

# Judgment Formation towards Health Risk Behaviors Concerning Obesity: An Integration Information Theory Approach

Aida A. Jimenez-Martinez<sup>1</sup>, Perla Lizeth Hernandez-Cortes<sup>2</sup>, Guadalupe E. Morales-Martinez<sup>3</sup>, Ernesto O. Lopez-Ramirez<sup>4</sup>

<sup>1</sup>Autonomous University of Tamaulipas (UAT), Matamoros, México

<sup>2</sup>Department of Nursing, Autonomous University of Nuevo Leon (UANL), Monterrey, Mexico

<sup>3</sup>Cognitive Science Laboratory, Institute of Research on the University and Education, National Autonomous University of Mexico (UNAM; IISUE), Ciudad de Mexico, Mexico

<sup>4</sup>Department of Psychology, Autonomous University of Nuevo Leon (UANL), Monterrey, Mexico

Email: aajm\_gv@hotmail.com, ajimenezm@uat.edu.mx

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## Abstract

A sample of 80 secondary students was required to take an information integration theory study to explore judgment formation toward health risk behavior regarding obesity. Here, twelve social scenarios containing a simulated actor were implemented (vignettes) having in mind a three factor experimental factor design (diet, weight and physical activity). Subjects had to read each vignette and provide an answer by marking ten points anchored scale to provide judgment on actors' possible health risk outcome. Results showed that study participants valued diet as the most relevant factor, followed by the description of weight and finally followed by the factor of physical activity. They impose systematic thinking to integrate different sources of information provided by factor manipulation in the vignettes by using a cognitive summative rule. Implications of this study result to clinical intervention in obesity as well as for theoretical considerations of cognitive models of health risk behavior are discussed in the present article.

## Keywords

Obesity, Cognitive Specification, Judgment Formation, Information Integration Theory, Cognitive Algebra

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## 1. Introduction

Individuals impose consciously or unconsciously systematic thinking on every day health behavior [1] [2]. These health cognitions (thoughts and feelings) de-

termine our judgment formation toward risk health behaviors and have an enormous impact on our wellbeing [3].

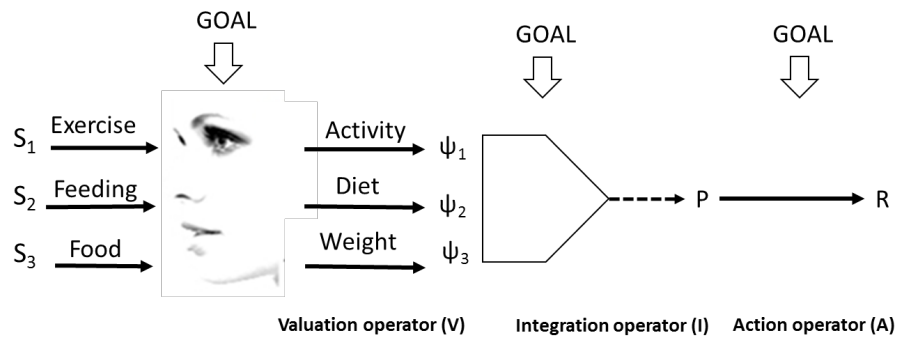
Firmly grounded in the cognitive tradition, theories of health like Ajzen's Theory of Planned Behavior (TPB; [4]), Health Belief Model (HBM; [5]), and Protection Motivation Theory (PMT; [6]) seek to explain self-care and predict risk health behavior based on health cognitions [7] [8] [9]. However, these models are more oriented to determine behavior prediction rather than to specify cognitive processing of health cognitions. As suggested by Anderson ([10], p. 128): "These two directions, namely, prediction of behavioral outcomes and understanding of cognitive processes, impose generally different constraints on strategy and tactics of investigation. Hence they usually interfere with each other." In turn, this lack of cognitive specification limits prediction power of adherence to healthy behavior. For instance, Hernandez *et al.* [2] have shown that cognitive specification of systematic thinking underlying judgment formation toward health risk behaviors in people with diabetes allows specific intervention on medication schedules and dietary behavior. Specifically, these authors found that diabetics tend to use a weighted summative cognitive rule to integrate sources of information on medication schedules, stress factors and exercise. Here, metamemory aspects related to schedule medication obtained higher valuation followed by stress and exercising. Thus understanding (diagnosis) rather than prediction is preferred to empower intervention. They used an Information Integration Theory (IIT) approach to identify this cognitive processing style in diabetics and the current study regarding obesity seeks for the same cognitive specification.

