

Perceived versus Actual Health and Nutritional Status: Results from a Cross Sectional Survey of Rural Older Adults

Roschelle Heuberger^{1*}, Brad van Eeden-Moorefield² and Helen Wong¹

¹Central Michigan University, Mount Pleasant, MI, USA

²Montclair State University, Montclair, NJ, USA

Abstract

Objectives: Perceptions of health can affect actual health and nutritional status, as well as influence motivation to make changes. This study sought to determine the associations between self-perceived health and actual health, dietary lifestyle, and demographic factors.

Study design: Cross-sectional study

Methods: Rural community dwelling older adults (n=1100) in the United States answered a battery of questionnaires administered by trained interviewers. Data on demographics, lifestyle, medication use, medical diagnoses, and other health related items was obtained.

Results: The strongest predictor of perceived health was perceived nutrition. Perceived eyesight, actual medical health, oral health, and ability to complete activities of daily living (ADL) also contributed to perceptions of health to a smaller degree. Actual medical health was the weakest predictor of perceived health in this study. Oral health was the only significant predictor of actual medical health.

Conclusions: This study considered several variables in relation to perceived and actual health and concluded that perceived nutritional status has the strongest effect on overall health perceptions in older adults. Other variables such as housing and ADL did not affect perceived health to the degree expected in this population.

Keywords: Actual health; Perceived health; Perceived nutrition

Introduction

Self-perceived health, also known as self-rated or self-assessed health is one's self evaluation of his/her health status. It is usually measured by asking an individual to rate his/her health on a 4- or 5-point ordinal scale or in comparison to peers [1]. Since the demonstration of its association with mortality [2,3], self-perceived health has been widely used in health research. To date, self-perceived health has been employed as a health indicator [4,5] and suggested as a tool for screening disease risk [6].

As compared to the objective measurement of actual health by physicians or health care professionals, self-perceived health is a subjective rating. An individual's assessment of his/her health status is based on a combination of one's subjective assumption and actual information regarding his/her health [1,7,8]. Hence, a person's perceptions of health can be influenced by numerous factors. Differences in age [2], gender [2,9], ethnicity [10,11], and population norms [12] have been shown to affect self-perceived health.

Of particular interest is the association found between self-perceived health and health measures and outcomes. In addition to mortality [2,3], the perception of health has been shown to influence the determinants of health and disease in older adults. For example, older aged women with poor/fair self-rated health experienced greater declines in walking speed than older women who perceived their health to be good/excellent [13]. Perception of osteoporosis risk among women in their sixties also led to reduced physical activity in order to minimize fracture or bone damage even if they were not actually at risk [14]. The result of this perceived frailty could increase osteoporosis risk due to reductions in weight bearing activities from being overly cautious. Grip strength, another measure of frailty, has also been shown to be related to perceived fatigue in older adults [15]. These studies illustrate how perceptions of health can influence actual health among older populations.

Less is known about the impact of illness on self-perceived health. An investigation of patients with type 2 diabetes and acute myocardial infarction found lower scores of self-rated health in individuals who experienced cardiovascular events or death as compared to those free from events [16]. Another study reported that chronic pain was associated with poor self-perceived health amongst the general population [17]. Common predictors of low self-rated health scores have been observed in groups with and without illness, but it appears that the presence of disease may influence the impact of such variables. For example, an association between activities of daily living (ADL) disability and poor self-rated health was reported in both older adults with and without stroke, but this association was double the strength in those without stroke [18]. In other words, people with stroke were more likely to report low self-rated health irrespective of level of disability as compared to individuals without stroke. Thus, it appears that poor actual health may adversely affect a person's self-perceived health rating.

