

# Intertemporal Discounting as a Risk Factor for Obesity: An Economic Approach

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# Abbreviations

AIC	Akaike Information Criterion
BIC	Bayesian Information Criterion
BMI	Body Mass Index
DALY	Disability-Adjusted Life Year
FIML	Full Information Maximum Likelihood
GHK (simulator)	Geweke-Hajivassiliou-Keane (simulator)
HRQoL	Health-Related Quality of Life
MSL	Maximum Simulated Likelihood
MVP	Multivariate Probit
NVS	Newest Vital Sign
NWAHS	North West Adelaide Health Study
OLS	Ordinary Least Squares
PDR-M	Positive Discount Rate in Monetary Domain
PDR-H	Positive Discount Rate in Health Domain
QALY	Quality-Adjusted Life Year
REALM	Rapid Estimate of Adult Literacy in Medicine
RCT	Randomized Controlled Trial
SAHOS	South Australian Health Omnibus Survey
SES	SocioEconomic Status
TOFHLA	Test Of Functional Health Literacy in Adults
WC	Waist Circumference
WHR	Waist-Hip Ratio

# Abstract

Body weight outcomes, although mediated by genetic and biological factors, are determined to a large extent by lifestyle choices such as diet and exercise. These choices involve a trade-off between immediate pleasure, and expected future wellbeing, since a large part of the health costs of weight gain occur in the future. Understanding of the complex issues around weight-related choices has been contributed to through research in various disciplines including psychology, economics and health research. This thesis contributes from an economic perspective, by focusing on the importance of intertemporal choices as an important determinant of body weight.

To analyse the association between body weight and intertemporal choices, it is important to have an appropriate measure of the rate at which individuals discount future payoffs. This thesis compares various methodologies for eliciting discount rates, before developing a set of stated-preference questions to elicit discount rates that were included in the South Australian Health Omnibus Survey 2008. Based on theory and previous empirical findings, it is investigated whether the standard monetary questions, or questions framed in a health context, are more appropriate to use in the analysis of health out-

comes. Evidence is shown of domain independence of the elicited discount rates, and the more standard monetary domain questions are shown to be more useful descriptors of discounting behaviour in the required contexts.

Using the data obtained on individuals' heterogeneous rates of discounting, as well as the health and demographic data contained in the survey, analysis is conducted to determine if intertemporal discounting is an important risk factor for high body weight, after controlling for other demographic risk factors. There is also some investigation of how these relationships might differ across the relative weight distribution, and by BMI category. It is robustly shown that a high rate of intertemporal discounting in the monetary domain is a significant and quantitatively important risk factor for high body weight.

Discounting behaviour may also be associated with smoking behaviour, and this could complicate the estimation of the relationship between discounting and body weight. Analysis is conducted first to show that the expected association between discounting and smoking behaviour is present, and then to understand how this relationship might bias the estimates of the association between discounting and body weight. Evidence is presented that shows that the estimated association between discounting and body weight is moderated by smoking behaviour, and thus the independent association between discounting and body weight may be higher than first estimated.

Many of the estimation procedures used in this thesis abstract from the pathways of diet and exercise as is appropriate. Separate analysis investigates the joint determination of obesity, diet, and exercise, by estimating a Mul-

tivariate Probit system of equations using Maximum Simulated Likelihood. Evidence is shown of the benefits of this approach for the estimated partial effects of diet and exercise on obesity propensity. This analysis also considers the importance of an individual's degree of planning within this system, and finds evidence that the effect of planning operates primarily through diet and exercise choices.

# Declaration

This work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution to Mark Christopher Dodd, and to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

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Mark Christopher Dodd

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