8-2014

# Felt Stigma From Medical Professionals: Effects of Body Mass Index on Medical Use

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# FELT STIGMA FROM MEDICAL PROFESSIONALS: EFFECTS OF BODY MASS INDEX ON MEDICAL USE

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A Thesis
Presented to
the Graduate School of
Clemson University

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In Partial Fulfillment
of the Requirements for the Degree
Master of Science
Applied Sociology

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by
Adam Michael Yates
August 2014

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Accepted by:
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**ABSTRACT**

This thesis examines the relationship between body mass index (BMI) and perceived discrimination, using the frequency of routine medical care as a proxy for discrimination using waves I (1995) and II (2005) of the Midlife in the U.S (MIDUS) survey. This thesis examines stigma and discrimination of the obese in medical care using the theoretical framework of Felt Stigma and Identity Theory. This thesis addresses 5 research questions: (1) What effect does body mass index have on health usage patterns? (2) What effect does gender have on the relationship between body mass index and health usage patterns? (3) What effect does age have on the relationship between body mass and health usage patterns? (4) What effect does socioeconomic status (SES) have on the relationship between body mass and health usage patterns? (5) How does the relationship between body mass and health usage differ over time? The current study finds that the frequency of medical use varies significantly with the category of obesity examined. There is partial support that obese respondents may engage in medical avoidance due to felt stigma in medical practice. Interactions between BMI and gender and BMI and age are strongest. Additionally, this study finds that the relationship between BMI and the frequency of medical use has changed significantly between 1995 and 2005. Relevant discussion regarding implications of findings, this study's limitations, and possible directions for future research is given.

“Health is not merely an absence of disease, but a state of complete physical, mental, and social well-being. A holistic approach involves the mind and the spirit as well as the physical.”

Fiji NCD Prevention and Control 2010-2014

## ACKNOWLEDGMENTS

First, I would like to thank Dr. Ye Luo, my thesis advisor, for her unending patience and unwavering support as I navigated through my graduate career. Her advice and support were instrumental to the completion of my thesis as well as my understanding of research.

I would also like to thank Dr. Ellen Granberg, my committee member, who was the inspiration for my interest in obesity studies as an undergraduate, and whose instruction over the past 3 years has been paramount.

I would like to thank Dr. Joel Williams, my committee member, for accepting me as an intern and broadening my understanding of public health. I thank him for allowing me to experience the professionalism, courtesy, and kindness that he brings to those around him, and which I hope to achieve.

I thank Dr. Brenda Vander Mey, my program coordinator, for her advice and guidance, always freely given. Be it for paperwork, research, or job searching, her continual guidance and unyielding support has allowed me to take advantage of many opportunities I would not have otherwise understood how.

I would like to thank Yiwei Zhou, Erin Shealy, and Yue Chen, my classmates and friends, who suffered and succeeded alongside me, and who were unendingly willing to have ideas bounced off of them.

Finally, a special thanks to Melissa Dunphy, my long-time friend, who contributed to my completion of this thesis in innumerable ways. Without her as a sounding board and support I would still be writing.

## TABLE OF CONTENTS

| | | Page |
|---|---|---|
| TITLE PAGE | | i |
| ABSTRACT | | ii |
| DEDICATION | | iii |
| ACKNOWLEDGMENTS | | iv |
| LIST OF TABLES | | vi |
| LIST OF FIGURES | | vii |
| I. | Introduction | 1 |
| II. | Literature Review | 7 |
| III. | Hypotheses | 33 |
| IV. | Methods | 37 |
| V. | Results | 48 |
| VI. | Discussion | 59 |
| VII. | Limitations | 64 |
| VIII. | Future Work and Conclusion | 66 |
| REFERENCES | | 70 |

## LIST OF TABLES

Table Page

4.1 Descriptive Statistics of Variables for 1995 and 2005 ............................. 50

4.2 Frequency of Routine Care by BMI, Gender, Age, and SES: Results for 1995 ................................................................... 51

4.3 Frequency of Routine Care by BMI, Gender, Age, and SES: Results for 2005 ................................................................... 54

4.4 Frequency of Routine Care by BMI, Year, Gender, Age, and SES .......... 58

# LIST OF FIGURES

| Figure | | Page |
|---|---|---|
| 2.1 | Theoretical Mode | 31 |

## INTRODUCTION

The rate of obesity has been growing in the United States for the last 30 years. The Centers for Disease Control and Prevention (CDC) has declared the problem of obesity an epidemic, as over 30% of the U.S adult populations are obese. This situation has far-reaching consequences for the nation, such as military recruitment capabilities, health insurance and life insurance prices, and occurrences of diabetes and heart conditions (which, again, feeds into issues with health insurance and life insurance). In 1999 as many as 300,000 deaths can be attributed to secondary health conditions related to obesity (Allison et. all, as cited in Zhang and Wang 2004). In particular, current estimates forecast that one-third of all children born today and one-half of black and Latino children will develop type-two diabetes in their lifetime (Glickman et al. 2012). In 2004, of the 11.7 million cases of diabetes two-thirds of diabetic deaths were attributable to being overweight (Bray 2004).

The health and social consequences of obesity produce drastic economic fallout. In part because obesity tends to affect morbidity more drastically than mortality (Deacon 2006; Harrington and Lee-Chiong 2009; Visscher and Seidell 2001). In 2000, the total direct and indirect costs attributed to obesity were estimated at a total of $117 billion (Zhang and Wang 2004). A study in 2011 estimated the annual cost of direct and indirect results of obesity cost $190 billion (in 2005 dollars) (Glickman et al. 2012). That represents nearly 20.6 percent of the nation’s annual health spending. If we can successfully reduce the rate of obesity, it’s predicated that the tax burden of Medicare and Medicaid could be reduced by as much as 8 to 12 percent.

While health and economic impacts are undeniable, the impact of obesity also extends beyond money and into the realm of social interaction. Obesity has been directly associated with stigma, negative stereotyping, discrimination, social marginalization, depression, and negative body image (Glickman et al. 2012). Many of the social aspects of being obese and how we treat those who are obese directly impact individuals in their everyday lives. Obesity has been associated with higher rates of unemployment, disability, absenteeism from school or work, reduced productivity, and reduced academic performance (Glickman et al. 2012). While the causes of these outcomes are myriad, ranging from increased medical needs to avoidance of bullying or discrimination, the end result cannot be denied.

The effects of obesity on personal interaction are equally as stark. Employers are less likely to hire obese individuals than normal weight individuals given the same qualifications (Glickman et al. 2012). Additionally, even when hired, obese individuals often report lower wages or other workplace discrimination (Baum and Ford 2004; Glickman et al. 2012). Puhl and Heur found that 25% of women in their survey of 2,249 reported experiencing job discrimination because of their weight. Fifty-four percent reported weight stigma from co-workers or colleagues, and 43% reported experiencing weight discrimination from their employers or supervisors (Puhl and Heuer 2009). Weight bias has been documented in places of work, close interpersonal relations, and educational institutions (Andreyeva, Puhl, and Brownell 2008; Carr and Friedman 2005). On an interpersonal level, obese men and women report experiencing significantly higher rates of discrimination (Carr, Jaffe, and Friedman 2008; Puhl and Heuer 2009).

The focus of the proposed study is on weight discrimination in the medical community. Because much of discrimination and stigma occurs on an interpersonal level, Identity Control theory may be used as a theoretical framework. Identity Control theory has been used frequently in obesity research where stigma and discrimination are explored (Carr et al. 2008; Deacon 2006; Puhl and Heuer 2009; Puhl 2009; Scambler and Hopkins 1986; Schafer and Ferraro 2011) and has also been used to discuss the social consequences of weight change (Granberg 2011). The current study will employ the Identity Control theory framework as it may prove particularly useful in assessing the relationships between the medical community and obese individuals, which is the focus of this study.

Medical practice is an intriguing area of societal interaction that bridges the gap between economic forces and interpersonal relations. Medical practitioners are placed in a unique position with regard to obesity, as they are simultaneously affected by general social malaise regarding obesity but maintain a position that is expected to affect patient weight.

Doctors also may play an important part in framing a patient's perception of his or her weight. Internationally and domestically, some doctors and nurses were reported to express highly stereotypical views of obese patients that profess obese individuals to be lazy, non-compliant, weak-willed, and sloppy (Puhl and Heuer 2009). Yet the attitudes and approach that doctors use with patients may significantly affect patients. Graham Scambler and Anthony Hopkins (1986) found in a study of epileptic patients and the framing of the "epileptic identity" that doctors, in their capacity as authorities, became an “official labeler” in the eyes of patients receiving a diagnosis (Scambler and Hopkins 1986). This capacity as an official labeler is possible for medical practitioners due to the authority the general public imbues on their station.

Despite the attention obesity discrimination has received, it continues to be a persistent force in western social interactions. While the work on obesity discrimination is both comprehensive and diverse, many relationships would benefit from further study. Specifically, few studies look at how discrimination towards the obese is changing over time. Change over time is an important indicator of changes in attitude towards obese individuals, and highlights trends in behavior that can inform both policy and social intervention. The literature that does examine obesity discrimination change over time does not focus on interactions within the medical field (Andreyeva et al. 2008; Schafer and Ferraro 2011).  Nor have we seen literature that examines how body weight and medical use relationships may vary by social variables such as socioeconomic status or gender and whether such interaction effects may have changed over time. Even when measures of medical discrimination are included in studies that examine changes over time (Andreyeva et al. 2008), their results say little about medical discrimination. Limitations in how perceived discrimination information is collected may limit what relationships we can identify.

Generally speaking, there has been little work that focuses on weight discrimination within the medical field.  There are few data sources on overt discrimination toward the obese in the context of patient care. While survey instruments have been developed for discrimination in other realms, the tools do not appear as developed for application in a medical environment. The Midlife in the United States Study (MIDUS), for example, has only one item meant to directly capture discrimination in the medical field. It asked,

"In each of the following, indicate how many times in your life you have been discriminated against because of race, ethnicity, gender, age, religion, physical appearance, sexual orientation, or other
characteristics? (If the experience happened to you, but for some reason other than discrimination, enter "0".) - YOU WERE DENIED OR PROVIDED INFERIOR MEDICAL CARE"

However, the response is highly skewed with few respondents reporting instances of discrimination in either the 1995 or the 2005 waves of MIDUS. While it may be that stigma does not transition into discrimination in the medical field, given the level of stigma present it is doubtful that this self-reported item represents the true relationship between obese patients and the medical community.

Thus, the current study uses data from both waves of the Midlife in the United States survey (MIDUS) (1995 and 2005) to examine the extent to which a known environment of stigma towards the obese may affect individual use of medical services as the rates of obesity increase. Rather than addressing discrimination directly, measures of the frequency of medical use will be explored. I am seeking to address five research questions: (1) What effect does body mass index have on health usage patterns? (2) What effect does gender have on the relationship between body mass index and health usage patterns? (3) What effect does age have on the relationship between body mass and health usage patterns? (4) What effect does socioeconomic status (SES) have on the relationship between body mass and health usage patterns? (5) How does the relationship between body mass and health usage differ over time?  I argue that answering these questions are useful for understanding the forces that lead to the stigmatization of the obese, and more importantly, for understanding how discrimination might affect patients in ways that are not traditionally captured using overt discrimination reports.

# LITERATURE REVIEW

## Definitions of Obesity, Stigma, and Discrimination

Before engaging in an in-depth discussion of literature, it is appropriate to define a number of terms as they will be used in this project. Obesity, stigma, and discrimination must all be clearly defined.