The aim of this study was to detect the associations between self-perceived health and actual health, dietary lifestyle, and demographic factors. Although the relevance of self-perceived health on actual health, nutritional status, and demographic factors has been previously looked at, limited studies have addressed this topic within older adults living within the community. The examination of a non-institutionalized

***Corresponding author:** Roschelle Heuberger PhD, RD, 106A Wightman Hall, Central Michigan University, MI 48859, USA, Tel: (989)774-3571; E-mail: heube1ra@cmich.edu

Received December 04, 2013; **Accepted** December 18, 2013; **Published** December 20, 2013

Citation: Heuberger R, van Eeden-Moorefield B, Wong H (2013) Perceived versus Actual Health and Nutritional Status: Results from a Cross Sectional Survey of Rural Older Adults. J Gerontol Geriat Res 3: 141. doi:10.4172/2167-7182.1000141

Copyright: © 2013 Heuberger R, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

sample of older adults makes this investigation important. The identification of factors related to the perception of health can be used to encourage healthy aging and enhance quality of life by fostering a positive self-perceived health status among the aged population residing within the community.

Methods

A convenience sample consisting of 1100 community-dwelling older adults living in the rural United States was recruited for this cross-sectional study. Rural adults were selected secondary to being an understudied population and the sample size calculation of $n > 1000$ subjects were based on preliminary pilot research. The inclusion criteria consisted of: (1) ability to give informed consent, (2) ability to provide reliable information on diet, health, demographics, and lifestyle, (3) being over the age of 60 years, and (4) willingness to answer at least 25% of all questions administered. Participants were encouraged to provide third party verification of data when feasible. Participation was entirely voluntary and no compensation was awarded. Subjects were recruited through advertisements, word of mouth, flyers and community organizations whose membership included older adults.

Trained interviewers administered a battery of questionnaires regarding demographics, lifestyle, food intake, medication use, medical diagnoses, and other health related items. Dietary status was measured by the Block Full Length Food Frequency Questionnaire (FFQ), 24-hour Food Intake Recall (24HR) and the Mini Nutritional Assessment (MNA).

Age was assessed by a single item simply asking the respondent to state his/her age. Perceived health was operationalized as general physical health, which was measured using responses to a single item that asked respondents how healthy they thought they were. Responses could range from 1 (excellent health) to 6 (very poor health). Perceived nutrition was likewise measured using responses to a single item that asked respondents how they believed their nutritional status was. Responses could range from 1 (excellent nutrition) to 6 (very poor nutrition).

Similarly, perceived eyesight was measured using responses to a single item that asked respondents how well they could see. Responses could range from 1 (excellent eyesight) to 6 (very poor eyesight). Oral health was measured using responses to two questions asking about the respondent's ability to taste and smell food. Any response indicating a difficulty tasting or smelling food was recorded as yes (1) or no (2) and a summed total between the two questions was calculated. Actual health was labeled as medical health, which was measured using a series of questions asking about the number and type of diagnoses or physical ailments. The final variable was a simple count of all major ongoing medical health issues (e.g., cancer, diabetes) with higher scores indicating more medical problems (i.e., poorer health). Housing was measured using responses to a single item asking about the level of restrictiveness in their current housing environment. Scores ranged from 1 (living independently in their own home) to 6 (living in an assisted living or institutional setting). ADL scores were calculated by summing responses to seven questions asking if the respondent experienced difficulty with such activities as bathing, toileting, etc. A greater total score represents a higher level of independence.

To ensure correct information was obtained from subjects, verification of information was determined. A sub-sample of the population was used to determine inter-rater reliability ($n=21$) at the start of the investigation. Similarly, interviewers rated the respondents' reliability on a scale of 1-5. When possible, third party verification

of data was obtained from family members, caregivers, or staff at the community organization where the data was acquired. Third party verification was not mandatory due to time and financial restraints.

Data for this study were analyzed in SPSS (version 18). Individuals who failed to complete at least 25% of the requested information were removed from analysis. Non-respondents were people who terminated participation after completing one or more questionnaires, who refused participation but consented to providing specific information regarding demographics and/or those who consented to and participated in the interviews but did not want to have their data included in analyses. Missing data was coded as missing. Preliminary analyses included descriptive statistics and a basic correlational analysis to verify appropriateness of the data for regression analyses and to examine the actual versus expected direction of relationships. Next, two hierarchical regressions were conducted to examine predictors of perceived and actual physical/medical health. Again, the purpose of our analyses was to understand how and which indicators of specific dimensions of perceived and actual health as well as environment interactions influence perceived and actual health. Both regressions included four models. The first model included age as a control. The second and third models included perceived health indicators and actual health indicators, respectively. Finally, the fourth models included variables that assessed interactions with one's environment (i.e., ADLs and housing restrictiveness).

