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# AN EXAMINATION OF ESTIMATED BMI AND PERCEIVED WELLNESS AMONG STUDENTS AT A MIDSIZED MIDWEST UNIVERSITY

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*Abstract: Health is complex and the perception of individual wellness can be influenced by various factors. Students at a Midwestern university estimated their BMI, completed the Perceived Wellness Survey, and had their BMI calculated. Measured BMI was significantly higher than estimated [ $F(2,155) = 62.03$ ,  $p = 0.001$ ]. Associations existed between the measured constructs of psychological ( $r = -0.231$ ;  $p = 0.004$ ), spiritual ( $r = 0.248$ ;  $p = 0.002$ ), and estimated BMI. Data indicates that perceived body composition is related to wellness. False perception of body composition could lead to wellness deficiencies.*

**Keywords:** BMI, Wellness, Health

## INTRODUCTION

Health is a broad term commonly associated with components of physical activity and nutrition. Health is defined as a state of complete physical, mental, and social well-being (Huber, Knottnerus, Green, Horst, Jadad, & Kromhout et al., 2011; Sartorius, 2006). Individuals often view health as the absence of an illness. However, health is multi-dimensional and not strictly dictated by the presence of a disease; it is centrally focused around overall well-being to create holistic equilibrium (Sartorius, 2006). Thus, health and well-being are sometimes used synonymously; however, each have distinct characteristics.

## Health and Wellness

Wellness, much like health, has many definitions and interpretations. Wellness is best described as being an ongoing, continuous process without an endpoint, and is described as a state when a person's awareness and understanding are in alignment with their values (Goss, Cuddihy, & Michaud-Tomson, 2010). Wellness is composed of dimensions that include physical, social, spiritual, intellectual, environmental, and emotional (Goss et al., 2010). These dimensions uniquely combine to encompass individual wellness. The dimensions of wellness include the ability to participate in physical activity and self-care, contribute to the environment and community, acquire beliefs and attitudes of nature, improve knowledge, and develop awareness of one's feelings (Goss et al., 2010). Health focuses on the physical state of the human body as well as the mental and social variables. Wellness is more broadly encom-

passing, as it includes aspects of the environment and occupation that can also greatly impact one's well-being. Health and wellness are equally important facets that influence quality of life.

## College Student Wellness

A student's experience in higher education is a time when they are trying to define themselves as an adult, transitioning from dependence on their parents to independent living (Parker, Summerfeldt, Hogan, & Majeski, 2004). This transition is accompanied by greater responsibility (Arnett, 2000; Dinger & Vesely, 2001). The problem is behaviors that impact health and wellness during college can have long-term negative effects (Centers for Disease Control and Prevention (CDC), 2009; Gordon-Larsen, Nelson, & Popkin, 2004). Balancing nutrition, physical activity, sleep, and stress without the direct guidance of parents or guardians can be challenging, which can significantly impact one's health and wellness (Hales, 2009).

While college students juggle more responsibilities, imbalances are more likely to be present, making them more susceptible to weight gain during the transition to young adulthood (Anderson, Shapiro, & Lundgren, 2003; Ferrara, 2009; Vella-Zarb & Elgar, 2009). The need to establish, maintain, and sustain academic motivation to complete schoolwork can potentially hinder college students health motivation. Roles and responsibilities associated with adulthood make college students prioritize tasks and unfortunately health and wellness is ignored, which can distort an individual's perception of overall health and

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wellness. Perception towards a healthy lifestyle is crucial because it can directly affect a student's wellness. Therefore, focusing on the dimensions of wellness is imperative to teaching students the type of balance necessary for life-long healthy living.