Obesity is most commonly defined in medical terms. While obesity may be defined by body fat percentage or hip-to-waist ratio, Body Mass Index is most often used as it can be easily calculated by using a respondent's height and weight. Following procedures outlined in Carr and Friedman (2008), for the purposes of this research I will be defining BMI scales according to National Heart, Lung and Blood Institute (NHLBI) Guidelines (Carr et al. 2008). The categories of body weight will be separated into are: *underweight* (BMI < 18.5), *normal weight* (BMI between 18.5 and 24.9), *overweight* (BMI between 25 and 29.9), *obese I* (BMI between 30 and 34.9), *obese II* (BMI between 35 and 39.9), and *obese III* (BMI ≥ 40). However, the separation of obesity into multiple categories is not universal. Therefore, unless specified otherwise, instances where this paper refers to obese individuals will generally include obese I through obese III categories combined.

While definitions for obesity emerge from medical distinctions, stigma and discrimination are far more challenging terms to clearly define. Stigma is difficult to define not only because it is a nebulous quality in and of itself, but because it is easily confused and interchanged with discrimination. A stigma may be loosely thought of as negativity or distain towards specific qualities or circumstances (Deacon 2006; Puhl

2009; Schafer and Ferraro 2011). Put another way, stigmas are attributes that are seen as "deeply discrediting" (Granberg 2011). Stigma may manifest itself on an individual level, but also on a societal or cultural level (and often both).

On the other hand, discrimination may be characterized as negative action, or lack of action, towards an individual when a power-relationship exists, *because of* the presence of negatively viewed traits or circumstances (Carr and Friedman 2005; Deacon 2006; Puhl 2009). The necessity of a power relationship seems to be the crucial distinction between stigma and discrimination (Deacon 2006). This power-relationship between a discriminator and an actor is the key for two reasons.

Firstly, it better classifies what social interactions may transpire between two actors and the behaviors we might expect from them (Deacon 2006). Two individuals on relatively equal footing that find a reason not to like each other, or else possess preconceptions about qualities of the other individual (e.g. a dislike for a racial background or employment category), may speak or act derogatorily towards one another without entering the realm of discrimination. In order for one of the actors to be discriminated against, one actor must desire, expect, or require something from the other actor and be denied attaining it on the basis of the disliked quality.

Secondly, it is because of this distinction that discrimination within medical practice is of particular note. Inherent within the relationship between medical professionals and their patients is a power differential that makes patients particularly vulnerable to discrimination based on their weight. In many ways, medical professionals are viewed as experts and authorities, and may color the expectation or general outlook of a patient based upon how they interact (Scambler and Hopkins 1986; Ward, Gray, and Paranjape 2009). It is precisely because of these power relationships that discrimination of obese individuals in medicine may be so damaging. The expectation of discrimination or stigma can cause social withdrawal and changes in behavior (Deacon 2006) that may contradict the medical communities' ability to positively affect obesity.

This expectation of stigma may also be called felt stigma and is distinguishable from discrimination in key ways. The concept of felt stigma was first introduced by Graham Scambler and Anthony Hopkins in 1986. They argued that a general sense of stigma, or global stigma, towards epileptics caused individuals with the condition to hide their diagnosis. It was only when absolutely necessary that epileptics revealed their condition to family members and loved ones, work-mates, or employers (Scambler and Hopkins 1986). In many instances, individuals reported foregoing seeking promotions due to a fear that their condition would become known if they took on more stress (a trigger for epileptic seizures) or worked more hours (Scambler and Hopkins 1986).

Overall, Scambler and Hopkins suggest that the fear of being discriminated against (enacted stigma) was more burdensome for the respondents than any actual instance of discrimination towards them. In fact, in many cases respondents had a very salient fear of being outed as epileptic despite never having been discriminated against due to their condition.

If the forces of felt stigma may be at play in cases of medical illness, it would be beneficial to better understand how these forces may be generated and proliferated. Work by Deacon may lend theoretical support to the pathways that lead to medical stigma. In a study of HIV/AIDS discrimination Deacon argues that stigma may exist separately from discrimination, and that distinguishing between the two is important to understanding the forces acting upon and motivations of individuals with HIV/AIDS (Deacon 2006). She presents a model that shows health-related stigma as a social process in which:

1. Illness is constructed as preventable or controllable;
2. 'Immoral' behaviors causing the illness are identified;
3. These behaviors are associated with 'carriers' of the illness in other groups, drawing on existing social constructions of the 'other';
4. Certain people are thus blamed for their own infection; and
5. Status loss is projected onto the 'other', which may (or may not) result in disadvantage to them. (Deacon, Harriet, 2006 pg. 421)

The Deacon model may be readily applied to obesity discrimination. However, the importance of felt stigma to an understanding of obesity stigma is such that framing Shambler and Hopkins's work within this framework may clarify felt stigma to a degree. Step 5 in Deacon's model is where the concept of felt stigma operates. In order for an individual to avoid being applied to steps one through four, individuals may alter their behavior and their public identity cues. The fears expressed by epileptic patients in Shambler and Hopkins's study may be strongly characterized as actions that would fall into this category; it was an effort to avoid the effects of this category that drove individuals with epilepsy to modify their behavior to avoid at all cost portrayal as "being epileptic" (Scambler and Hopkins 1986).

In another study with HIV individuals, researchers tested whether the general public's attitudes were as hostile towards HIV-positive individuals (Green 1995). In a study of 300 men and women in England, Green tested whether public opinion of HIV-positive individuals was as stigmatizing as HIV-positive individuals felt it was. She found that non-HIV individuals were less stigmatizing in their attitudes than HIV-positive individuals expected. Additionally, she found that both HIV-positive and non-HIV respondents expected the generalized other to have a high level of stigma towards HIV-positive individuals (Green 1995). This is an interesting example of the effects of felt stigma; on an individual level, non-HIV individuals report relatively liberal attitudes towards HIV-positive individuals, yet also expect others to stigmatize. Thus, despite potentially never being stigmatized for their disease, HIV-positive individuals come to expect stigma towards their condition and act accordingly.

Because of the pervasive and well-documented presence of stigma towards being obese, it may be that overweight and obese individuals avoid situations in which masking would be impossible. Specifically, overweight and obese individuals may avoid interacting with physicians that present stigmatized attitudes, speech, emotions, or aspects of care. Additionally, it may be that the expectation of stigma from medical practitioners motivates obese individuals to avoid the interactions when possible. Within this context, felt stigma may be seen as an identity maintenance process. Thus, a brief discussion of identity control theory and its application to stigma and identity maintenance is relevant.

**Identity and Obesity Stigma**

A summative definition of an identity can be described as "the answers we give to the question 'who am I'." (Stryker and Burke 2000) (Stets and Burke 2000).

A foundational premises identity theory is that social stressors may induce a process of identity reformation. Stress or stressors refer to "environmental, social or internal demands that require the individual to readjust her usual behavior patterns" (Kiecolt 1994; Thoits 1995). Thoits argues that social distress is a key ingredient in identity reformation (Thoits 1995). Stressors lead to feelings in the actor of alienation, disaffection, estrangement, and similar emotions (Burke 1991). These emotions are also commonly associated with low self-esteem and perceived discrimination (Carr and Friedman 2005), which are frequently associated with obesity. Distress can be alleviated through a number of means, such as modifying his or her portrayal of the identity (e.g. their behavior) to account for the discrepancy. Scambler and Hopkins demonstrate that the anticipation of discrimination can cause distress for individuals with salient negative identities, which actors may attempt to relieve through avoidance behavior and masking (Scambler and Hopkins 1986).

However, there has been some suggestion that negative role-identities may be unsustainable. Hoelter (1983) finds that the saliency of role identities becomes more prominent as the actor receives positive feedback from the social context. He also suggests that, as it is an inherent desire for humans to feel good about themselves (an assumption which identity theory is effectively based upon), it would be natural for an identity that an actor judges to be negative or maladaptive to have less saliency for the actor (Hoelter 1983).

Hoelter's argument assumes that an actor has the option of reducing the saliency of an identity in the first place; yet some characteristics such as gender and race cannot be easily discarded. Research on the connection between negative identity stigmas and genital herpes indicates that such identities do exist and have a significant effect on the day-to-day behaviors of social actors (Craft, 1987). Craft argues that while stigmatized identities might not gain saliency in the same sense that positive identities do (through social ratification via. role-behavior), they may achieve saliency through directing behaviors towards denying the identity association. Effectively, rather than the salience of a negative identity being ratified through behaviors to socially confirm the identity, salience is established and maintained through social behavior to *deny* the identity, which nevertheless solidifies the role for the actor (Craft, 1987; Scambler and Hopkins 1986) .

Stigma acts as a social process that conveys culturally defined expectations and values towards specific roles and role-behavior (Granberg 2011). The 'anticipation of discrimination' mechanism that drives felt stigma may increase the saliency of the stigmatized identity by promoting avoidance behavior intended to hide associations with the stigmatized qualities, such as those seen with epilepsy and herpes (Craft, 1987; Scambler and Hopkins 1986).

In the case of obesity, concealing the identity is particularly hard as the identity itself is predicated on externally visible physical characteristics. Following Granberg's research on obesity stigmas, any change from properly fulfilling a negative or stigmatized identity would require a proactive self-definition change that either causes social confirmation of the identity change or else occurs in a socially supportive atmosphere for that change (Granberg 2011). It is because of this need for social confirmation that stigma in medical practice has such a potential to be damaging to patient weight loss as well as the likelihood to use medical services. As was indicated with epilepsy, stigmatizing attitudes and expressions from physicians may constitute official labeling for that patient as belonging to the stigmatized group (Scambler and Hopkins 1986). Additionally, an inability to conceal being obese could be a factor in leading obese individuals to engage in avoidance behavior as a response to felt stigma.

The current study will primarily focus on the effects of social variables of gender, age, body mass, and socioeconomic status on the likelihood to use routine medical services. In the case of discrimination in medical practice, felt stigma has the potential to affect a person's willingness to seek care or listen to medical advice, which has direct and obvious consequences on the overall health of overweight and obese individuals. In order to better understand how body mass, social variables, and felt stigma may interact, a better understanding of how discrimination is related to these variables will be explored.

**Weight Discrimination in Medical Practice**

Carr and Friedman (2005) examine the extent to which obese individuals report instances of perceived discrimination using the MIDUS I. They extend the body of literature on obesity stigmatization at the time by disaggregating the obesity classification and examining underweight, normal, overweight, and obese respondents as separate categories. Within obesity, Carr and Friedman distinguish between categories of obesity: obesity I is characterized as persons with a BMI of 30-34, and class II/III individuals who have a BMI of 35 or above. This is an important distinction because of the previously discussed observed nature of obesity; individuals must be able to notice you are obese in order to discriminate against you, which is much easier to do with higher levels of obesity. However, they only applied this methodology to the MIDUS I data, so change over time was not assessed.

Carr and Friedman (2005) find that, while controlling for gender, race (black or white), marital status, education, and self-rated health, obese I and II/III categories report discrimination based off of weight; however, only obese categories II/III reported discrimination from health care (Carr and Friedman 2005). Obese II/III respondents were nearly three times as likely as normal weight respondents to report that they have been denied or received inferior medical care. They examined whether these relationships are mediated or moderated by gender, age, or socioeconomic status.

Hunte and Williams (2009) find that perceived discrimination can lead to increases in obesity in and of itself. Using the Chicago Community Adult Health survey, they find that ethnic white groups who perceive discrimination have a higher likelihood of increasing on abdominal fat retention leading to obesity (Hunte and Williams 2009). Work by Schafer and Ferraro also comment on trends that suggest a causal connection between discrimination and increase in obesity due to the relationship between discrimination and lowered self-confidence, which produces stress eating and other maladaptive behaviors (Schafer and Ferraro 2011). Research by Farrow and Tarrant corroborates Shafer and Ferraro's findings. In a study of 197 graduate students at Keele University, they found that experiences of weight-based discrimination lead to emotional eating and negative body images. This effect was stronger for women than men but remained constant when gender and age were controlled (Farrow and Tarrant 2009).