Results

From the sample of 1100 participants recruited, data from 35 subjects were removed due to the failure to obtain at least 25% of information requested, specifically demographic and health information. Thus, the final sample consisted of 1065 individuals (Table 1). T-test comparisons were not statistically significant on select characteristics for available demographic data for respondents versus non-respondents.

Trained interviewers had high rates of inter-rater reliability at levels of .93 between identical questions asked by different interviewers to the same subject on different days. Third party verification was available for approximately 23% of the respondents interviewed. There were no significant differences seen between third party verified data and self-reported data from primary respondents on several key variables.

The average age of respondents was 75.47 ($SD = 8.32$). On average, respondents rated their health as good ($M = 2.84$, $SD = 1.03$), their nutrition as good ($M = 2.84$, $SD = .98$), and their eyesight as good ($M = 3.03$, $SD = 1.04$). Likewise, the average summed total for oral health was 3.77 ($SD = .49$) representing good oral health, i.e., few difficulties smelling and tasting food. Chronbach's alpha was .82. In terms of medical health, the average count of all major ongoing medical health issues was 5.56 ($SD = 5.06$). The average housing score was 2.95 ($SD = 1.68$) suggesting the average respondent lived in their own home with assistance from friends and family members. For ADL score, the average respondent could complete 6.02 ($SD = 1.94$) ADLs representing a higher level of independence.

Preliminary analyses suggest that the data were appropriate for use with regression (Table 2). Additionally, age was significantly correlated to all major study variables. As such, it was retained as a control in the main analyses. Further, correlations between study variables were all in the expected direction except for several non-significant relationships between perceived general physical health and indicators of actual physical health as well as environmental interactions.

Characteristic	
Sex [n (%)]	
Male	368 (35)
Female	697 (65)
Age (mean ± SD)	75.5 ± 4.4
Marital status [n (%)]	
None listed	48 (5)
Married	482 (45)
Divorced	86 (8)
Widowed	384 (36)
Single	62 (6)
Other	3 (<1)
Race [n (%)]	
None listed	14 (1)
Asian	15 (1)
Caucasian	955 (90)
Hispanic	17 (2)
Black	49 (5)
Native American	10 (1)
Other	5 (<1)
Gross annual income in \$US [n (%)]	
Missing information	222 (21)
Not answered	112 (11)
<5000	25 (2)
5000-10 000	46 (4)
10 000-15 000	82 (8)
15 000-20 000	79 (7)
20 000-30 000	136 (13)
30 000-40 000	154 (14)
40 000-50 000	1 (<1)
50 000-60 000	99 (9)
60 000-70 000	24 (2)
70 000-80 000	19 (2)
80 000-90 000	17 (2)
90 000-100 000	12 (1)
>100 000	37 (3)

Table 1: Demographic information of study participants (n=1065).

	Age	Perceived Nutrition	Perceived Eyesight	Perceived Physical Health	Mouth Health	Medical Health	ADLs
Perceived nutrition	.09**						
Perceived eyesight	.25**	.38**					
Perceived physical health	.19**	.67**	.43**				
Mouth health	.19**	.10**	.16**	.09*			
Medical health	.33**	.19**	.20**	.04	-.14**		
ADLs	.39**	.21**	.20**	.05	-.14**	.35**	
Housing	.37**	.10**	.14**	.00	-.12**	.33*	.58**

Note: * p < 0.05; ** p < 0.01

Table 2: Correlations of all major study variables.