### **Body Composition**

Body mass index (BMI) is a universally accepted tool in assessing body composition and is one of the most popular tools to assess overweight and obese individuals (Stevens, Katz, & Huxley, 2010). This assessment requires simple measurements (height and weight), and is easy to calculate. The main assumption of BMI guidelines is that body mass is closely associated with body fatness (Gallager, Heymsfield, Moonseong, Jebb, Murgatroyd, & Sakamoto, 2000). BMI has tiers based on the calculated values ranging from underweight (BMI < 18.5 kg/m<sup>2</sup>) to obese (BMI > 30.0 kg/m<sup>2</sup>). Among women, BMI is strongly related to perceived health and wellness status; however, no research exists examining college students (Agrawal, Gupta, Mishra, & Agrawal, 2015). Body mass index is a user-friendly tool; however, BMI can be deceiving because some individuals can be overweight, yet not overfat, due to muscle mass (Gallager et al., 2000; Coleman & Loprinzi, 2016). Conversely, individuals can be overfat and not overweight, yet due to one's weight they perceive themselves as healthy.

Gregory, Blanck, Gillespie, Maynard, and Serdula (2008) reported men and women have skewed interpretations of their actual body weight and found that overweight and obese men and women tend to believe themselves to be at normal weight. Additionally, gender differences exist in perception of body weight versus actual values, with females tending to overestimate their body weight compared to males (Bish, Blanck, Serdula, Marcus, Kohl, & Khan, 2005; Haring, Montgomery, & Hardin, 2010).

An individual's accurate weight perception has been found to be positively related to wellness (Edwards, Pettingell, & Borowsky, 2010). Normal weight participants who reported participating in health-enhancing behaviors (nutrition and physical activity) were found to positively perceive their accurate weight (Edwards, Pettingell, & Borowsky, 2010). Further, individuals who are overweight are aware of the impact their body size has on behaviors relating to social reluctance, timidity, and low self-confidence (Pop, 2016). Therefore, BMI can promote an individual's view of wellness, or disguise it.

### **Perception of Wellness**

Perception of wellness includes an individual's beliefs of behaviors and how an individual maintains, sustains, or even ignores behavior changes. Perceptions can be derived from individual or social influences and can be influenced

by various ecological layers. However, colleges and universities serve as a unique setting to reach students and promote personal health due to the unhealthy behaviors college students partake in such as drinking, lack of physical activity, drug use, and high-risk sexual behavior (Dinger, Britain, & Hutchinson, 2014; Sepulveda, Carrobbles, Gandarrillas, Poveda, & Pastor, 2007).

Often, an individual's perception of wellness focuses around weight, yet weight can be a sensitive health topic. In many circumstances individuals are hesitant to confront their current body composition if actual composition does not match their perceived values. Weight perception is an individual's ability to correctly identify their weight in correlation to the BMI scale (Yang, Turk, Allison, James, & Chasens, 2014). Accurate weight perception has been linked to healthy behaviors for managing weight, but not all students who correctly perceive their body weight are participating in healthy behaviors (Wharton, Adams, & Hampl, 2008; Yang et al., 2014). Presumably, as college students take on new responsibilities, the demands of being a college student can outweigh personal health. The effects of unhealthy behaviors take time to evolve and the small incremental changes can easily be disguised; therefore, individuals may believe they are not susceptible to weight gain (Cohn, Macfarlane, Yanez, & Imai, 1995; Lipnickey, 1986; Newell-Winthrow, 1986). Students could perceive themselves as being normal weight and healthy, but their body composition might indicate contradicting results.

### **Systems Theory**

The Perceived Wellness Survey was established based on the Systems Theory. According to this theory, each part of a system is crucial towards the success of a larger system, and is also an important sub-element of that larger system (Adams, 1997). The smaller parts of the system (i.e., the dimensions of wellness) need to be balanced for the success of the larger system (i.e., overall wellness) (Adams, 1997). As mentioned previously, there are six dimensions of wellness (Goss et al., 2010). The largest sub-element of the Systems Theory is wellness and the theory explains that overall wellness is established with balance among the various sub-elements (psychological, emotional, social, physical, spiritual, & intellectual).

