We conduct a randomized experiment with about 10,000 shoppers on an online grocery platform to examine the consequences of providing consumers with information about healthier alternatives when they add less healthy versions of certain food items to their shopping baskets. The four-month-long "Swap and Be Healthy "nudge, which highlighted the improved nutrient profile of specific alternative products, led to a significant and persistent increase in the purchase of healthier alternatives. The intervention also led to broader changes in shopping behaviour such as decreases in produce expenditure, number of products purchased, time spent shopping, and price sensitivity. Using machine learning methods to characterize the types of consumers the intervention impacts most, we analyze the relationship between a shopper's propensity to respond to the nudge and the spillover effects. We find that the nudge causes similar spillover effects for all treatment shoppers, including those unlikely to respond directly to the intervention. Additional tests provide evidence for a model of anticipated contemplation costs over explanations involving direct cognitive costs.