Ward et al. (2009) found in a qualitative study examining interactions between African Americans and primary care medical professionals that doctor behavior may be seen as discriminatory and become counterproductive to patient weight loss; these behaviors may be seen as discriminatory regardless of the doctor's intent but still generate negative health consequences (Ward et al. 2009).

Many of Ward et al.'s findings support the framework of a stigmatized identity. While patients will self-identify as fat or obese, the use of these terms in discussions of their weight loss leads patients to feel discriminated against or persecuted due to their negative connotation. Ward et al. also found that the way a physician discussed weight loss was important to the likelihood that the patient would begin or continue weight loss efforts. Patients reported that the perception of disrespect, insincerity, or lack of emotion was often counterproductive in their weight loss efforts (Ward et al. 2009). Patients reported high levels of frustration and anger when physicians attempted to attribute weight to all complaints made by patients. Lastly, Ward et al. note that patients have mixed responses to scare tactics in conversations regarding weight loss. Some patients report scare tactics as positive motivation while others report it as unnecessary and demoralizing, and ultimately counterproductive.

Ward et al.'s findings suggest that perceived discrimination, intended or otherwise, have direct consequences for patient weight loss efforts. Equally important is that their findings suggest that perceptions of physician discrimination, intimidation, or stigma affirmation affect the overall patient-physician relationship, which obviously has the potential to negatively impact the patient's health outcomes. While this study is small and may have issues generalizing its results, it is one of few qualitative studies that examine patient-physician relationship with regard to stigma and weight discrimination.

Sutin and Terracciano reach similar findings. In a 2013 study using the Health and Retirement Study (HRS) they find that individuals who were not obese that reported weight discrimination were 2.5 times more likely to be obese at follow up than those who did not report weight discrimination (Sutin and Terracciano 2013). Interestingly, this effect was only true for weight discrimination; gender or age discrimination did not lead to increases in weight at follow up ((Sutin and Terracciano 2013). Weight discrimination was also correlated with weight retention. Those individuals who were obese and reported weight discrimination were three times more likely to remain obese than those who did not.

Research by Myers and Rosen (1999) also indicates that weight stigmatizing comments are made to patients (Myers and Rosen 1999). In a qualitative study of 146 obese patients individuals were asked whether they had undergone discrimination and the form of that discrimination. Additionally, they were asked in what ways they responded to stigmatizing events (Myers and Rosen 1999). A total of 182 stigmatizing experiences and 382 coping responses were reported. The researchers categorized the stigmatizing experiences into 11 categories and the coping responses into 21 categories (Myers and Rosen 1999).

Results indicate that obese individuals of higher BMIs experience more frequent stigmatizing events than do individuals with lower BMIs when controlling for age and socioeconomic status. Using a Likert scale ranging from '0=never' to '9=daily', more obese patients reported stigmatizing situations with an average of 2.16 times while less obese patients reported stigmatizing events with an average of 1.05, which corresponds to "several times in your life" to "once in your life" respectively (Myers and Rosen 1999).

Data on individual stigmatizing events suggests that respondents experience stigmatization from medical practice at least once in their life but close to several times in their lives (mean=1.88). Individual responses for coping mechanisms to stigmatizing situations indicate that obese individuals don't avoid or leave stigmatizing situations very often (m= 1.77). However, this item may not represent medical avoidance directly; the "avoid or leave situation" category was comprised of eight items. Two items are shown to be "I quit jobs where I encounter stigma or discrimination" and "I avoid looking in the mirror so that I don't have to think about my weight." (Myers and Rosen 1999).

Andreyeva, Puhl, and Brownell conducted a study examining changes in perceived discrimination between the MIDUS I and II datasets (Andreyeva et al. 2008). Their research aggregates all forms of discrimination into a single variable rather than examining discrimination in medical practice, employment, etc. separately. They find that rates of perceived discrimination have increased from 7.3% to 12.2% between 1995-1996 and 2004-2006. This paper examines weight and height discrimination over the two waves and treats each wave as its own cross-section. They examine the frequency of perceived weight/height discrimination within specific body mass categories, as well as the frequency of perceived discrimination among various demographics, and argue that the increase in perceived discrimination is unlikely to be due to increases in the number of obese people. By examining narrow segments of BMI, they find that only BMI ranges from 27-29 and 31-40 report significantly higher rates of weight/height discrimination.

This paper is critical in establishing a baseline for examining trends in weight/height discrimination over time. However, they do not fully examine the relationship between weight and height discrimination and how it is affected by respondent body mass and various demographic variables simultaneously. Equally important, Andreyeva et al. makes no comment upon how these trends in discrimination may be present in health care.

Lastly, a substantial body of research has been established that indicates the presence of weight bias in medical practice. In a comprehensive review of this literature Puhl and Heuer present evidence that physicians, nurses, medical students, and fitness professionals indicate a multitude of stigmatizing feelings towards overweight and obese patients (Puhl and Heuer 2009). For example, research indicates that in a study of 620 primary care physicians, 50% viewed obese patients as "awkward, unattractive, ugly, and noncompliant," and an additional third of the physicians surveyed indicated they thought obese patients were "weak-willed, sloppy, and lazy" (Foster et al. 2003; Puhl and Heuer 2009). Similarly, a study conducted by Schwartz et al. (2001) found that medical professionals exhibit significant anti-fat bias when questioned using the Implicit Associations Test (IAT) (Schwartz et al. 2003) . A study conducted by Teachman and Brownell (2001) found that, while somewhat less significant, medical professionals that specialized in working with overweight and obese patients carried the same stigmatizing attitudes towards overweight and obese individuals that the general public held (Puhl and Heuer 2009; Teachman et al. 2003).

Another study conducted an experimental study examining how physicians responded to six vignettes depicting patients who were identical except for gender and BMI. They found that as the patients got heavier physicians judged them to be "less healthy, worse at taking care of themselves, and less self-disciplined" (Hebl and Xu 2001; Puhl and Heuer 2009). Furthermore, in the same study Hebl and Xu found that as patient BMI increased, physicians reported liking their jobs less, having less patience, and less of a desire to help the patient (Hebl and Xu 2001).

Similar evidence of anti-fat bias and discrimination were presented for nurses, medical students, fitness professionals, and dietitians. These findings are highly suggestive of common and salient stigmatized feelings towards overweight and obese individuals. The consistency between the studies presented by Pulh and Heuer suggests that the medical community's attitudes towards obese individuals is consistent enough that it stands to reason that these feelings would be felt by their obese patients, leading to feelings of discrimination and mistreatment.

However, it may not be reasonable to anticipate the social expectations of weight to be homogeneous across all demographics or social categories. It is therefore prudent to examine how gender, age, and SES may be affected by medical discrimination differently.

**Gender and Weight Discrimination**

Obesity rates tend to increase equally between men and women (Wang and Beydoun 2007). To some degree, gender is highly central to the context of obesity perceptions as gender itself influences so many social norms and perceptions of physical appearance (Schieman, Pudrovska, and Eccles 2007). This being said, there are few studies that examines gendered differences in medical discrimination (Fikkan and Rothblum 2011).

One paper that does examine physician gendered attitudes of obese patients was conducted by Anderson et al. Using vignettes that depicted individuals with BMIs of 25, 28 and 32 (Anderson et al. 2001). Similar results were seen for individuals in the BMI 28 and 32 ranges. However, for the vignettes of the 25 range, intervention methods were more commonly suggested to women, while men were more commonly instructed to accept their weight (Anderson et al. 2001).

There have been a number of studies that look at gendered discrimination more generally. Teachman (2001) shows that anti-fat bias is pervasive throughout western culture. They also find that this bias is stronger than other stigmatized groups including race, age and gender (Teachman et al. 2003).

One area in which obesity discrimination may be clearly seen is in the effects obesity discrimination has on dating. Obese women in particular are found to experience negative effects from their weight in dating. A recent experimental study by Smith et al. tested what associations subjects had with keyword descriptors of female body types

(Puhl and Heuer 2009). Smith et al. showed individuals multiple pictures and asked respondents to rate descriptions of various women (Smith et al. 2007) .

They found that large-sized descriptors of the body, such as “obese,” “overweight,” and “fat,” received more negative evaluations of the target by both women and men compared to the control conditions. Descriptors such as an objective weight or a more neutral descriptor (such as full-figured) were seen much more positively (Puhl and Heuer 2009; Smith et al. 2007). Another example of the negative aspects of obesity descriptors may be research that indicates men were less likely to respond to a personal advertisement in which a female was described as obese than they were a female who was described as having a history of drug problems (Puhl and Heuer 2009; Smith et al. 2007). While these results are separate from a medical context of perceived discrimination, they indicate generalized gendered bias towards obesity that is important to consider.

Other research has indicated more specific health and gender distinctions. In a 10-year longitudinal study, Schafer and Ferraro (2011) examine the extent to which perceived-weight discrimination and weight stigma affect mental and physical health. They find that people are likely to perceive themselves as heavier if they have experienced weight discrimination, regardless of their actual weight status (Schafer and Ferraro 2011). Additionally, there was a strong increase in risk for feeling overweight if the respondent was female and had reported perceived discrimination.

While Schafer and Ferraro use both MIDUS I and II they did not analyze trends in changes of perceived discrimination between the years. They focus on changes in functional disability by individuals that reported instances of perceived discrimination in wave I. Additionally, while they examine weight discrimination's effect on health they do not specifically consider weight discrimination in medical practice.

Hebl, Xu, and Mason (2003) examine patient perceptions of physician care by gender and find that there are some unexpected interactions between weight and gendered effects on patient perceptions of care. They find in a survey of 125 patients in Texas Medical Care in Houston, Texas that overweight men do not report a lower quality of care than do non-overweight men. However, overweight women do report a significantly lower level of quality of care than do non-overweight women (Hebl, Xu, and Mason 2003). When assessing the length of care Hebl et al. found that overweight women do not report physicians spending shorter times on their care than do non-overweight women, but overweight men do report shorter care times than do non-overweight men (Hebl et al. 2003). Male overweight patients also reported that their physicians spend less time talking to them about weight concerns than did female overweight patients. This study is small, considering a small sample size of patients at one hospital. However, it highlights trends that may be present on a larger scale. Its findings regarding the gendered nature of physician intervention should be taken into account.

Schieman et al. present data from a study untaken in the Washington DC-Maryland area comprised of 1,164 individuals aged 65 and older (Schieman et al. 2007). Schieman et al. consider what modifying effects gender, race, and socioeconomic status might have on the relationship between self-perceived weight status and actual BMI. They find that BMI has a suppressing effect on the significance of gender and race on perceptions of appropriate weight. When controlling for actual body mass index, gender, and socioeconomic status (SES), female respondents are significantly more likely to perceive being overweight and obese than men (Schieman et al. 2007). Their data show that interactions between gender and SES are non-significant, nor are interactions between race and gender in predicting perceptions of weight.

This study sheds significant light on the interplay between SES, race, and gender on perceptions of body weight, but it is lacking in several significant areas. Firstly, there is no actual analysis of discrimination, nor of interaction with medical practice. The paper is valuable for its analysis of gender, but the context of Schieman et al should not be misunderstood. Secondly, the age brackets for their research are narrowly focused to persons over 65. Lastly, the generalizability of the study may be in question as its respondent pool is restricted to the Washington D.C area and two close counties in Maryland.

**Age and Weight Discrimination**

Age is a complicated variable to account for in obesity studies. Not only are there many socio-cultural values attributed to age categories, there are many significant biological consequences of age. Additionally, age discrimination in medical practice is its own concern that presents its own difficulties without the added difficulties of age specific obesity discrimination (Williams 2009). Unfortunately, while obesity rates tend to peak between ages 50 and 59, and then decrease in higher age brackets, research has indicated a change in this trend. In 2005 19.5% of persons over age 65 were obese, which increased from 12% in 1990 (Schieman et al. 2007). Other reports indicate that between 2003 and 2004 31% of individuals over the age of 60 are obese according to NHANES data (Harrington and Lee-Chiong 2009). Given this we may expect age and body mass to have significant interactions.