Predictors of Perceived Physical Health

Each successive model in the regression examining predictors of perceived physical health included significant increases in variance explained after controlling for the effects of age (Table 3). As such, only results from the hypothesized model (model 4) are presented here. Model four, which included all variables of interest, accounted for

52% of the variance in perceived health. All predictors were significant except for housing. All other predictors were related as expected and significant. We hypothesized that specific dimensions of perceived health indicators would more strongly predict perceived health compared to actual health indicators and environmental interactions, and this was consistent with our findings. The strongest predictor was perceived nutrition, such that individuals who perceived their nutrition as worsening also perceived their overall physical health to be declining. The same was true for perceived eyesight, actual medical health, oral health, and ability to complete ADLs, although the strength of these was much smaller in comparison. Most interesting was the fact that actual medical health was the weakest predictor of perceived health.

The results from the regression predicting actual medical health, controlling for age, were largely non-significant (Table 4). Contrary to our hypotheses, model 3 was the best predictor of actual medical health, but only accounted for 2% of the variance. Further, oral health was the only significant predictor such that as an individual's mouth health increased their physical health also increased.

Discussion

The most significant finding of this study was the strong relationship between perceived nutrition and perceptions of general health. While older adults' perceptions on the meaning of nutrition and healthy eating have been explored [19,20], to our knowledge, the concept of one's self-perceived nutritional status has not been directly studied by asking respondents to rate their own state. Instead, investigations examining self-reported and actual dietary energy intake provide some insight on how older adults view their own eating habits. Under reporting of caloric intake appears frequently in the aging population [21,22]. Discrepancies observed between reported compared to actual intakes may suggest that perceived versus actual nutrition in older adults is also not aligned. In other words, older individuals may believe they are eating healthy, but they are not in reality. A review of nutrition education interventions in older adults revealed varied success in improving actual food choices [23]. Whether improved eating habits translate into a better self-perceived nutrition remains undetermined. Understanding the ability of perceived nutrition to predict health perceptions could give caregivers and/or health care professionals an area of focus in trying to improve health perceptions in this population.

Perceived nutrition has also been investigated indirectly by several studies evaluating perceived nutritional status through measuring differences in perceived and actual Body Mass Index (BMI) weight categories [24-29]. Gender differences in these studies indicate women are more likely to accurately estimate their weight status or misperceive themselves as overweight even if their BMI is in the normal category or between 18.5 and 24.9 kg/m², while men are much more likely to underestimate their weight status, or think they are normal weight or underweight, when they are actually overweight or obese. Age can also influence accuracy in weight perceptions with advancing age often associated with weight underestimation [25,28,30]. In this study respondents were asked to evaluate the health of their nutritional status on a scale, so perceptions could have included perceived dietary intake as well as weight status.

It is well known that poorer self-rated or perceived health is related to increased mortality [31], and perceived health has been shown to identify key geriatric conditions among older aged adults and can predict functional decline and health care use [32]. Due to the large body of research supporting a relationship between perceived and

Variable	Model 1			Model 2			Model 3			Model 4		
	B	SE B	β	B	SE B	β	B	SE B	β	B	SE B	β
Age	.02	.00	.17*	.01	.00	.08*	.01	.00	.04	.00	.00	.01
Perceived Nutrition				.62	.03	.59*	.59	.03	.56*	.58	.03	.55*
Perceived Eyesight				.19	.03	.20*	.17	.03	.17*	.17	.03	.17*
Mouth Health							.11	.05	.05*	.10	.05	.05*
ADL										.05	.02	.08*
Housing										.00	.02	.00
R ²		.03			.49			.52			.52	
ΔR ²		.03			.48			.51			.52	
F for change in R ²		26.07*			402.69*			28.81*			4.82*	

Note: * p < .01

Table 3: Summary of hierarchal regression analysis predicting perceived physical health controlling for age (n = 1059).