### **Purpose**

The objective of the study was to examine the relationships between BMI and perceived wellness. The overall impact of health perceptions is supported by researchers who have suggested that individual health perceptions are valid indicators of future health outcomes (Idler & Kasl, 1991). This information can provide valuable insight regarding the perception of body weight.

## METHODS

### Participants

Participants were recruited from a midsized Midwestern university in two separate buildings on multiple days in the fall (2016) and spring (2017). The targeted university has a student enrollment of 6,644 (undergraduate and graduate students). The target population was college students 19 years of age and older. A convenient sampling technique was used to recruit participation from students passing by the data collection research locations. The data collection locations were in buildings that are centrally located in the university and have the most student traffic. The data collection research locations included tables and chairs that were partitioned with privacy blinds. Privacy blinds provided a safe area for data collection. No one walking down the hall or within the building could see or have contact with participants as they completed the study.

### Instruments

**Estimated Body Mass Index.** Participants were provided a single question that asked them to identify how they perceived their BMI, per the BMI categories (underweight, normal weight, overweight, and obese). Participants were asked to circle the category they felt best portrayed their body weight.

**The Perceived Wellness Survey.** The Perceived Wellness Survey (PWS) was designed to give researchers insight about an individual's perceived wellness. The PWS assesses the six dimensions of health: physical, spiritual, emotional, social, psychological, and intellectual (Adams, 1997). The PWS has been used in various populations and found to be a valid tool to assess wellness (Adams, Beznar, Garner, & Woodruff, 1998). Sample items found in the PWS include examples such as "I believe there is a real purpose in my life," and "My friends will be there for me when I need help." There are an equal number of questions from each category that offer insight towards an individual's wellness. Each item is rated on a six-point Likert scale ranging from "very strongly disagree" to "very strongly agree." Each wellness dimension's rating was totaled and divided by six to establish construct weight in percentage. Reversed questions were adjusted and coded for analysis. The PWS data were scored by construct (psychological, emotional, social, physical, spiritual, & intellectual) and grouped together for a total PWS score.

**Body Mass Index (BMI).** Body mass index was calculated by obtaining each participant's height and weight. Prior to data collection, participants were instructed to remove their shoes and all excess items from their clothing. Height was collected using a height scale and recorded in centimeters. Weight was collected using a Befour professional precision scale (model #P3660055, serial #1311PSD17214, Saukville, WI) and was

recorded in kilograms. Height and weight protocols have been previously used and found to be a valid means of data collection (WHO, 1995). Individuals' BMI was calculated by trained research personnel. The equation used to calculate BMI was:  $\text{weight (kg)} / [\text{height (m)}]^2$ .

### Protocol

Consenting participants were given a research packet. The research packet included the (a) individual perceived BMI question and (b) PWS questionnaire. Participants were instructed to select the BMI category they felt best described their estimated BMI per the BMI categories, and then completed the PWS questionnaire. Upon completion of the survey, participants were objectively weighed and measured by researchers in order to calculate their actual BMI. Participants were entered into a random drawing for university apparel. Data were collected on different days and during different time blocks between 8:00am – 5:00pm. This study was approved by the host institution's Institutional Review Board (IRB).

### Data Analysis

Descriptive statistics were analyzed including group frequencies, group percentages, and construct ratings. Pearson correlations were used to analyze associations. Each of the perceived wellness constructs (psychological, emotional, social, physical, spiritual, and intellectual) were analyzed to determine if associations were present with estimated BMI. A regression analysis was used to describe the combined effect of the measureable constructs (psychological, emotional, social, physical, spiritual, & intellectual) on the outcome of interest (estimated BMI), as well as which construct(s) were most influential on estimated BMI. Data were deemed significant at 0.05.