Despite this rising rate of obesity amongst older persons, it appears that there is a tendency towards lower rates of perceived discrimination (Carr and Friedman 2005). Age has been found to be inversely related to reports of discrimination (Carr and Friedman 2005), which may be due to a generational effect where older respondents are either unaware of discrimination or unwilling to report discrimination (Carr and Friedman 2005). Andreyeva, Puhl, and Brownell found that reports of discrimination increased for all age groups except the elderly (respondents between 64-74) (Andreyeva et al. 2008) which seems to corroborate research by Carr and Friedman.

While age was not the focus of their research, Carr, Jaffe, and Friedman examined age as a demographic component in an examination of race, class, and gender and obesity discrimination using the MIDUS 1995 data (Carr et al. 2008). Their research indicates that age may play a significant role in stigmatizing and discriminatory experiences. Results indicate that increased age may lead to less perceived discrimination for acts that involve harassing and teasing and being treated as if their character is flawed (Carr et al. 2008). However, there was no significant age difference for perceived discrimination concerning being treated without respect (Carr et al. 2008). This being said, the weight of such findings should be considered carefully since their study was not focused on age. These findings remain consistent with research by Carr and Friedman as well as

Andreyeva et al. However, it is unclear what effect these results may have on subjective health and one's likelihood of using medical care.

Research on subjective health measures indicates that for lower body masses, older and younger men have roughly the same level of subjective health ratings. As body mass increases older men have significantly lower subjective health ratings (Seidell et al. 1986). However, for younger males subjective health increased as body mass increased. For females, older respondents indicated lower levels of subjective health than younger women at normal body mass levels. As body mass increased, subjective health decreased for younger women, but did not significantly change for older women (Seidell et al. 1986).

**Socioeconomic Status and Weight Discrimination**

Understanding the socioeconomics of obesity is important to both our overall understanding in the phenomena of obesity as well as explaining trends in perceived discrimination. Socioeconomic status (measured by income, education, and occupation) has frequently been found to be a moderately predictive indicator of risk to obesity (Goodman 2008; Zhang and Wang 2004). Similarly, it is also moderately correlated to health outcomes. However, the measure of status results in wide variations as to how strong socioeconomic status is related to rates of obesity. Occupation tends to be strongly correlated with obesity, while education as a measure of status yields weaker correlations and income yields weaker associations still (Goodman 2008). Education in particular has decreased over time as a predictor of obesity, especially for women (Zhang and Wang 2004), but it may still have impacts on health.

Subjective social status is also an important predictor of obesity. Higher subjective status tends to be associated with lower rates of obesity. In this, controlling for race is an important factor. For example, young black women have little to no subjective status correlation with obesity while young white women have very strong correlations between subjective status and obesity (Goodman 2008). Goodman suggests this may be due to a difference in how obesity is viewed; within the black community obesity is less stigmatized than in white and Hispanic communities (Goodman 2008).

However, there has been little research done on the association of socioeconomic status and obesity discrimination in medicine. More extensive research has been published on the associations of obesity and socioeconomic status as well as the impact socioeconomic status has on individual weight perceptions. Due to the lack of research examining the impact socioeconomic status may have on perceptions of obesity discrimination within medical practice, I will discuss the relevant aspects of the topic as a whole. One such study conducted by Schieman, Pudrovska, and Eccles examines the relationship between socioeconomic status, age, and race on the accuracy of self-perceived weight.

Schieman, Pudrovska, and Eccles collected 1,164 in-person interviews assessing individual perceptions of weight, actual BMI, race, and gender of persons 65 years and older in the District of Columbia. Their research suggests that socioeconomic status may play a significant role in framing individual perceptions (Schieman et al. 2007). They found that self-perception of weight status varied strongly with respondent gender and socioeconomic status (Schieman et al. 2007). Without controlling for body mass index, it appeared that there was no significant trend between socioeconomic status and perceptions of weight. However, controlling for actual BMI, strong relationships between socioeconomic status and likelihood to feel one was obese were discovered (Schieman et al. 2007). While their research is only marginally relevant to the current study, it does highlight the importance of accounting for socioeconomic status as it influences self-perceptions and a potential for interaction between actual BMI and socioeconomic status.

A study by Baum and Ford (2004) demonstrates an interesting dynamic between obesity and earned wages over time. Using the National Longitudinal Survey of Youth (NLSY) they examine the earned wages of obese and none obese men and women between the years of1981 and 1998 (Baum and Ford 2004). They find that obese men and women consistently earn less than non-obese men and women throughout the first two decades of their careers. Furthermore, they find that being overweight is not correlated with a wage reduction for men while it is for women (Baum and Ford 2004). Other research by Cawley corroborates findings by Baum and Ford. Cawley also uses NLSY and finds that an increase of 64 pounds from the mean weight for white females results in a 9 per cent decrease in wages (Cawley and Levy 2014).

Puhl and Heur's (2009) study reviewing the stigma of obesity does not directly address socioeconomic status and the discrimination of the obese in medicine, but they do discuss trends in weight-based discrimination in employment and wages. Their review of the literature indicates a strong body of evidence that obese individuals experience job discrimination, weight stigma from co-workers and colleagues, and employers (Puhl and Heuer 2009). Such stigma has been found to manifest itself in obese individuals not being hired for jobs, not receiving promotions, and instances of wrongful termination (Puhl and Heuer 2009).

These findings are significant to this study because they indicate that one's socioeconomic status may be affected by one's weight, since employment and income are factors that affect socioeconomic status. However, Pulh and Heuer's study on obese discrimination in medical practice does not present any evidence that a patient's socioeconomic status was taken into account.

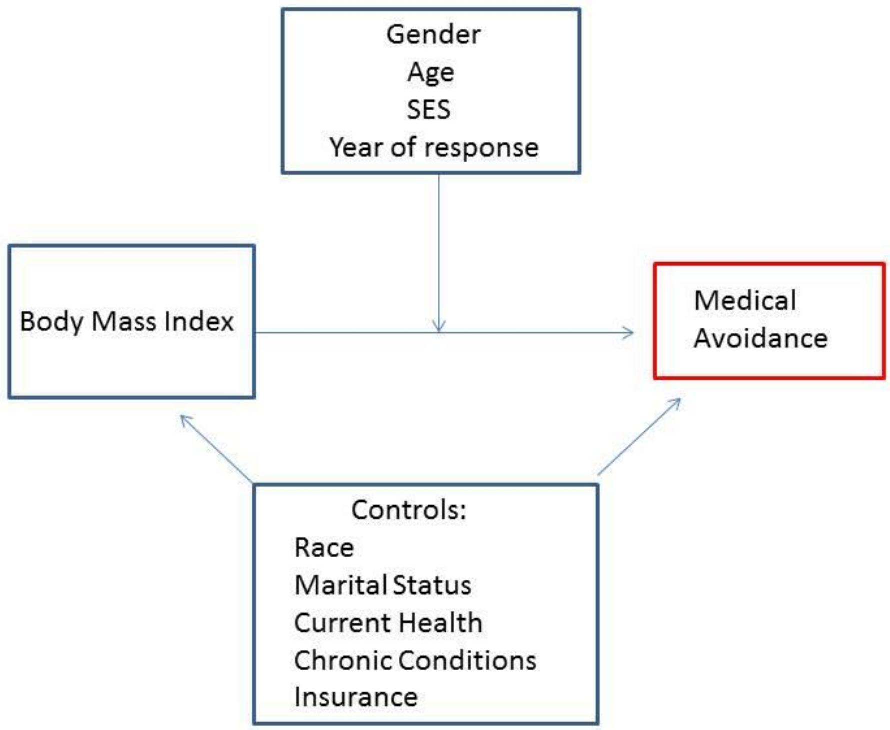
Carr and Friedman observe that obese individuals are more likely to be female, black, and less educated (Carr and Friedman 2005), which are traits that are highly associated with a higher likelihood of reporting perceived discrimination, as well as traits common to a lower socioeconomic. However, there is no report in their work of how these factors may affect medical discrimination in particular.

Another study examined socioeconomic status and its effects on perceived interpersonal mistreatment varied by socioeconomic status and body mass (Carr et al. 2008). Their study finds that socioeconomic status does have an effect on an individual's likelihood of perceiving mistreatment. Using the 1995 MIDUS data, they find that individuals in white-collar positions who are obese are more likely to feel mistreated than those in other occupations. While this study does not specifically examine medical discrimination, the association between occupational status and likelihood of mistreatment is important.

Overall, the literature indicates that there is a significant trend in medical practice towards stigmatized emotions and attitudes towards obese patients. There is clear evidence that the emotions and practices of medical personnel are frequently stigmatizing towards obese patients, and this behavior results in negative outcomes for patient health and patient-physician relationship. These conditions seem operationally ideal for Deacon's model. Thus, conditions seem ideal for felt stigma to be a driving force behind whether individuals choose to visit medical facilities and the frequency with which they do so.

What is less clear is the extent to which social variables affect the relationship between body mass index and the perception of discrimination, and thus the operational validity of felt stigma upon the individual's decision making. The literature indicates that perceived discrimination is gendered to a moderate degree and older individuals are less likely to report incidences of discrimination. There is also a moderate amount of evidence that socioeconomic status affects not only perceptions of discrimination, but perceptions of the respondent's weight as a whole. However, research on these interactions is lacking on the whole. This study intends to add to the existing literature by examining how body mass may interact with gender, age, and socioeconomic status to affect an individual's likelihood to use medical services.

Figure 1: Theoretical Model of BMI and Medical Avoidance Effect Pathways




This model represents the theoretical relationships between our variables. Body Mass Index impacts the likelihood of medical avoidance because of the mechanisms of felt stigma. Gender, age, and socio-economic status will have a moderating effect on the relationship between BMI and medical avoidance. Finally, the year of response, measured as respondents in MIDUS I or MIDUSII, may have a moderating effect on medical avoidance as it affects both likelihood of being obese and general perceptions of obesity in society. Additionally, we purpose that there may be a statistical interaction between BMI, gender, age, and SES, which will be tested.

