beneficial for a patient)? Do they believe the persuasive use of different formats of information is ethical and helpful to the patient? Overall, are physicians aware of the effects of numeric format on the comprehension of health-related information? An emphasis on these topics is needed to determine how physicians communicate with their patients. Acquiring this information would then allow researchers to postulate strategies or aides, which can be employed to increase informed communication and decision-making practices. One example of an aide to communication is the drug facts box. The facts box presents relevant numeric information in an easily understood manner, and has shown increased comprehension (compared to formats currently regulated) in both normal and highly educated samples.

Research into the communication of numeric formats would allow for the facts box to be further modified to fit the communication patterns frequently utilized by physicians.

APPENDIX A

DEMOGRAPHIC, DEPRESSION, AND NUMERACY QUESTIONS

1. Year of Birth: __ __ __ __

2. Gender (check one): O Male O Female

3. State of Practice: __ __

4. Number of years in practice: _____

5. Type of Practice (check one):
   O Obstetrics and Gynecology O Gynecology only O Obstetrics only
   O Other Specialist (e.g. MFM, urogynecology,etc) Please explain:_____

6. Practice Setting (check one): O Private (solo or group) O University
   O Other (e.g. community)

7. Do you consider yourself to be a "generalist" or a "primary care provider"?
   O Yes O No

8. Do you see adolescent patients? O Yes O No

Your Practice:
The questions in this section concern your practices regarding screening and treatment of depression.

9. How many patients do you diagnose with major depressive disorder in a typical year?
   _____

10. Please fill in the blank… At any given point in time _____% of children and adolescents are suffering from depression.

11. Have you ever used any of the following screening tools? (check all that apply)
    O Beck Depression Inventory (BDI-II) O PHQ-2 O PHQ-9
    O Other (please indicate) _____
    O No, I've never used any screening tools for depression.

12. Do you currently prescribe anti-depressants to your patients? (check one)
O No (answer question 4, skip question 5)
O Yes (skip question 4, answer question 5)

13. If you do not prescribe anti-depressants, why not? (check all that apply)
O Anti-depressants are not safe
O Anti-depressants are not effective
O I do not have privileges to prescribe anti-depressants
O I refer patients for depression treatment with anti-depressants.
O Other - please explain:_____

14. What class of antidepressant medication do you most often prescribe? (check one)
O Selective serotonin reuptake inhibitors O Tricyclic antidepressants
O Benzodiazepines O Other - please indicate:_____

15. On a scale from 0 (not effective) to 10 (very effective), how effective do you think anti-depressants are, in general, for: (circle one for non-pregnant and one for pregnant) (check one):

Non-pregnant women:

Not effective										Very effective
0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*

Pregnant women:

Not effective										Very effective
0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*

16. Do you consult with the DSM-IV to confirm diagnosis of major depressive disorder? (circle one)
No Yes

17. Do you consult with the DSM-IV to confirm diagnosis of major depressive disorder before prescribing antidepressant medication? (circle one)

No Yes

18. Which of the following side effects deter you from prescribing antidepressants? (check all that apply)
O Nausea O Dizziness O Constipation O A skin rash
O Feeling sleepy or having trouble sleeping O Gaining or losing weight
O Feeling restless O Sexual problems, including loss of libido

The purpose of the next eight questions is to understand your ability and preferences for numbers. Please answer to the best of your ability. All responses are reported in the aggregate.

For each of the following four questions, please check the box that best reflects how good you are at doing the following things:

19. How good are you at working with fractions?

Not at all good *Extremely good*

☐1 ☐2 ☐3 ☐4 ☐5 ☐6

20. How good are you at working with percentages?

Not at all good *Extremely good*

☐1 ☐2 ☐3 ☐4 ☐5 ☐6

21. How good are you at calculating a 15% tip?

Not at all good *Extremely good*

☐1 ☐2 ☐3 ☐4 ☐5 ☐6

22. How good are you at figuring out how much a shirt will cost if it is 25% off?

Not at all good *Extremely good*

☐1 ☐2 ☐3 ☐4 ☐5 ☐6

For each of the following four questions, please check the box that best reflects your answer:

23. When reading the newspaper, how helpful do you find tables and graphs that are parts of a story? *Not at all helpful* *Extremely helpful*

☐1 ☐2 ☐3 ☐4 ☐5 ☐6

24. When people tell you the chance of something happening, do you prefer that they use words ("it rarely happens") or numbers ("there's a 1% chance")?

Always prefer words *Always prefer numbers*

☐1 ☐2 ☐3 ☐4 ☐5 ☐6

25. When you hear a weather forecast, do you prefer predictions using percentages (e.g., "there will be a 20% chance of rain today") or predictions using only words (e.g., "there is a small chance of rain today")?

Always prefer percentages *Always prefer words*

☐1 ☐2 ☐3 ☐4 ☐5 ☐6

26. How often do you find numerical information to be useful?

Never *Very often*

☐1 ☐2 ☐3 ☐4 ☐5 ☐6

APPENDIX B

FACTS BOX AND VIGNETTES

***Below we present the results from a Cochrane Review. We have presented the information in a summary table below. Please review the information and answer the questions below.*

Please read the following results of a Cochrane Review carefully, and then answer the respective questions:

BENEFITS	*number out of 1000 who take placebo*	*number out of 1000 who take anti-depressant*	*absoulte risk change*	*relative risk reduction*
Increased chance of improving	**261 out of 1000** (26%) A	**454 out of 1000** (45%) B	**19.3** percentage points C	**74%** D
SIDE EFFECTS	*number out of 1000 who take placebo*	*number out of 1000 who take anti-depressant*	*absoulte risk change*	*relative risk increase*
Increased dry mouth	**121 out of 1000** (12%) E	**224 out of 1000** (22%) F	**10.3** percentage points G	**85%** H
Increased sexual problems	**55 out of 1000** (5%) I	**114 out of 1000** (11%) J	**5.9** percentage points K	**107%** L

Please read the questions carefully.

27. Imagine that you have a depressed non-pregnant patient who is considering taking an anti-depressant. You believe that an anti-depressant **will be safe and effective** for this particular patient. You decide to use summarized information from a Cochrane Review to educate the patient on the advantages and disadvantages of taking anti-depressants. Which pieces of information from the Cochrane Review (displayed above) would you *most likely* use to explain the benefits or disadvantages of anti-depressants to this patient? You many choose more than one, but please do not choose more than four.

O Box A O Box B O Box C O Box D O Box E O Box F O Box G O Box H
O Box I O Box J O Box K O Box L O Other, please explain:_____

28 You now have another patient. For this patient, you believe that an anti-depressant **will NOT be safe and effective**. Again, you decide to use summarized information from a Cochrane Review to educate the patient on the advantages and disadvantages of taking anti-depressants. Would you show this patient different information than the patient in the question above?

O Yes (complete question 25b) **O** No

28b. If yes, Which pieces of information displayed above from the Cochrane Review would you *most likely* use to explain the benefits or disadvantages of anti-depressants to this patient? You many choose more than one, but please do not choose more than four.

O Box A **O** Box B **O** Box C **O** Box D **O** Box E **O** Box F **O** Box G **O** Box H
O Box I **O** Box J **O** Box K **O** Box L **O** Other, please explain:_____

Thank you for your time and responses.

Please return the completed in the **postage-paid envelope provided** or mail to:

ACOG Research Department
409 12th St SW
Washington, DC 20024
FAX: 202-554-4346

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