Variable	Model 1			Model 2			Model 3			Model 4		
	B	SE B	β	B	SE B	β	B	SE B	β	B	SE B	β
Age	-.01	.01	-.06	-.01	.01	-.05	-.02	.01	-.06	-.02	.01	-.07
Perceived Nutrition				-.14	.09	-.07	-.13	-.09	-.07	-.12	-.09	-.06
Perceived Eyesight				-.03	.07	-.02	-.06	.07	-.03	-.05	.07	-.03
Perceived Health				.01	.09	.00	-.03	-.09	-.01	-.02	.09	-.01
Mouth Health							.50	.14	.13*	.49	.14	.13*
ADL										-.01	.05	-.06
Housing										-.12	.05	.10*
R ²		.00			.01			.03			.03	
ΔR ²		.00			.00			.02			.02	
F for change in R ²		2.59			1.51			6.60*			2.90*	

Note: * p < .01

Table 4: Summary of Hierarchical Regression Analysis Predicting Medical Health Controlling for Age (n=1059).

actual health, it was surprising that this study was unable to show a significant correlation with actual and perceived health. It is interesting to consider why actual health was the weakest predictor of health perceptions among this group of older adults. One possible scenario may be a difficulty in coming to terms with the aging process, causing a disconnection between actual health and how it is perceived.

Other variables that showed less prominent roles than expected in regards to perceived health included ADLs and housing. All predictors were significant except for housing, suggesting that changes in restrictiveness of housing environments is not related to one's perception of their overall physical health. This finding runs contrary to our hypotheses and previous research [33,34]. All other predictors were related as expected and significant. We hypothesized that specific dimensions of perceived health indicators would more strongly predict perceived health compared to actual health indicators and environmental interactions, and this was consistent with our findings.

The average responses to ADL and housing questions indicated the average respondent lived at home with some help from friends and family and had a higher level of independence, so perhaps restrictiveness in housing and activities has yet to affect the majority of the respondents. Previous research also shows that while housing options do affect perceptions among the very old, its effects are different

with varying levels of ADL dependence [34] and often depends on circumstances [33]. Among those with serious health problems in pre and early retirement age, medical interventions and improvement in symptoms have been identified as variables which contribute most to improved self-perception of health [35].

Muenning et al., [36] showed that mental and physical health were influenced more by the difference between desired and actual body weight than by BMI alone, with the strongest connection among white women. From this study one must consider the possibility that the way people perceive themselves may in part be responsible for the negative health effects of obesity. Many studies show a relationship between perceived and actual health, but few have evaluated possible mechanisms behind this connection. One possibility involves measures of inflammation as studied by Christian et al., [37]. Even though numerous factors were controlled for, there remained an association between poor self-rated health and elevated circulating inflammatory markers interleukin 6 and C-reactive protein in generally healthy older adults.

Whatever the mechanisms of action are behind the correlations, it is apparent that perceptions of health and nutritional status can and do affect actual health. Perceived health status, along with actual health status influences our perceptions when considered in tandem.

From this study, the data show how older adults perceive many areas of their lives, in particular their nutritional status, affects perceptions of their overall health. Becoming aware of risks associated with chronic disease through more accurate perceptions of health and nutrition status may be the first step in preventing chronic disease. Healthcare providers for populations such as older adults can help reduce risks by improving perceived health and supporting actual health. Perceiving current disease states accurately may also help in better disease control and encourage adherence to medical advice. When helping individuals obtain accurate perceptions of health, it is also important to consider cultural, ethnic, and age factors that may influence perceptions in the varying populations as well as the variables included in this study such as perceptions of nutrition and physical functioning. This study was not without its limitations. Hence, the interpretation of this study's results must take into consideration that the participants were recruited via convenience sampling, the probability of response bias was high, and there was homogeneity within the sample in term of race, ethnicity, religion, and geographic location. Finally, third party sources for data verification were not available for all respondents.

Conclusion

This study found perceived nutritional status to have the strongest effect on the overall health perceptions of older adults living in rural United States. The perception of eyesight, actual medical health, oral health, and ability to complete ADLs also contributed to perceived health in the aging population to a smaller degree. Actual medical health was the weakest predictor of perceived health.