## HYPOTHESES

### Hypothesis 1

The literature suggests that medical practice harbors an environment pervasive with stigmatizing attitudes towards the obese. In other avenues of social interaction, such as employment or social interactions, these same stigmatizing attitudes and beliefs are associated with frequent reports of discrimination. Yet in medical practice there is a conspicuous lack of perceived discrimination reported from patients. However, based on the concepts of felt stigma, it may be that individuals who are most likely to be the targets of weight discrimination engage in avoidance behavior to reduce the disruptive influence their weight has on their lives. Due to the nature of the patient-physician relationship, it would be expected that felt stigma would lead individuals who feared being discriminated against to partake in medical care. Therefore, we hypothesize that:

*H1: As body mass increases, frequency of medical use decreases.*

### Hypothesis 2

The literature suggests that men and women are affected by obesity stigma differently. Women are more likely in the workplace or in social interactions to report having been discriminated against because of their weight (Puhl and Heuer 2009). Findings by Andreyeva et al. (2008) indicate that the rate of perceived discrimination has increased between 1995 and 2005 at a much higher rate for women than men. Women are more likely at all socioeconomic levels to perceive themselves as overweight (Schieman et al. 2007) and research by Schafer and Ferraro (2011) indicates that perceived discrimination significantly increases the risk of feeling overweight for women. Finally, research by Ward et al. (2009) indicates that obese patients have a strong objection to the use of the term obese, and that detachment and emotionless approaches to weight loss from physicians were often counterproductive to their weight loss efforts. Considering that research by Hebl, Xu, and Mason (2003) indicates that obese men spend less time talking to physcians about weight concerns than do obese women; it may be that the counterproductive effects due to physcian appraoch choices reported by Ward et al. more strongly affect women on the whole than they do men. Thus, because felt stigma suggests that the anticipation of discrimination or stigma towards an individual motivates individuals to avoid circumstances that will lead to that discrimination, we hypothesize that:

*H2: The effect of body mass on the frequency of medical use is stronger for women than men.*

**Hypothesis 3**

It is unclear what effects the potential for older age groups to be unaware of discrimination (Carr and Friedman 2005) may have on any felt stigma. As age and increased BMI are both strong correlates for increased need of healthcare services, it seems natural that older individuals would use medical services more frequently. Andreyeva et al. (2008) reports that the rates of perceived discrimination due to weight increased between 1995 and 2005 for all age categories except ages 65-74. If this is the case, we would expect to see older persons with higher body mass indices use medical services without regard to the potential for discrimination due to weight, while younger individuals of the same body mass may be more cognizant or aware of the potential for discrimination. An awareness of the potential to be stigmatized due to a quality an individual possesses is an essential aspect of the felt stigma model. Without this awareness, an individual would have no compunction to avoid potentially stigmatizing situations. Therefore, it is hypothesized that:

*H3: The effect of body mass on medical use is weaker as age increases.*

**Hypothesis 4**

Literature suggests that socioeconomic status will have an effect on how overweight and obese people are viewed as well as the opportunities they are able to pursue. Socioeconomic status can have a modifying effect on how individuals view their obesity; people with higher socioeconomic statuses are more likely to view themselves as overweight when controlling for actual body mass (Schieman et al. 2007). Additionally, individuals in higher socioeconomic statuses are more likely to perceive mistreatment (Carr et al. 2008). Both of these factors are likely to lead to avoidance behavior. Therefore, we hypothesize that:

*H4: The effect of body mass on frequency of medial use increases as socioeconomic status increases.*

**Hypothesis 5**

Lastly, we consider the difference in responses from 1995 and 2005. In the intervening years, the rate of obesity has increased significantly (Glickman et al. 2012), affecting all age brackets, including the elderly (Schieman et al. 2007). While obesity rates increased significantly between 1995 and 2005, instances of perceived discrimination have increased nearly 5% in the intervening years (Andreyeva et al. 2008). Additionally, Andreyeva et al. (2008) show that it is unlikely that increases in perceived discrimination are due to increases in the number of obese people. Felt stigma is predicated on a quality being generally understood as stigmatized and the anticipation that interaction involving the stigmatized quality will result in discrimination towards them. Thus, given these trends, we hypothesize that:

*H5: The relationship between body mass index and frequency of medical use is stronger in 2005 than it was in 1995.*

# METHODS

## Data

The data come from two waves of the Midlife in the U.S: A National Longitudinal Survey of Health & Well-being (MIDUS). The first wave of MIDUS was conducted by the McAurthor Foundation Research Network in 1995-1996. The aim of the survey was to collect data on the role of behavioral, psychological, and social factors that lead to age-related variations in health and well-being. The MIDUS was groundbreaking in many respects, one of which is its multi-disciplinary data collection scheme that allows for psychological factors to be readily applied to sociological and epidemiological questions (MIDUS, 2011). It also used both Random Digit Dialing phone survey (RDD) and mailed self-administered questionnaires (SAQ's) to collect data. The survey is nationally representative of the United States population of middle aged adults between the ages of 20 and 72, with a total of 7,108 respondents.

Based on the success from the first wave of MIDUS, a second wave was conducted and funded through the Institute on Aging in 2004-2006 using the participants from MIDUS I. MIDUS II was expanded to incorporate biological and neurological assessments. The MIDUS now represents a longitudinal assessment of social-psychological factors and their effects on health in the US adult population between the ages of 28 and 84. The total sample size for the MIDUS II is 4,963. This represents a 70% longitudinal response rate. Out of the 2,145 missing participants between the two waves, 405 cases were confirmed deceased and an additional 67 cases were suspected deceased but were unable to be confirmed through mortality interview. Additional reasons for non-response were refusal (832 cases), unable to interview (120 cases) and a non-working number (721). Adjusting for mortality the longitudinal response rate is 75%.

Because the dataset is longitudinal, the age range of respondents differs between the MIDUS I and II. The MIDUS I data comprises respondents between the ages of 20 and 72 and the MIDUS II dataset comprises respondents between the ages of 28 and 84. In order to normalize the data due to the aging intrinsic to longitudinal samples, the data need to be restricted in order to assure that the results are comparable for the two time periods. As the age range for the first wave was 20-75 and the age range for the second wave was 28-84, the data for this study are restricted to respondents aged 28-75. Deletion of cases with respondent ages below 28 results in a loss of 411 cases for MIDUS I. Deletion of cases with respondent ages over 75 for MIDUS II result in a loss of 358 cases.

The data also contained an oversampling of urban populations (658 respondents in MIDUS 1 and 489 respondents in MIDUS II) as well as the inclusion of sibling pairs (869 pairs in MIDUS I and 733 pairs in MIDUS II) and twin-pairs (1,764 in respondents in MIDUS I and 1484 respondents in MIDUS II). The inclusion of these respondents in the data may alter the generalizability of the results. MIDUS provides weighting for both datasets but this was not utilized in this analysis and thus the results only reflect the relationships in the sample.

A filter was constructed to exclude those cases in each dataset that are missing values for any of the variables under consideration. Because medical use questions were only asked in in-person interviews, 783 of the 6638 wave 1 respondents and 640 of the

4604 wave 2 respondents who were interviewed only by phone were dropped from the analysis. In addition, in wave 1, 168 cases were dropped because they were missing on medical use, 208 were missing household income, 254 cases were dropped due to missing BMIs, 12 cases were dropped due to missing education level, 2 cases were dropped due to missing marital status, 17 cases were dropped for missing chronic conditions, 139 were missing race, 30 were missing self-rated present health, and 126 were missing any insurance. The final sample size for 1995 is 5,230. In wave 2, 1065 cases were dropped because they were missing on medical use, 1109 were missing household income, 1150 missing BMI, 7 were missing education, 6 were missing marital status, 922 were missing from chronic conditions, 0 were missing from race, and 992 were missing for any insurance. The final sample size for 2005 is 3,253.

## Measures

***Dependent variable***

The dependent variable for this study is medical avoidance.  Because there is no question in MIDUS that asked directly on medical avoidance, I use medical use as a proxy measure of this concept and it is measured with the MIDUS question,

"Please indicate how many times you saw each of the following doctors in the past 12 months about your physical health. Include only visits regarding your own physical health, not visits when you took someone else to be examined.  - A DOCTOR, HOSPITAL OR CLINIC FOR A ROUTINE PHYSICAL CHECK-UP OR GYNECOLOGICAL EXAM."

This variable gives a frequency for routine medical use that may be the best proxy for medical avoidance in this survey. MIDUS asked respondents this question to capture a number of medical use trends including emergency care and physiological care. I use routine care rather than psychological care or urgent care because the need for psychological care and urgent care are arguably motivated by non-normal needs that could mask any effect felt stigma may have on medical use. Routine care may be delayed or avoided more readily than psychological or urgent care, and thus may be a better measure of medical avoidance. Since this variable is highly skewed, it will be top coded to range from 0 to 12 as medical use of an average of once a month for routine care may be considered frequent enough to be unencumbered by a fear of stigma.

## Independent Variables

### *Body Mass*

The primary independent variable is body mass index, which was calculated by using respondent height and weight. The respondents were asked about their weight and height. The formula for calculating BMI is as follows:

$$\frac{t(lbs)x \qquad 3)}{t(in)x}$$

This creates a continuous variable that will be categorized into an ordinal variable based on standard BMI categories. BMIs of less than 20 are classified as underweight, BMI between 20 and 24.9 are classified as normal, and BMIs between 25-29.9 are classified as overweight. BMI of 30-34.9 are classified as obese I, a BMI of 35-40 is classified as obese II and a BMI>40 is classified as obese III. Carr and Friedman (2005) combined the categories for obese II and III due to low response rates for obese III (Carr and Fridman 2005). However, Carr and Friedman only used MIDUS I data in their analyses. Because we are interested in medical use for each category and whether this usage has changed between 1995 and 2005 these categories will be separated. However, attention is given in analysis to the effects of small sample sizes. Body mass index is dummy-coded with Normal BMI as the comparison group.

***Age***

As previously noted, the age of respondent is truncated for both 1995 and 2005 data to include only respondents between 28 and 75. Age is measured as years since birth.

***Gender***

The gender variable has two categories “Male” and “Female.” It is dummy-coded to have 1 for female and 0 for male. Female is the comparison group.

***Socioeconomic Status***

Socioeconomic status is measured with education and household income. Goodman (2009) shows that occupation has the strongest correlation with obesity among socioeconomic status measures, and is also correlated strongly with health. However, in the MIDUS occupation was only collected for the 1995 survey. While education level is the stronger individual predictor of obesity (Goodman, 2009), income may affect insurance and other contributors to health access that may augment routine use of medical care more strongly.

Education is an ordinal variable ranging between “1” for no education and “12” for PhD MD, etc. Because of the large number of choices and increments between levels of education are relatively uniform in both time and degree achievement, this variable is treated as ratio as well.

Research exploring the interaction of public health and socioeconomic status predictors indicate that income is the most relevant predictor of mortality (Daly et al. 2002). Ideally, measures of wealth would be calculated, which would account for total income, savings, and material investment. However, while wealth data were collected for the 2005 MIDUS survey, they were not collected for the 1995 MIDUS. This study is not specifically looking at mortality, but the theoretical associations between healthcare and income are strong enough to warrant a focus on income as an indicator of socioeconomic status. Rather than using individual income, household income will be used as it better accounts for potential resources available to non-working individuals.

Household income in MIDUS I and MIDUS II is a categorical variable ranging from "Less than zero (loss)" to "$300,000 or more." It was constructed by combining responses for "personal income in the past 12 months" for the respondent, his or her spouse, and all others in the household, as well as income from social security and other government assistance from the respondent and their spouse, and "all other income in the past 12 months." Income is categorized in scaled increments. Given the number of income categories, income will be recoded into a singular median value for the given brackets as well as in units of $1000, and treated as a ratio variable.

***Year of Interview***

Rather than using "year of response" as a variable, I run analysis of BMI, Age, Gender, and SES separately for 1995 and 2005. The benefit to this approach is that it allows us to treat each MIDUS wave as a cross-sectional data set and test for change over time. The data will be filtered by "Year of Response" so that analysis may be run separately for respondents in 1995 and 2005.

**Controls**

Many of the control variables for this analysis are the same as those from Carr and Friedman (2005). Demographic variables have been well shown to have significant effects on rates of obesity and medical discrimination (Andreyeva et al. 2008; Carr and Friedman 2005).

***Race***

Race has been shown in multiple studies to be a factor not only for the risk of obesity (Goodman 2002) but also be a factor in perceived discrimination (Andreyeva et al. 2008). Due to this, we will control for self-identified racial categories. Race was recoded into three response categories of white, black, and other, combining multiple racial categories into 'other' due to low rates of identification for multiple non-black, non-white categories. The race variable will be dummy-coded with 'white' as the comparison group.

***Marital Status***

Marital status will be controlled for as it may have an effect on health access and household income. It was recoded to combine divorced and separated categories due to low response rates for both categories. Marital status will be dummy-coded with married as the comparison group.

### *Current Health*

Health is controlled for mainly due to its potential relevance to both BMI and frequency of medical care. Logically, individuals who rate their health as lower may be more motivated to partake in routine medical care more frequently than those that rate their health higher. Self-rated health is measured by a survey question asking, "Using a scale from 0 to 10 where 0 means 'the worst possible health' and 10 means 'the best possible health,' how would you rate your health these days?" This variable is treated as an interval/ratio variable in the analysis.