## 2. Information Integration Theory and Obesity

Obesity is related to several diseases (e.g., diabetes, stroke, and high blood pressure; [11]) and it leads to early death [12] and cognitive decline [13]. What are the cognitive causes to enforce, maintain and to eliminate obesity are at a center of an extensive research effort [14] [15].

Dieticians, nutritionist, and physicians, stress the importance of healthier diets and a less sedentary life style. However, even when many obese people know that they should eat less and healthier and that they should exercise more, their efforts to reduce weight are unsuccessful in the long run. For example, many dieters are able to lose some weight in the short term but they frequently end up regaining more weight than they initially lost [16]. Here it is argued that this is so due to a specific cognitive ruled mechanism that contributes to maintain obesity by implicit biased valuation of information regarding unhealthy food intake and exercising. As it was pointed out previously cognitive specification of cognitive processing parameters underlying this mental ruled behavior can be achieved by using an IIT approach.

Basic assumptions of the IIT cognitive approach postulate that relevant stimuli ( $S_i$ ) are extracted from an environment and psychologically represented through a valuation process ( $V$ ) with cognitive coefficients ( $\psi_i$ ). Here, a person



**Figure 1.** A study three factor IIT diagram (Activity, weight and diet) describing a possible cognitive algebraic integration of psychological evaluated information of food, feeding behavior an exercise (Modified from Anderson, 2009).

is assumed to combine these subjective values (I) by means of a cognitive algebra dominated by addition, multiplication, and averaging to form a unified implicit response (P) that will produce an explicit response (R) through an action operator (A). This goal oriented and feed forward cognitive processing comprehending obesity in this study is best represented by the IIT functional diagram in **Figure 1**.

Information valuation (V) of sources of information depends on perception of events whereas information integration (I) relates to generalizable systematic (algebraic) cognitive processing of sources of information ( $S_i$ ) across a sample of individuals. This cognitive algebraic behavior can be specified by IIT functional measurement methodology (FMIIT) as described in the method section. This is relevant because cognitive specification of systematic thinking deepens our knowledge about people beliefs. For instance, there is robust evidence suggesting that people tend to follow an average integration rule to attitude formation and change rather than a summatory of products like in the Fishbein and Ajzen's expectancy-value model [10] [17].

Regarding perception of risk health behavior and obesity, no cognitive algebra specification research exists. Again, this is so, since TPB/TRA, PMMT and HBM approaches on this topic focuses on prediction rather than on understanding judgment formation cognitive mechanisms. The following study provides initial empirical research to cognitive specification of mental mechanisms underlying judgment formation toward health risk behavior in obesity.

### 3. Method

In order to explore judgment formation on health risk behavior a three factor IIT cognitive algebra design was implemented: 3 (Diet: Good, regular and bad)  $\times$  2 (weight normal, overweighted)  $\times$  2 (physical activity: sedentary, active).

#### 3.1. Participants

A sample of 80 third grade secondary education students (50% female and 50% male) were considered in this study. Their age ranged between 13 and 16 years old ( $M = 13.8$  years old,  $SD = 1.29$ ). All of them belonged to a city located at the



= 1.44, p = 0.001,  $\eta^2 = 0.03$ ].

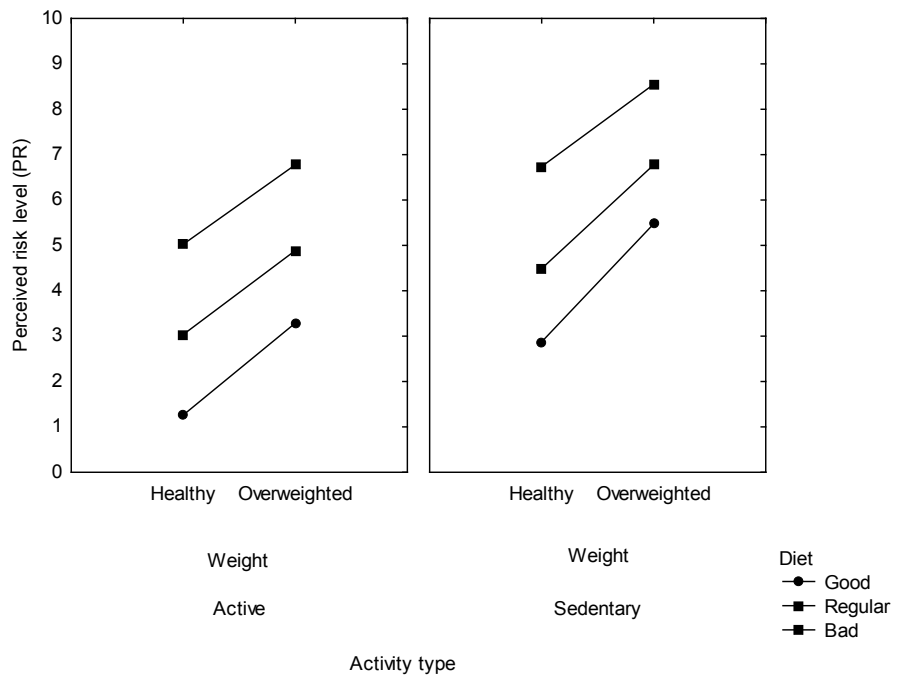
A general description from the obtained experiment data shows that adolescents' risk perception level judgement was moderately high (M = 5, DS = 0.84). Also, as it can be noticed from **Table 1**. The most relevant factor to participants' judgment formation (higher valuation) relates to diet information source ( $\eta^2 = 0.72$ ) followed by the weight factor ( $\eta^2 = 0.65$ ) and finally followed by the frequency of physical activity factor ( $\eta^2 = 0.58$ ).