Funding and Ethics

The research protocol was approved by Central Michigan University's Institutional Review Board and Human Subjects Committee. Funding for the project was provided by internal granting mechanisms within the university. No competing interests.

Acknowledgement

We would like to thank Natasha Bushnell Nuno for her assistance on this project.

References

- Jylha M (2009) What is self-rated health and why does it predict mortality? Towards a unified conceptual model. *Soc Sci Med* 69: 307-316.
- Benyamini Y, Blumstein T, Lusky A, Modan B (2003) Gender differences in the self-rated health-mortality association: is it poor self-rated health that predicts mortality or excellent self-rated health that predicts survival? *Gerontologist* 43: 396-405.
- DeSalvo KB, Bloser N, Reynolds K, He J, Muntner P (2006) Mortality prediction with a single general self-rated health question. A meta-analysis. *J Gen Intern Med* 21: 267-275.
- Jylhä M, Volpato S, Guralnik JM (2006) Self-rated health showed a graded association with frequently used biomarkers in a large population sample. *J Clin Epidemiol* 59: 465-471.
- Rahman MO, Barsky AJ (2003) Self-reported health among older Bangladeshis: how good a health indicator is it? *Gerontologist* 43: 856-863.
- May M, Lawlor DA, Brindle P, Patel R, Ebrahim S (2006) Cardiovascular disease risk assessment in older women: can we improve on Framingham? *British Women's Heart and Health prospective cohort study. Heart* 92: 1396-1401.
- Kaplan G, Baron-Epel O (2003) What lies behind the subjective evaluation of health status? *Soc Sci Med* 56: 1669-1676.
- Mavaddat N, Kinmonth AL, Sanderson S, Surtees P, Bingham S, et al. (2011) What determines Self-Rated Health (SRH)? A cross-sectional study of SF-36 health domains in the EPIC-Norfolk cohort. *J Epidemiol Community Health* 65: 800-806.
- Piko BF (2007) Self-perceived health among adolescents: the role of gender and psychosocial factors. *Eur J Pediatr* 166: 701-708.
- Brandon LJ, Proctor L (2010) Comparison of health perceptions and health status in African Americans and Caucasians. *J Natl Med Assoc* 102: 590-597.
- Umar N, Aliyu MH, Otado J, Gillum RF, Obisesan TO (2011) Ethnic-based differences in the association of self-perceived health status and doctor's office utilization: Longitudinal Study on Aging. *Clin Interv Aging* 6: 295-301.
- Ely GE, Miller K, Dignan M (2011) The disconnect between perceptions of health and measures of health in a rural appalachian sample: implications for public health social workers. *Soc Work Health Care* 50: 292-304.
- Ashburner JM, Cauley JA, Cawthon P, Ensrud KE, Hochberg MC, et al. (2011) Self-ratings of health and change in walking speed over 2 years: results from the caregiver-study of osteoporotic fractures. *Am J Epidemiol* 173: 882-889.
- Reventlow SD (2007) Perceived risk of osteoporosis: restricted physical activities? Qualitative interview study with women in their sixties. *Scand J Prim Health Care* 25: 160-165.
- Bautmans I, Gorus E, Njemini R, Mets T (2007) Handgrip performance in relation to self-perceived fatigue, physical functioning and circulating IL-6 in elderly persons without inflammation. *BMC Geriatr* 7: 5.
- Venskutonyte L, Brismar K, Öhrvik J, Rydén L, Kjellström B (2013) Self-rated health predicts outcome in patients with type 2 diabetes and myocardial infarction: a DIGAMI 2 quality of life sub-study. *Diab Vasc Dis Res* 10: 361-367.
- Mäntyselkä PT, Turunen JH, Ahonen RS, Kumpusalo EA (2003) Chronic pain and poor self-rated health. *JAMA* 290: 2435-2442.