## RESULTS

The current study (n = 156) revealed that roughly 40% of participants who had measured BMIs categorized as overweight/obese estimated their BMI to be normal (Table 1). A total of 9 participants estimated their BMI to be underweight (5.8%), 131 participants identified themselves as normal (84.0%), and 16 identified as being overweight/obese (10.3%) (Table 1). Measured BMI yielded 3 participants categorized to be underweight (1.9%), 90 participants categorized as normal (57.7%), and 63 participants categorized as overweight/obese (40.4%) (Table 1). Spirituality had the highest rating among the measured constructs with an average rating of 4.67 followed by Physical (4.56) and Social (4.47) (Table 2).

Pearson correlations were used to assess associations between the measured PWS constructs and estimated BMI. Significant correlations were revealed between estimated BMI and the con-

structs of psychological ( $r = -0.231$ ;  $p = 0.004$ ) and spiritual ( $r = -0.248$ ;  $p = 0.002$ ) (Table 3). A repeated measures analysis revealed that measured BMI was significantly higher than estimated BMI [ $F(2,155) = 62.03$ ,  $p = 0.001$ ] (Table 4). A regression analysis was conducted to measure the influence of the PWS constructs (psychological, emotional, social, physical, spiritual, & intellectual) on estimated BMI. The total regression model was significant, explaining 28.7% of total variance, [ $F(2,155) = 2.22$ ,  $p = 0.05$ ],  $R^2 = 0.287$ . Standardized coefficients indicate that spirituality ( $p = 0.05$ ) has a statistically significant effect on college student's ability to predict measured BMI, explaining 28.7% of variance (Table 5).

**DISCUSSION**

The purpose of the current study was to (a) compare individual's estimated BMI to measured BMI and (b) evaluate perceived wellness constructs in relation to estimated BMI. The novelty of the current study was that it sought to identify and connect wellness constructs to individual perception of health (BMI) among college students. Much debate exists around the use of BMI as an assessment tool; however, BMI still serves as a helpful tool to assess body composition (Dietz & Robinson, 1998; Garrow & Webster, 1984; Goulding, Gold, Cannan, Taylor, Williams, & Lewis-Barned,

1996; Himes, & Dietz, 1994; Keys, Fidanza, Karvonen, Kimura, & Taylor, 1972; Khosla, & Lowe, 1967; Pietrobelli, Faith, Allison, Gallagher, Chiu-mellow, & Heymsfield, 1998; Taylor, Gold, Manning, & Goulding, 1997; World Health Organization, 1995). BMI is one way to assess physical health and is an interesting variable because, to a certain extent, it can be seen with the naked eye as compared to other health and wellness variables such as spirituality and intelligence.

Individual perception is based on knowledge and self-awareness. Knowledge serves as the foundation of decision-making and has proven to be a valuable pillar for health educators for decades (Glanz, Rimer, & Viswanath, 2008). The more individuals know about their own health, the better they can evaluate themselves (McQueen, Kikbusch, Potvin, Pelikan, Balbo, & Abel, 2007; Sorenson, Van den Broucke, Fullam, Doyle, Pelikan, Slonska, & Brand, 2012). There is a correlation between knowledge of health habits and actual behavior (Dickson-Spillman & Siegrist, 2010). While health knowledge alone, such as knowledge of an individual's body composition, is not sufficient to facilitate behavior change (O'Brien & Davies, 2007; Stark, 2003), it is a necessary component to allow an individual to evaluate their overall health and has shown to increase their motivation to make healthier decisions (Nanda, Mohabbat, Nagaraju, Varayil, Ra-