No significant interactions were found among interactions underlying judgment formation. However, and most interestingly, judgment to health risk perception in this population seems to follow a cognitive summative rule to integrate sources of information regarding diet, weight and physical activity. This is graphically illustrated in **Figure 2**.

**Table 1.** ANOVA statistical results obtained from participants' perceived risk health behavior.

Source	df	MS	df	MS	F	p	$\eta^2$
Weight (w)	1	1012.70	79	6.81	148.66*	0.001	0.65
Diet (D)	2	1010.75	158	4.92	205.23*	0.001	0.72
Physical activity (Pa)	1	752.60	79	6.65	113.12*	0.001	0.58
W * D	2	5.65	158	3.64	1.55	0.21	0.01
W * Pa	1	7.70	79	2.83	2.71	0.10	0.03
D * Pa	2	1.11	158	3.53	0.31	0.73	0.00

Note. \* = p < 0.001.



**Figure 2.** Interaction graph showing a cognitive summative rule to integrate diet, weight and physical activity information. Here, diet factor was valued as the most relevant, followed by the weight factor and finally by the frequency of physical activity factor.

## 5. Discussion

The aim of this research was to investigate judgment formation towards obesity as a health risk behavior. As it can be noticed from this study results, exercising had the lowest ponderation by the study population. Benefits of exercising are well documented especially when obesity is under scrutiny [18]. However, nowadays, exercise is severely discouraged by technological developments (e.g. use techs like cellphone, video plays, tablets) and malicious food intake satisfies more to commercial interests than people fitness. Gollwitzer and Sheeran [19] have found that significant behavior changes to favor exercising are achieved when positive pro-exercise cognition was combined with encouragement to form implementation intentions and to visualize the obstacles that stand in your way, Oettingen [20]. It looks like study participants prefer to consider diet formulations to cope with obesity rather than exercising no matter the weight condition.

Accordingly, risk perception about health threatens due to obesity should follow an implicit cognitive rule defined as:

$$PR = \text{DietWd} + \text{WeightWw} + \text{Physical ActivityWpa}$$

where perceived risk (PR) results from orthogonal contributions of weighted ( $W_{ij}$ ) factor values and their parameter estimation can vary according to health intervention programs, cultural diet backgrounds, etc. (reflecting different valuation processes). Even though, the same information integration summative cognitive rule is expected to be maintained on different conditions.

However, factor contribution in this PR cognitive rule might vary by including other relevant health cognitions. For instance, inclusion of motivational [21] or affective [1] considerations could specify new orthogonal factor contribution if they are included on social scenarios represented by vignettes like the ones used in this study.

More research is needed to explore these possibilities. It is evident that by using an IIT approach to explore rationale underlying unhealthy behavior, more predictive behavior power can be achieved on cognitive prediction models like the ones appointed before, for instance, establishing a relation between healthy cognitive ruled behavior of a health belief and the HBM model predictions.

## References

- [1] Lawton, R., Conner, M. and Parker, D. (2007) Beyond Cognition: Predicting Health Risk Behaviors from Instrumental and Affective Beliefs. *Health Psychology*, **26**, 259-267. <https://doi.org/10.1037/0278-6133.26.3.259>
- [2] Hernández, C.P.L., Morales, M.G.E., Lopez, R.E.O. and Salazar, G.B.C. (2014) Systematic Thinking Underlying People with Diabetes' Beliefs on Health Outcomes: An Information Integration Theory Approach. *Advances in Aging Research*, **3**, 310-317. <https://doi.org/10.4236/aar.2014.34040>
- [3] Cameron, D.S., Bertenshaw, E.J. and Sheeran, P. (2014) The Impact of Positive Affect on Health Cognitions and Behaviours: A Meta-Analysis of the Experimental Evidence. *Health Psychology Review*, **9**, 345-365. <https://doi.org/10.1080/17437199.2014.923164>