- Mavaddat N, Van der Linde R, Savva GM, Brayne C, Mant J (2013) What determines the self rated health of older individuals with stroke compared to other older individuals? A cross sectional analysis of the Medical Research Council Cognitive Function and Aging Study. *BMC Geriatr* 13: 85.
- Brownie S, Coultts R (2013) Older Australians' perceptions and practices in relation to a healthy diet for old age: a qualitative study. *J Nutr Health Aging* 17: 125-129.
- Krahn VM, Lengyel CO, Hawranik P (2011) Healthy eating perceptions of older adults living in Canadian rural and northern communities. *J Nutr Gerontol Geriatr* 30: 261-273.
- Ferriolli E, Pfrimer K, Moriguti JC, Lima NK, Moriguti EK, et al. (2010) Under-reporting of food intake is frequent among Brazilian free-living older persons: a doubly labelled water study. *Rapid Commun Mass Spectrom* 24: 506-510.
- Yannakoulia M, Tyrovolas S, Pounis G, Zeimbekis A, Anastasiou F, et al. (2011) Correlates of low dietary energy reporting in free-living elderly: the MEDIS study. *Maturitas* 69: 63-68.
- Sahyoun NR, Pratt CA, Anderson A (2004) Evaluation of nutrition education interventions for older adults: a proposed framework. *J Am Diet Assoc* 104: 58-69.
- Bhanji S, Khuwaja AK, Siddiqui F, Azam I, Kazmi K (2011) Underestimation of weight and its associated factors among overweight and obese adults in Pakistan: a cross sectional study. *BMC Public Health* 11: 363.
- Chang VW, Christakis NA (2003) Self-perception of weight appropriateness in the United States. *Am J Prev Med* 24: 332-339.
- Daniels J (2005) Weight and weight concerns: are they associated with reported depressive symptoms in adolescents? *J Pediatr Health Care* 19: 33-41.
- Linder J, McLaren L, Siou GL, Csizmadi I, Robson PJ (2010) The epidemiology of weight perception: perceived versus self-reported actual weight status among Albertan adults. *Can J Public Health* 101: 56-60.
- Miller EC, Schulz MR, Bibeau DL, Galka AM, Spann LI, et al. (2008) Factors associated with misperception of weight in the stroke belt. *J Gen Intern Med* 23: 323-328.
- Tang J, Yu Y, Du Y, Ma Y, Zhu H, et al. (2010) Association between actual weight status, perceived weight and depressive, anxious symptoms in Chinese adolescents: a cross-sectional study. *BMC Public Health* 10: 594.
- Mujica E V, Leiva M E, Rojas M E, Díaz N, Lcaza G, et al. (2009) [Discordance between nutritional status and self perception of weight among adults from Talca, Chile]. *Rev Med Chil* 137: 76-82.
- Walker JD, Maxwell CJ, Hogan DB, Eby EM (2004) Does self-rated health

-
- predict survival in older persons with cognitive impairment? *J Am Geriatr Soc* 52: 1895-1900.
32. Bluestein D, Rutledge CM (2006) Perceived health and geriatric risk stratification: observations from family practice. *Can Fam Physician* 52: 626-627.
33. Haak M, Malmgren Fänge A, Iwarsson S, Dahlin-Ivanoff S (2011) The importance of successful place integration for perceived health in very old age: a qualitative meta-synthesis. *Int J Public Health* 56: 589-595.
34. Iwarsson S, Horstmann V, Slaug B (2007) Housing matters in very old age - yet differently due to ADL dependence level differences. *Scand J Occup Ther* 14: 3-15.
35. Choi NG (2003) Determinants of self-perceived changes in health status among pre- and early-retirement populations. *Int J Aging Hum Dev* 56: 197-222.
36. Muennig P, Jia H, Lee R, Lubetkin E (2008) I think therefore I am: perceived ideal weight as a determinant of health. *Am J Public Health* 98: 501-506.
37. Christian LM, Glaser R, Porter K, Malarkey WB, Beversdorf D, et al. (2011) Poorer self-rated health is associated with elevated inflammatory markers among older adults. *Psychoneuroendocrinology* 36: 1495-1504.