### *Chronic Conditions*

Another important control for this study is chronic conditions. Disabilities have been positively associated with BMI and perceived discrimination. Obese people are at greater risk for developing a myriad of chronic conditions than non-obese people (Glickman et al. 2012) and people with more chronic conditions are more likely to use medical services (CDC 2009), and thus chronic conditions could potentially suppress the hypothesized negative relationship between BMI and medical use.

The 'Chronic Conditions' variable is a constructed item present in both MIDUS I and MIDUS II data. Respondents were asked, "In the past 12 months have you experienced or been treated for any of the following?" It is constructed from a battery of questions that assess the number of chronic conditions respondents report having. While this data is self-reported, research indicates that self-reported chronic conditions tend to be accurate regardless of the gender and age of the respondent (Martin et al. 2000). The chronic conditions variable in MIDUS is a ratio variable ranging from 0 to 27; however, since this variable is highly skewed, it will be top coded so frequency values range from ‘0 chronic conditions’ to ‘14 chronic conditions’ for both 1995 and 2005.

***Insurance Coverage***

Both MIDUS I and MIDUS II contain a battery of questions that ask each respondent what type of medical insurance they are covered by, if any. The types of medical insurance included in this battery are: insured through private insurer, through employer, through spouses employer, through a union, through a spouses union, through Medicare, through Medicaid, and through the government or military.

A dummy variable called “any insurance” was coded 1 if a respondent indicated they were medically insured through any of the included sources, and 0 if respondents indicated that there were not medically insured by any of the included sources. ‘No insurance’ is the reference group.

**Analysis Scheme**

First, descriptive statistics are calculated for each wave and t-test and Chi-square test are used to test whether they have changed significantly between 1995 and 2005. Ordinary least squares regression will be utilized for analysis. The analysis scheme is run separately for both 1995 and 2005, which allows us to assess differences in the interactions in both years. A battery of five nested models for each year is ideal as it best allows for the observation of suppression effects. Model one addresses research question and hypothesis one. It will include only BMI and the controls in order to assess whether frequency of medical use varies by BMI. Model two adds gender, age, education and income to see whether the BMI effect holds once these variables are controlled for.

Models three through five assess whether there are any interactions between BMI and age, gender, and SES, that modifies frequency of medical use and test our interaction hypotheses for each variable. For model three, an interaction term for BMI and gender is added to the terms present in model two. This tests whether the association between BMI and the frequency of medical use depends on the gender of the respondent. Model four assesses the interaction between BMI and age and is added to the terms present in model three. This model tests whether the association of BMI and the frequency of medical use is dependent upon age. Lastly, model five assesses the interaction effect of BMI and SES on frequency of medical use. Two separate sets of interaction terms for SES will be constructed; one for BMI and education and one for BMI and income. This tests whether the association between BMI and the frequency of medical use depends on the education and income levels of the respondent.

In order to test whether the effect of BMI changed over time, a combined dataset is also created and survey year is treated as a dummy variable and interactions between year and BMI categories are created.

## RESULTS

Descriptive statistics for each study measure are shown in Table 1 for 1995 and 2005. Descriptive trends indicate relatively constant distribution in both 1995 and 2005. Medical use increased slightly from 1.4 in 1995 to 1.7 in 2005 with equal variance between the two waves.

BMI distributions in 2005 are slightly higher than in 1995, which is to be expected given documented increases in overweight and obesity. Gender distribution increased slightly between the two years. Female response rate increased from 51.9 percent in 1995 to 54.8 in 2005 while male response rate fell from 48.1 in 1995 to 45.2 in 2005. This decrease may be for a few reasons. Firstly, there may have been a selection bias due to nonresponse between the two response years. However, because the maximum age is 72, it may be that the missing responses due to age were disproportionately male.

Measures of socioeconomic status were also relatively constant between the two waves. Mean level of education increased between the two waves from 6.9 to 7.4. The standard deviation of education also decreased from 2.5 to .5, indicating less variance in level of education in 2005. Income is more consistent between waves than education, with mean income increasing from $73,900 in 1995 to $75,200 in 2005. The standard deviation dropped from 62 to 60, suggesting slightly less variation in income among respondents in 2005.

Among control measures, rates of insurance should be of particular note. Insurance rates are high in both years, with 91.5 percent of respondents in 1995 and 94.3 percent indicating they are covered by some type of insurance. Respondents with no insurance decreased from 8.5 percent in 1995 to 5.7 percent in 2005. The high rates of insurance coverage may be due to the measure including coverage from government insurance such as Medicare and Medicaid, as well as military insurance.

### 1995 Regression Results

Results from regression analysis for 1995 indicate a varying, inconsistent relationship between BMI and the frequency of medical use and are depicted in Table 2. Model 1 indicates that in the categories overweight, with a coefficient of -.098, and obese III, with a coefficient of .614, varied significantly in their frequency of medical use ($p<.1$ and $p<.001$ respectively) when controlling for race, marital status, number of chronic conditions, having insurance, and self-rated health. People who are overweight are .098 lower on frequency of medical use than normal weight respondents while respondents in obese III category are .614 higher on frequency of medical use than normal weight respondents. Underweight respondents and respondents in obese I and II categories are not significantly different from normal weight respondents in frequency of medical use. However, when controlling for gender in Model 2, this relationship appears spurious for the overweight category because it is no longer significant, while remaining consistent

**Table 1: Discriptive Statistics for Variables in MIDUS 1995 and 2005**

| | MIDUS 1995 n=5230 | | | MIDUS 2005 n=3240 | | |
|---|---|---|---|---|---|---|
| | **Frequency (Percent)** | **Min (Max)** | **Mean (SD)** | **Frequency (Percent)** | **Min (Max)** | **Mean(SD)** |
| **Medical Use*** ** | - | 0 (12) | 1.4 (1.93) | - | 0 (12) | 1.7(1.93) |
| **Body Mass Index (BMI)*** ** | | | | | | |
| Underweight | 302 (5.8) | - | - | 110 (3.4) | - | - |
| Normal Weight | 1842 (35.2) | - | - | 926 (28.5) | - | - |
| Overweight | 1973 (37.7) | - | - | 1265 (39.0) | - | - |
| Obese I | 747 (14.3) | - | - | 584 (18.0) | - | - |
| Obese II | 248 (4.7) | - | - | 233 (7.2) | - | - |
| Obese III | 118 (2.3) | - | - | 125 (3.9) | - | - |
| **Gender *** | | | | | | |
| Male | 2633 (47.6) | - | - | 1465 (45.2) | - | - |
| Female | 2897 (52.4) | - | - | 1775 (54.8) | - | - |
| **Age*** ** | - | 28 (75) | 47.74 (12.2) | - | 30 (75) | 54 (10.8) |
| **SES** | | | | | | |
| Education | - | 1 (12) | 6.91 (2.5) | - | 1 (12) | 7.42 (2.51) |
| Household Income (Units = $1000) | - | 0 (300) | 73.9 (62.0) | - | 0 (300) | 75.9 (60.7) |
| **Marital Status*** ** | | | | | | |
| Married | 3625 (69.3) | - | - | 2364 (73.0) | | - |
| Divorced/Separated | 820 (15.7) | - | - | 478 (14.8) | | - |
| Widowed | 260 (5.0) | - | - | 147 (4.5) | | - |
| Never married | 525 (10.0) | - | - | 251 (7.7) | | - |
| **Race*** | | | | | | |
| White | 4811 (92.0) | - | - | 2989 (92.3) | - | - |
| Black | 230 (4.4) | - | - | 115 (3.5) | - | - |
| Other | 189 (3.6) | - | - | 136 (4.2) | - | - |
| **Self-rated Present Health** | - | 0 (10) | 7.5 (1.6) | - | 0 (10) | 7.45 (1.53) |
| **Any Insurance** | | | | | | |
| No insurance | 445 (8.5) | - | - | 185 (5.7) | - | - |
| Has Insurance | 4785 (91.5) | - | - | 3055 (94.3) | - | - |
| **Chronic Disorders** | - | 0 (14) | 2.4 (2.4) | - | 0 (14) | 2.3 (2.30) |

Significant difference by year: * P<.1 ** P<.05 *** P<.01

## Table 2: Frequency of Routine Care by BMI, Gender, Age, and SES: Results for 1995

| | | Model | | | |
|---|---|---|---|---|---|
| Variable | Model 1 | Model 2† | Model 3 | Model 4 | Model 5† |
| **BMI** (Ref=Normal) | | | | | |
| Underweight | 0.168 | 0.133 | 0.018 | 0.244 | 0.652 |
| Overweight | -0.098* | -0.049 | -0.003 | -0.260 | -0.228 |
| Obese I | -0.039 | -0.030 | 0.026 | -0.392 | 0.013 |
| Obese II | 0.117 | 0.081 | -0.089 | -0.621 | -1.535** |
| Obese III | 0.614*** | 0.577*** | 0.505 | -0.842 | 0.933 |
| **Gender** (Ref=Male) | | 0.350*** | 0.386*** | 0.389*** | 0.398*** |
| **Age** | | 0.015*** | 0.015*** | 0.011*** | 0.012*** |
| **Socioeconomic Status** | | | | | |
| Education | | -0.027** | -0.027** | -0.027** | -0.024 |
| Income | | 0.000 | 0.000 | 0.000 | 0.001 |
| **Interactions** | | | | | |
| Underweight-Gender | | | 0.127 | 0.101 | 0.135 |
| Overweight-Gender | | | -0.098 | -0.102 | -0.105 |
| Obese I-Gender | | | -0.112 | -0.121 | -0.132 |
| Obese II-Gender | | | 0.261 | 0.253 | 0.277 |
| Obese III-Gender | | | 0.092 | 0.077 | -0.154 |
| Underweight-Age | | | | -0.005 | -0.007 |
| Overweight-Age | | | | 0.005 | 0.005 |
| Obese I-Age | | | | 0.009 | 0.008 |
| Obese II-Age | | | | 0.011 | 0.015 |
| Obese III-Age | | | | 0.029* | 0.023 |
| Underweight-Education | | | | | -0.027 |
| Overweight-Education | | | | | 0.004 |
| Obese I-Education | | | | | -0.053 |
| Obese II-Education | | | | | 0.139** |
| Obese III-Education | | | | | -0.113 |
| Underweight-Income | | | | | -.002 |
| Overweight-Income | | | | | -.001 |
| Obese I-Income | | | | | 0.000 |
| Obese II-Income | | | | | -0.002 |
| Obese III-Income | | | | | -0.011*** |
| **Controls** | | | | | |
| **Race** (Ref=White) | | | | | |
| Black | 0.707*** | 0.697*** | 0.705*** | 0.705*** | 0.733*** |
| Other | 0.439*** | 0.512*** | 0.518*** | 0.527*** | 0.520*** |
| **Marital Status** (Ref=Married) | | | | | |
| Divorced/Separated | -0.072 | -0.095 | -0.095 | -0.094 | -0.098 |
| Widowed | 0.190 | -0.067*** | -0.067*** | -0.065*** | -0.070** |
| Never Married | -0.173*** | -0.049 | -0.049 | -0.049 | -0.059 |
| **Chronic Conditions** | 0.193*** | 0.168*** | 0.168*** | 0.167*** | 0.165*** |
| **Any Insurance** (Ref=No Insurance) | 0.480*** | 0.454*** | 0.456*** | 0.457*** | 0.469*** |
| **Self-Rated Current Health** | -0.124*** | -0.133*** | 0.000*** | -0.134*** | -0.135*** |
| **($r^2$), intercept** | (0.11) 1.431 | (0.127) 0.851 | (0.128) 0.831 | (0.128) 1.021 | (0.13) 0.929 |

* <.1 ** P<.05 ***P<.01 p<.1 ††=$R^2$ p<.05 †††=$R^2$ p<.01

for obese III ($p<.001$). The magnitude, direction, and significance of obese III remain relatively unchanged through Model 5.