**Table 1. Analysis of College Student's Estimate and Measured BMI**

|  | <u>n</u>             | <u>%</u> |                     |          |                   |
|--|----------------------|----------|---------------------|----------|-------------------|
| Participants                                   | 156                  |          |                     |          |                   |
| Female   | 79                   | 50.6     |                     |          |                   |
| Male   | 77                   | 49.4     |                     |          |                   |
|  | <u>Estimated BMI</u> |          | <u>Measured BMI</u> |          |                   |
| BMI Categories                                 | <u>n</u>             | <u>%</u> | <u>n</u>            | <u>%</u> | <u>Difference</u> |
| Underweight                                    | 9                    | 5.8      | 3                   | 1.9      | -6                |
| Normal   | 131                  | 84       | 90                  | 57.7     | -41               |
| Overweight/ Obese                              | 16                   | 10.3     | 63                  | 40.4     | 47                |
|  | <u>n</u>             | <u>%</u> |                     |          |                   |
| Accurately Identified their Body Composition   | 97                   | 62.2     |                     |          |                   |
| Inaccurately Identified their Body Composition | 59                   | 37.8     |                     |          |                   |

**Table 2. Construct average and weight**

|            | Psychological | Emotional | Social | Physical | Spiritual | Intellectual | Total |
|------------|---------------|-----------|--------|----------|-----------|--------------|-------|
| Average    | 4.43          | 4.24      | 4.47   | 4.56     | 4.67      | 4.41         | 26.78 |
| Percentage | 12.33         | 11.7      | 12.42  | 12.68    | 12.98     | 12.25        |       |

**Table 3. Correlation between Estimated BMI and PWS Constructs**

|               | <u>Estimated BMI</u> |          |
|---------------|----------------------|----------|
|               | <i>r</i>             | <i>p</i> |
| Psychological | -0.023               | 0.004**  |
| Emotional     | -0.099               | 0.217    |
| Social        | <u>-0.114</u>        | 0.157    |
| Physical      | -0.088               | 0.274    |
| Spiritual     | -0.248               | 0.002**  |
| Intellectual  | -0.11                | 0.171    |

\*\* Denotes significance at 0.01

**Table 4. Repeated Measure Analysis between Estimated BMI and Measured Body Composition**

| <u>Estimated BMI</u> |      | <u>Estimated BMI</u> |      | F (2,155) | p     | <i>n</i> <sup>2</sup> (WilksLambda) |
|----------------------|------|----------------------|------|-----------|-------|-------------------------------------|
| M                    | SD   | M                    | SD   |           |       |                                     |
| 2.04                 | 0.39 | 2.38                 | 0.52 | 62.031    | 0.001 | 0.714                               |

**Table 5. Summary of Regression Analysis for Wellness Variables in Predicting BMI**

| Variables     | B                              | <u>BMI</u>   |         |
|---------------|--------------------------------|--------------|---------|
|               |                                | SE B         | B       |
| Constant      | 2.732                          | 0.323        |         |
| Psychological | -0.018                         | 0.011        | -0.188  |
| Emotional     | <u>0.006</u>                   | <u>0.009</u> | 0.069   |
| Social        | -0.004                         | 0.01         | -0.032  |
| Physical      | 0.004                          | 0.009        | 0.042   |
| Spiritual     | -0.024                         | 0.013        | -0.229* |
| Intellectual  | 0.012                          | 0.013        | 0.102   |
|               | <i>F</i>                       |              | 2.22*   |
|               | <i>R</i> <sup>2</sup>          |              | 0.287   |
|               | Adjusted <i>R</i> <sup>2</sup> |              | 0.082   |

\* Denotes significance at 0.05; \*\* Denotes significance at 0.01

trout, Abu-Lebdeh, & Majka, 2015). If students are more aware of their health behaviors, there is a larger chance that they can accurately perceive their overall health and make appropriate behavior changes.

Self-perception can be an important concept as it relates to health and wellness. Presumably, those who are more aware of their health and wellness, specifically constructs associated with wellness (psychological, emotional, social, physical, spiritual, and intellectual), will be able to better regulate and assess their personal health and wellness status. According to the Systems Theory, each sublevel of the system is critical towards the success of the larger system, suggesting that those who score higher on the PWS might have a more

realistic perception of their body composition (Adams et al., 1998).