- [4] Fishbein, M. (2008) A Reasoned Action Approach to Health Promotion. *Medical Decision Making*, **28**, 834-844. <https://doi.org/10.1177/0272989X08326092>
- [5] Abraham, C. and Sheeran, P. (2005) The Health Belief Model. In: Conner, M. and Norman, P., Eds. *Predicting Health Behaviour: Research and Practice with Social Cognition Models*, 2nd Edition, Open University Press, Maidenhead, 28-80.
- [6] Rogers, R.W. (1983) Cognitive and Physiological Processes in Fear Appeals and Attitude Change: A Revised Theory of Protection Motivation. In: Cacioppo, J. and Petty, R., Eds., *Social Psychophysiology*, Guilford Press, New York, 153-175.
- [7] Gibbons, F.X., Gerrard, M., Ouellette, J.A. and Burzette, R. (1998) Cognitive Antecedents to Adolescent Health Risk: Discriminating between Behavioral Intention and Behavioral Willingness. *Psychology and Health*, **13**, 319-339. <https://doi.org/10.1080/08870449808406754>
- [8] Gerrard, M., Gibbons, F.X., Reis-Bergan, M. and Russell, D.W. (2000) Self-Esteem, Self-Serving Cognitions, and Health Risk Behavior. *Journal of Personality*, **68**, 1177-11201. <https://doi.org/10.1111/1467-6494.00131>
- [9] Conner, M. (2010) Cognitive Determinants of Health Behavior. In: Steptoe, A., Ed., *Handbook of Behavioral Medicine: Methods and Applications*, Springer Verlag, New York, 19-30. [https://doi.org/10.1007/978-0-387-09488-5\\_2](https://doi.org/10.1007/978-0-387-09488-5_2)
- [10] Anderson, N.H. (2009) Unified Social Cognition. Psychology Press, New York.
- [11] Jansen, A., Houben, K. and Roefs, A. (2015) A Cognitive Profile of Obesity and Its Translation into New Interventions. *Frontiers in Psychology*, **6**, 1807. <https://doi.org/10.3389/fpsyg.2015.01807>
- [12] World Health Organization (1998) Obesity—Preventing and Managing the Global Epidemic. WHO/NUT/NCD/98 1, WHO, Geneva.
- [13] Braet, C. and Crombez, G. (2003) Cognitive Interference Due to Food Cues in Childhood Obesity. *Journal of Clinical Child and Adolescent Psychology*, **32**, 32-39. [https://doi.org/10.1207/S15374424JCCP3201\\_04](https://doi.org/10.1207/S15374424JCCP3201_04)
- [14] Nilsson, L.-G. and Nilsson, E. (2009) Overweight and Cognition. *Scandinavian Journal of Psychology*, **50**, 660-667. <https://doi.org/10.1111/j.1467-9450.2009.00777.x>
- [15] Ziauddeen, H., Alonso, A.M., Hill, O.J., Kelley, M. and Khan, N.A. (2015) Obesity and the Neurocognitive Basis of Food Reward and the Control of Intake1, 2. *American Society for Nutrition*, **6**, 474-486.
- [16] Wing, R.R. and Hill, J.O. (2001) Successful Weight Loss Maintenance. *Annual Review of Nutrition*, **21**, 323-341. <https://doi.org/10.1146/annurev.nutr.21.1.323>
- [17] Anderson, N.H. (1971) Integration Theory and Attitude Change. *Psychological Review*, **78**, 171-206. <https://doi.org/10.1037/h0030834>
- [18] Chan, J.S., Yan, J.H. and Payne, V.G. (2013) The Impact of Obesity and Exercise on Cognitive Aging. *Frontiers in Aging Neuroscience*, **5**, 97. <https://doi.org/10.3389/fnagi.2013.00097>
- [19] Gollwitzer, P. and Sheeran, P. (2006) Implementation Intentions and Goal Achievement: A Meta-Analysis of Effects and Processes. *Advances in Experimental Social Psychology Journal*, **38**, 69-119.
- [20] Oettingen, G. (2014) Rethinking Positive Thinking. Penguin Group, USA.
- [21] Pawlowska, M. and Kalka, D. (2015) Cognitive-Motivational Model of Obesity: Motivational Mechanisms and Cognitive Biases Underlying the Processing of Food-Related Images by People with Excess Body Weight. *Psychiatria Polska*, **49**, 983-991. <https://doi.org/10.12740/pp/30860>

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