Model 2 adds the gender, age, education, and income variables. The effect of gender in Model 2 is significant ($p<.001$) and positive indicating that when controlling for race, marital status, chronic conditions, insurance, self-rated health, and body mass index women in 1995 went to medical professionals for routine care .350 times more frequently than  men. Age is significant ($p<.01$) and positive, indicating one year increase in age is associated with a .015 increases in frequency of medical use. Income in is not significantly associated with medical use. When controlling for other variables respondents with one point higher education level report .027 lower in frequency of routine care ($p<.01$).

Models 3, 4, and 5 assess whether the association between BMI and medical use varies by gender, age and SES. Model 3 adds interaction terms of BMI and gender. Regression results indicate that there is no significant interaction between BMI and gender for 1995. Model 4 assesses the interaction terms for BMI and age. Only the interaction term for the obese III category shows significant difference from normal weight individuals. While the difference between individuals who fall into the obese III category and normal weight individuals is -.842, as age increases by one year, we see this difference reduce by .029 ($p<.1$).

Model 5 assesses interactions between BMI and socioeconomic status, measured with both education and income. For education, only the interaction between obese II and education is significant. When controlling for other variables, the difference between obese II individuals and normal weight individual is negative. But for individuals in the obese II range, the difference between obese II individual and normal weight individuals in medical use become less negative. The only term that is significant for BMI-income interactions was for the Obese III category. The obese III results indicate that as income increases the difference between individuals in the obese III category and normal weight individuals in medical use becomes less positive ($p<.01$) when controlling for, education, gender, race, marital status, chronic conditions, insurance, and self-rated health.

**2005 Regression Results**

Regression analysis for 2005 shows a more consistent relationship between body mass and frequency of medical use. Regression results for 2005 are presented in Table 3. Model 1 indicates that the categories of obese I and obese III are significantly different from normal weight individuals in the frequency of routine medical care. People with a body mass in the obese I range use routine medical care .184 more often than do normal weight individuals, and people in the obese III category use routine medical care .432 more than normal weight individuals ($p<.1$ and $p<.05$ respectively) when controlling for race, marital status, chronic c conditions, insurance, and self-rated current health.

Model 2 added gender, age, and SES to the equation. Results indicate that women use routine medical care .325 times more often than men ($p<.01$). Additionally, when controlling for gender, age and SES, the overweight category became significant ($p<.1$) and the obese I category increased in magnitude and significance. This indicates that when controlling

**Table 3: Frequency of Routine Care by BMI, Gender, Age, and SES: Results for 2005**

| | | Model | | | |
|---|---|---|---|---|---|
| **Variable** | Model 1 | Model 2† | Model 3 | Model 4†† | Model 5 |
| **BMI** (Ref=Normal) | | | | | |
| Underweight | 0.126 | 0.142 | 1.265 | 0.962 | 1.051 |
| Overweight | 0.101 | 0.142* | 0.294 | 0.037 | 0.495 |
| Obese I | 0.184* | 0.224** | 0.335 | -.675 | -0.071 |
| Obese II | 0.184 | 0.100 | 0.570 | -.742* | -0.505 |
| Obese III | 0.184** | 0.461*** | 1.018 | 0.761 | 1.382 |
| **Gender** (Ref=Male) | | 0.325*** | 0.554*** | 0.549*** | 0.575*** |
| **Age** | | 0.026*** | 0.026*** | 0.019*** | 0.021*** |
| **Socioeconomic Status** | | | | | |
| Education | | -0.029* | -0.026 | -0.026 | -0.002 |
| Income | | 0.001 | 0.001 | 0.001 | 0.001 |
| **Interactions** | | | | | |
| Underweight-Gender | | | -1.320** | -1.31** | -1.367** |
| Overweight-Gender | | | -0.233 | -0.228 | -0.263 |
| Obese I-Gender | | | -0.152 | -0.140 | -0.186 |
| Obese II-Gender | | | -0.755*** | -0.759*** | -0.813*** |
| Obese III-Gender | | | -0.836** | -0.830** | -0.871** |
| Underweight-Age | | | | 0.005 | 0.003 |
| Overweight-Age | | | | 0.005 | 0.003 |
| Obese I-Age | | | | 0.019** | 0.017* |
| Obese II-Age | | | | 0.024* | 0.022* |
| Obese III-Age | | | | 0.005 | -0.001 |
| Underweight-Education | | | | | 0.019 |
| Overweight-Education | | | | | -0.037 |
| Obese I-Education | | | | | -0.072* |
| Obese II-Education | | | | | 0.013 |
| Obese III-Education | | | | | 0.014 |
| Underweight-Income | | | | | -0.001 |
| Overweight-Income | | | | | -0.001 |
| Obese I-Income | | | | | 0.000 |
| Obese II-Income | | | | | -0.002 |
| Obese III-Income | | | | | -0.005 |
| **Control** | | | | | |
| **Race** (Ref=White) | | | | | |
| Black | 0.688*** | 0.676*** | 0.678*** | 0.690*** | 0.679*** |
| Other | -0.053 | 0.015 | 0.004 | 0.016 | 0.023 |
| **Marital Status** (Ref=Married) | | | | | |
| Divorced/Separated | -0.006 | -0.036 | -0.032 | -0.031 | -0.038 |
| Widowed | 0.316** | -0.022 | -0.018 | -0.014 | -0.009 |
| Never Married | -0.126 | 0.020 | 0.022 | 0.018 | 0.002 |
| **Chronic Conditions** | 0.172*** | 0.134*** | 0.137*** | 0.134*** | 0.134*** |
| **Any Insurance** (Ref=No Insurance) | 0.652*** | 0.571*** | 0.558*** | 0.559*** | 0.551*** |
| **Self-Rated Current Health** | -0.131*** | -0.145*** | -0.146*** | -0.148*** | -0.148*** |
| **($r^2$), intercept** | (0.091) 1.547 | (0.116) 0.367 | (0.334) 0.198 | (0.122) 0.597 | (0.123) 0.285 |

*P<.1 ** P<.05 ***P<.01 †$R^2$ p<.1 ††=$R^2$ p<.05 †††=$R^2$ p<.01

for gender, age, and SES overweight individuals frequented routine medical care .142 times more than individuals in normal BMI ranges and people in the obese I category used routine medical care .224 times more than individuals in normal BMI ranges. The coefficients for obese III also increases from .184 in model 1 to .461 and increased in significance to $p<.01$. Model 2 results also indicate that for each year increase in a person's age, they use routine medical care .026 times more ($p<.01$). Income was non-significant in model 2 and remains non-significant throughout the analysis. Education results indicate that for each unit of education attainment there is a .029 decrease in the use of routine medical care ($p<.1$).

Models 3 through 5 test the interaction terms for obesity and age, gender, income and education respectively. Model 3 assesses the interaction variables for gender. While for men, all BMI coefficients are positive, but none of them are significant, meaning BMI is not associated with medical use for men. For women, the difference in medical use tend to be negative between women in underweight, obese II and III categories and normal weight women. Underweight women use routine medical care .055 times less than individuals in the normal weight category. Women in the obese II category use routine medical care .185 times less than individuals in the normal weight category. Results also indicate that women in the obese III category use routine medical care .182 times more than normal weight individuals. This is a strong reduction in the magnitude of the difference in usage patterns between obese III and normal weight individuals which may indicate that a significant portion of this difference is due to gender.

Model 4 tests the effects of the obesity-age interaction term on the use of routine medical care. Results indicate that for obese I respondents, as respondents increase in age their use of routine medical care increases ($p<.05$). At age 0 obese I respondents use medical care .675 less than normal weight individuals. However, as age increases medical care use increases by .019. For obesity II, as respondents increase in age by one year their use of routine medical care increases .024 ($p<.1$). At age 0 obese II respondents use medical care .742 times less compared to individuals in the normal weight category ($p<.1$). However, as age increases by one year medical use difference between the two groups increases by .024 times. No other body mass categories show significant difference in health care usage patterns as age increases.

Model 5 assess the interaction between body mass index and the measures of socioeconomic index, education and income. Results indicate that there are no significant interactions between BMI and income. Similarly, the only obese I interaction term for education shows significant health usage patterns compared to normal weight individuals. While for individuals in normal weight, education is negative but not significant, for individuals in the obese I category, each unit of education corresponds with a .074 reduction in the frequency of routine care.

**Changes Between Years**

Results from the between-year change regression analysis are depicted in Table 5. Model 1 results indicate that respondents in 2005 used routine medical care .286 more than respondents in 1995 ($p<.01$). Model 2 results indicate that associations between overweight and obese and medical use frequency are significantly different for 2005 respondents. While overweight respondents in 1995 uses medical care .298 times less than normal weight respondents, overweight respondents in 2005 use routine medical care .096 times less than respondents in 1995, suggesting that the difference between overweight and normal weight medical use is smaller in 2005 than in 1995.

## Table 5: Frequency of Routine Care by BMI, Year, Gender, Age, and SES

| | Model | | |
|---|---|---|---|
| **Variable** | Model 1††† | Model 2 | Model 3††† |
| BMI (Ref=Normal) | | | |
| Underweight | 0.165* | 0.208 | 0.189 |
| Overweight | -0.023 | -0.298** | -0.264* |
| Obese I | 0.048 | -0.255 | -0.288 |
| Obese II | 0.090 | 0.173 | 0.095 |
| Obese III | 0.500*** | 0.836** | 0.766*** |
| Year (Ref = 1995) | 0.286*** | 0.182** | 0.055 |
| Underweight-Year | | -0.040 | -0.038 |
| Overweight-Year | | 0.202** | 0.210** |
| Obese I-Year | | 0.218* | 0.254** |
| Obese II-Year | | -0.045 | -0.002 |
| Obese III-Year Interaction | | -0.209 | -0.139 |
| **Gend**er (Ref=Male) | | | 0.336*** |
| **Age** | | | 0.019*** |
| **Socioeconomic Status** | | | |
| Education | | | -0.028*** |
| Income | | | 0.000 |
| **Control** | | | |
| **Race** (Ref=White) | | | |
| Black | 0.696*** | 0.696*** | 0.690*** |
| Other | 0.204** | 0.239** | 0.315*** |
| **Marital Status** (Ref=Married) | | | |
| Divorced/Separated | -0.044 | -0.068 | -0.069 |
| Widowed | 0.1.67* | 0.169* | 0.178* |
| Never Married | -0.148** | -0.150** | -0.015 |
| **Chronic Conditions** | 0.186*** | 0.185*** | 0.157*** |
| **Any Insurance** (Ref=No Insurance) | 0.538*** | 0.538*** | 0.494*** |
| **Self-Rated Current Health** | -0.127*** | -0.127*** | -0.137*** |
| **($r^2$), b** | (.106)1.092 | (.107)1.230 | (.126)0.652 |

*P<.1 **P<.05 ***P<.01 †=$R^2$ P<.1 ††=$R^2$ P<.05 †††=$R^2$ P<.01

Obese 1 respondents use medical care .255 less than normal weight respondents in 1995 though it is not significant, obese 1 respondents in 2005 use routine medical care .037 times less than normal weight respondents.

There are also significant differences for obese III respondents in model 2. For 1995, compared to normal weight individuals respondents in the obese 3 category used routine medical care .836 times more than normal weight ($p<.01$). However, the interaction term is not significant; the difference between obese III and normal weight individuals in medical use does not significantly change between 1995 and 2005.

Model 3 adds gender, age, education, and income to test whether year effects are explained by social variables. When controlling for these variables, differences and directionality between 1995 and 2005 remain significant for overweight and obese I categories. When controlling for social variables the difference between overweight respondents and normal weight respondents in 1995 reduced to .264 ($P<.1$). Additionally, the difference between the two groups reduced to .054 ($P<.05$). The coefficient for the obese 1 interaction term remains effectively the same, increasing from .218 to .254 (indicating a decrease in the difference between the two groups) but increases in significance, from $P<.1$ to $P<.05$.