Only 62% of student participants accurately identified their BMI. A false perception of health could be detrimental because it can promote and reinforce behaviors that further contribute to an unhealthy lifestyle. For example, if an individual believes he or she has a healthy body composition but does not, the behaviors that contributed to an unhealthy body composition could continue to create more severe health risks. The problem is habitual behaviors are hard to change. Individuals may be hesitant to accept reality because it could yield difficult behavior changes or alterations.

Participants in this study estimated their

BMI to be lower (normal BMI) than their measured/actual BMI (Table 1). This study also found negative correlations between an individual's estimated BMI and the constructs of psychological and spiritual wellness. As individuals increase their psychological and spiritual wellness, their estimated BMI becomes a more realistic view of their measured/actual BMI. Individuals who exhibit high levels of psychological and spiritual wellness are more likely to estimate their BMI closer to their measured/actual BMI. This relationship between estimated BMI and the constructs of psychological and spiritual wellness highlights the importance of these constructs with respect to an individual's physical health. This finding also highlights the importance of health education and promotion that goes beyond giving students the knowledge of how to be healthy. Health education and promotion should strive to teach students how to become more self-aware and how to develop a sense of purpose.

Spirituality is defined as when an individual has a sense of purpose and embodies the beliefs and attitudes towards nature, as well as attempts to seek out an understanding of their own life (Goss, et al., 2010). This current study revealed that spirituality has a statistically significant relationship on college students' BMI. People who feel they have a sense of purpose in their life are more likely to value their health (Boero, Caviglia, Monteverdi, Braida, Fabello, & Zorzella, 2005) and maintaining a healthy body weight is an integral part of being healthy. Watson (1989) stated that spirituality is described as a possession of human beings, which enables self-awareness and heightened consciousness. An individual's spirituality may bring them more in tune with their sense of self, and therefore lead them to having a greater understanding of their overall health. Mansager (2000) argues that spirituality is understood to be a part of healthy human functioning and also of wellness.

Spiritual health is indeed one of the dimensions of wellness, as stated earlier, but perhaps there exists a more powerful connection between it and physical health. Several researchers have provided evidence indicating that having a sense of purpose was associated with lower obesity risk and prevalence (Cline & Ferraro, 2006; Gillum, 2006a; Gillum, 2006b; Koenig, King, & Carson, 2012). Bruce (2016) and colleagues found that deepening spirituality was linked to an increased effort to manage or control body weight, and suggested "The inner sense of connection to the divine or transcendent aspect of life could heighten esteem and efficacy...in a manner motivating them to improve their health" (p. 187). The connections between spirituality, weight management, and body composition also further strengthen the interconnectedness of the dimensions of health; as one improves their spiritual health, aspects of their physical health such as weight management

and body composition may be improved, which in turn can improve mental health components.

### **Limitations**

This study is reliant on self-reported responses concerning perceived wellness and body composition, which presents a challenge as participants may not understand the various dimensions of wellness or understand how to assess their body composition as it pertains to BMI. Data could be misleading due to understanding definitions and categories of BMI. Another important limitation was the geographic location of the participating university. Additionally, participation was only solicited on certain days, limiting participation. Lastly, potential socially desirable responses should be noted if participants felt uncomfortable reporting ratings of wellness due to misrepresented health behaviors.

### **Conclusion**

The human body is complex and as many of its systems function similarly, they are uniquely different. The ability to assess and evaluate individual health is a valuable tool for health maintenance. Understanding how the human body responds to the countless layers of influence that affect body composition can potentially facilitate individually-based health decisions. Having a sense of purpose (spiritual wellness) and self-awareness (psychological wellness) can increase a person's likelihood of maintaining a proper body weight. Modest correlations found in this study can serve as a foundation for future research exploring the negative relationships found between estimated BMI and the constructs of psychological and spiritual wellness. Overall, understanding your body composition can promote health-related decisions, create health-related goals, and regulate behaviors associated with personal health.

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