## Discussion

Regression analysis offers mixed confirmation of research hypotheses. Models 3 through 5 directly test hypotheses with the exception of the first hypothesis which is tested in Model 1 and Model 2. Hypotheses 1 stated that as body mass increases, frequency of medical use will decrease. Regression results indicate that this relationship is not directly linear. For 1995, results indicate that overweight and obese III categories differ significantly with normal weight medical usage patterns, while other groups do not. However, overweight individuals use medical services less ($p<=.1$) than normal weight individuals while obese III individuals use medical services more. For 2005, overweight respondents in model one do not differ significantly from normal weight individuals, but obese I and obese III ($p<.1$ and $p<.05$ respectively) do. Additionally, the effects for 2005 are positive, suggesting that obese respondents use medical services more frequently than normal weight respondents. Thus, hypothesis 1 is not supported by the results for either 1995 or 2005.

When controlling for gender in model 2, the significance for overweight individuals in 1995 was proven spurious. However, for 2005 it appears that gender was suppressing the relationship between body mass and the frequency of medical use for overweight respondents, and partially suppressing the significance of usage patterns for obese III respondents. Yet both these effects are still positive and indicate that increases in BMI generally lead to increases in routine care compared to normal BMI.

Hypothesis 2 stated that the effect of body mass on the frequency of medical use would be stronger for women than men. Results indicated that in 1995 that women used routine medical care much more frequently than men did and that gender had no effect on the usage patterns of individuals in specific body mass categories.

For 2005 data, we see that weights effects on frequency of medical use are gender dependent for underweight, obese II and obese III categories. However, the coefficients are not consistent in direction. While underweight and obese II categories consistently indicate that women in those categories use routine medical care much less than men do, it also appears that women in the obese III category use routine care more than normal weight people. While this pattern does not wholly fulfill the expectations of a felt stigma model, this trend may be due to medical necessity rather than a break in the model. Because we are using a proxy for medical avoidance, it is possible that the health conditions present for individuals in the obese III are drastic enough to overpower any expectation of stigma.

Because underweight behaviors were not directly addressed in the literature, it is difficult to extrapolate whether this usage pattern may be due to felt stigma towards women who are underweight than men. Eating disorders that might reduce weight, such as bulimia or anorexia, are more common for women than men (Striegel-Moore and Rosselli 2009). It may be true that women below normal BMI may avoid routine medical care due to a felt stigma that their weight would lead to assumptions of these behaviors. However, these behaviors have not been the focus of this study and thus extrapolation should be done with caution.

The small sample size for the obese III category may have increased type 1 error and indicates a stronger trend in medical use for obese III respondents compared to normal than actually exists. While this remains a concern, the benefits of maintaining the obesity III category separate outweigh the potential concerns. This being said, the strength of the association between obese III and the frequency of medical use should be taken conservatively given the lower sample size. Despite these concerns, there is evidence that gendered medical use patterns have developed for certain levels of BMI between 1995 and 2005, and that for certain categories women use routine medical care less than men. Thus, our hypothesis is partially supported.

Hypothesis 3 stated that the effect of body mass on medical use will be weaker as age increases since literature indicated that older individuals were less likely to report perceived discrimination. For 1995, as age increased respondents use routine medical service more frequently ($p<.01$). However, this age difference was only significant for one BMI category. Only obese III differed significantly from normal weight respondents for the BMI-age interaction term, but it indicated that as age increase medical use also increased. The age at which medical use for obese III respondents becomes more than the medical use of normal weight individuals is 30. The indication that these age differences are only true for obese III would seem to suggest that only younger individuals with the most extreme BMI. While extrapolation should be done cautiously, because 1995 data was truncated at 28, the age model may be extendable to individuals from 20 to 27.

For 2005 we see significant age differences in two body mass categories. There are no longer age differences in the obese III category, but obese II and obese I indicate that as age increases medical use also increases. For obese I, individuals younger than 37 use routine medical services less than normal weight individuals. Respondents 37 and older use routine medical services more than normal weight individuals. For obese II, respondents younger than 31 use medical services less than normal weight individuals. Respondents older than 31 use medical services more than normal weight individuals. Thus, we conclude that hypothesis 3 was partially supported. While there is no age difference in usage patterns for overweight or obese III categories, the trends in obese I and II indicates an age differential in medical use that may be due to felt stigma.

Hypothesis 4 stated that the effect of body mass on frequency of medical use would increase as socioeconomic status increases. Socioeconomic status was tested using both income and education. Model 5 added interaction terms for income and education. For 1995, the only income interaction term that was significant was obese III ($p<=.01$). Results indicate obese III respondents with lower incomes tend to use routine medical care less compared to normal weight individuals of the same income, but as income increases medical frequency for obese III respondents also increases. Obese III respondents with a household income of $85,000 or more begin to use medical services more than normal weight individuals. For 2005, there are no significant income differences in routine medical use BMI categories.

Education indicates a much different trend for SES effects on medical use. In 1995, there are no significant effects for BMI-education. However, for 2005 results indicate significant differences in medical frequency for obese II respondents. For obese II respondents, each unit increase in educational attainment is associated with a .143 reduction in the use of routine medical care compare to normal weight individuals.

These data suggest a complex relationship between socioeconomic status and medical use. While in 1995 income affected the most extreme levels of obesity, and in fact increased medical usage patterns compared to normal weight individuals, this trend is not present in 2005. However, the opposite trend is true for education. While there were no significant educational interactions in 1995, results suggest that for obese II categories increases in education negatively impacts medical use. The overall trend seems to suggest however that routine medical care use in higher levels of SES is reducing over time for certain categories of BMI. Additionally, if there were no SES effect for medical frequency, we might expect that income in particular would lead to increased levels routine medical care. Thus, it may be that BMI does reduce medical frequency in higher education brackets to levels not dissimilar of normal weight individuals. If this is the case, it may in fact be a sign of felt stigma effects for income. Given the general trend and the results from the 2005 education interaction, it appears that hypothesis 4 is partially supported.

Lastly, Hypothesis 5 stated that the relationship between body mass index and frequency of medical use will be stronger in 2005 than it is in 1995. It is not supported as the data show that the difference between overweight and normal weight individuals and between obese 1 and normal weight individual decreased from 1995 to 2005. Obese III respondents in 1995 used medical services significantly more than normal weight individuals, but usage patterns do not significantly differ for obese III respondents in 2005 and 1995.

## Limitations

There are a number of limitations to this study. Firstly, our actual observance of medical avoidance is limited to what trends we may find using a proxy variable because there are no direct measures of medical avoidance. However, because BMI is associated with increased illness, the true relationship between BMI and medical avoidance is inadequately captured by the use of medical frequency. For example, it may be possible that instances of "no difference" between normal weight medical use and the various levels of obesity usage are in fact indicators of medical avoidance. Medically we would expect obese individuals in increasing weight categories to have consistently higher rates of medical use given the number of chronic conditions associated with obesity. The apparent lack of this difference in medical use could be an indicator that increases in body mass are associated with medical service avoidance, but still increases their use so it roughly equates that of a non-obese individual.

To a certain extent, this limitation also exists for findings relating to female medical frequency. Previous literature has suggested females generally use medical services more than males do. It also indicates that women tend to engage in body masking and avoidance then men do (Striegel-Moore and Rosselli 2009); thus, instances where female medical use is the same as male medical use for a given BMI range may in fact be indicators of an association between BMI and female medical avoidance. However, given the study design, it is difficult to discern whether this is the case.

The theory of "distance to death" may be a limitation for the study design particularly this study focuses on variables highly correlated to mortality. "Distance to death" has been shown to be a significant explanatory factor for changes in cognitive function, most notably with verbal meaning and reasoning ability (Bosworth and Schaie 1999), which may partially explain variation in answers in longitudinal samples. Because of the 10 year gap between waves in MIDUS, we cannot discount that the effect of distance to death may impact any observed variation between responses as it may affect cognitive ability.

An additional limitation may be an attrition effect between the two years that either creates or magnifies between-year differences. While much of this attrition is explainable and only mortality may be specifically related to BMI, we cannot discount that year-specific significance may be due to the large differences in sample size, or that there is not a selection effect that exists between the two years. In part, this may be corrected for by examining the demographic distribution of respondents that remained in the study between the two years using the case IDs provided in MIDUS; however, this analysis was outside the scope of the current thesis so has not been conducted.

A final limitation that must be considered is that these analyses used BMI for a measure of body fat, rather than other potentially more accurate measures. BMI was used because it is one of the most accessible and widely used measures of body fat. However, particularly for ageing individuals, measures of BMI have known inaccuracies due to muscle density and loss of bone mass. This may lead assumptions of behavior due to BMI to be misleading.

## Future Work and Conclusion

Overall, the association between medical frequency for routine care and body mass index is inconsistent. Income and education are less strong than would have been expected, but gender and age trends are both significant and conform to hypothesized relationships. While there is evidence that body mass has some effect on the frequency of care, the association varies in both direction and strength indicating that the relationship is non-linear. There is some evidence that certain categories of obesity are associated with lower levels of medical avoidance. Particularly for 1995, evidence for felt stigma in higher levels of socioeconomic status may be observed through income for obese III. This evidence suggests that as incomes rise, they differentially affect the respondent's likelihood to use medical services. However, these effects are weak for obese III and marginally stronger for obese II.

While felt-stigma would seem to be an appropriate explanation for the disjunction between a presence of high levels of stigma within the medical community and an absence of perceived stigma on the part of patients, the evidence suggests that this may not be the case. In most cases, BMI does not seem to be a significant factor in health usage patterns, and when it is a significant factor it tends to increase health usage as one would expect. However, this research may benefit from future research that may augment our understanding of the BMI-health usage relationship.

Firstly, gender interactions are an area where future research would be beneficial. The gendered relationship is non-significant for 1995, but becomes significant for certain BMI levels in 2005. Over the last 10 years, underweight and obese II women have begun to use routine medical care less than men where they previously showed no difference in usage patterns. One possible explanation for this is that the gendered-weight scheme may be entering a felt stigma relationship but the felt-stigma process is not so strong yet as to endues medical avoidance in obese I categories. While the increased usage of routine medical care among obese III respondents compared to normal weight respondents would seem to work against this explanation, it may be that the medical concerns of individuals within the obese III category overpower medical avoidance from felt stigma due to practical necessities.

Future work may clarify whether this is the case by better controlling for chronic conditions. While this research controls for the number of chronic conditions for each respondent, based on the logical premise that the more chronic conditions one has the more routine need they will have of medical services, a more targeted approach may yield different results. Specifically, future research should endeavor to control for those chronic conditions most relevant to obesity (e.g. diabetes, cardiovascular disease, etc.) to see whether this augments the relationship between BMI and medical frequency.

Lastly, it may be beneficial to examine how regionality affects these results. Particularly in light of the apparent gendered nature of the BMI-medical frequency relationship, the inclusion of geographic regionality could significantly augment results since felt-stigma is predicated on concepts of social expectation. Unfortunately, the public MIDUS data set does not include measure of location, or even urban or rural variables.

There a few theoretical implications of these results. This is the first known work that attempts to apply the concepts of felt stigma to a modular disease. Past research that applies felt stigma to medical circumstances used fixed diseases that one either has or does not have. While this may be a limiting factor in our results and lead to some ambiguity in the findings, the results show that stigmatized medical identities that are not static may result in differential behaviors based on the severity of the condition. If we consider the social purpose of stigma towards the obese as a reaction to "correct" the obesity problem, the application of felt stigma suggests that while shame from stigma may motivate some to avoid having those stigmatized qualities (e.g increased weight) to others with a more severe level of the condition it may induce behaviors that impede getting proper medical care.

The practical implications of this are mostly centered on medical services. While more research is needed to establish a stronger link to felt stigma and medical avoidance, some of these findings suggest that physicians should take extra care to connect with patients in higher levels of BMI and proactively engage in positive conversation regarding weight outcomes.

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