ABSTRACT

ASSESSING VERBAL MOTIVATING OPERATIONS AND THEIR INFLUENCE ON VIRTUAL FOOD SELECTION AND RELATIONAL RESPONDING

There is a concern regarding correspondence between verbal and overt behavior. Verbal behavior measured by the Implicit Relational Assessment Procedure (IRAP) has been found to have better correspondence with overt behavior than verbal behavior measured by self-reports (Nicholson & Barnes-Holmes, 2012). Additionally, Jackson et al. (2016) found that verbal behavior measured by the IRAP can be used to identify verbal stimuli (words or phrases) that increase exercising behavior. The authors conceptualized the verbal stimuli that increased exercising behavior as motivative augmentals. Motivative augmentals are verbal stimuli that increase the reinforcing value of a consequence, and thus increase the probability of behaviors for which the consequence is contingent. Furthermore, verbal behavior measured by the IRAP has been found to be malleable under the appropriate conditions (Cullen, Barnes-Holmes, Barnes-Holmes, & Stewart, 2009). The current study investigated the relationship between the IRAP, self-reports and simulated shopping behavior and evaluated the effects of a verbal intervention across each measure. Results of the study indicated that shopping and survey responses changed in the expected direction following the intervention, but implicit relational responding did not. In fact, there was very little correspondence between the IRAP and other results.

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ASSESSING VERBAL MOTIVATING OPERATIONS AND THEIR INFLUENCE ON VIRTUAL FOOD SELECTION AND RELATIONAL RESPONDING

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In his book, *Handbook of Research Methods in Human Operant Behavior*, B.F. Skinner mentions an informal research principle: “some people are lucky.” I have been extraordinarily lucky with respect to the environments that I have been exposed to, which have shaped the behaviors that have allowed me to get to the point that I currently am.

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CHAPTER 1: INTRODUCTION

Relational Frame Theory (RFT) is a behavior analytic account of language and cognition suggesting that verbal behavior involves arbitrarily applicable relational responding, and transformation of stimulus functions under relevant forms of contextual control. A relational response is a response to one stimulus based on its relation to another stimulus. An arbitrarily applicable relational response is a relational response that is not wholly under the control of the formal features of the stimulus. It has been proposed by Barnes-Holmes et al. (2006) that a relational response that is controlled by immediate contextual cues in the absence of elaboration can be considered "implicit," while the term "explicit" would refer to a response under the control of extended and elaborated contextual cues. A contextual cue is a feature of the environment that specifies the type of relation between stimuli. For example, if someone said "John is taller than Mark," then "is taller than" is a contextual cue.

The Implicit Relational Assessment Procedure (IRAP) is used to assess implicit relational responses to stimuli, and was developed within an RFT approach. The IRAP has been used to measure relational responding with respect to body image (Parling, Cernvall, Stewart, Barnes-Holmes, & Ghaderi, 2012), drug dependence (Carpenter, Martinez, Vadhan, Barnes-Holmes, & Nunes, 2012), sexual attraction to children among sexual offenders (Dawson, Barnes-Holmes, Gresswell, Hart, & Gore, 2009), attitudes towards different nationalities (Power, Barnes-Holmes, Barnes-Holmes, & Stewart, 2009), and several others. However, the majority of the IRAP research has failed to investigate the relationship between relational responses to a particular stimulus and overt behavior with respect to the same stimulus. This is an issue because, according to De Houwer

(2002), the primary goal of implicit measures is to be able to accurately predict overt behavior.

In one study on arachnophobia (Nicholson & Barnes-Holmes, 2012), overt behavior was shown to correlate with relational responding as measured by the IRAP. It was found that participants who related to spiders more fearfully completed less steps towards approaching a tarantula in a terrarium. Furthermore, research has found that relational responding, as measured by the IRAP, may be malleable under particular contexts. In another study (Cullen, Barnes-Holmes, Barnes-Holmes, & Stewart, 2009) participants completed an IRAP involving attitudes toward the elderly before, and after, an intervention involving exposure to respected elderly people. After the intervention, participants were shown to relate to the elderly more positively (Cullen et al., 2009). These findings beg the question: if a relational response to a stimulus correlates with an overt response to the same stimulus, and a variable is introduced that changes relational responding to the stimulus, what effects would it have on the overt response?

There is some research to suggest that the IRAP can also be used to identify stimuli that can alter the reinforcing value of a consequence and temporarily increase overt responding (Jackson et al., 2016). As such, the current study (1) measured the effects of verbal stimuli on overt behavior (healthy food selection) and relational responding and (2) investigated whether exposure to these stimuli would alter the motivative function of secondary verbal stimuli as they relate to healthy food selection behavior. More specifically, this study examined if exposure to one category of motivative augmentals not only affects overt and relational responding, but also other motivative augmentals.

CHAPTER 2: LITERATURE REVIEW

IRAP

The IRAP is a computer software program that has been used as a tool for assessing implicit ways of relating to stimuli (Barnes-Holmes et al., 2006). A sample stimulus is presented, and participants are trained to rapidly respond in a way that relates to the stimulus consistently and inconsistently. Latency measures (the duration of time it takes before a response is emitted) are used to determine which response corresponds with the way the participant relates to the stimuli; the response that results in a lower latency is the one that is hypothesized to correspond with the way the participant relates to the stimulus in the absence of further elaboration. Since its initial development, the IRAP has been shown to be difficult to fake. Specifically, IRAP results from participants given strategies to fake their responses have not significantly differed from responses from when they were not using such strategies (McKenna, Barnes-Holmes, Barnes-Holmes, & Stewart, 2007).

The IRAP is a procedure that has been adapted from the Implicit Association Test (IAT). The IAT was developed as a tool to assess attitudes or beliefs that are easily hidden when using explicit measures such as self-reports (De Houwer, 2002). The IAT presents participants with a stimulus to be associated with one of two options. The IAT is theorized to measure "associations." The IRAP has been modified in order to be consistent with behavior analysis and Relational Frame Theory. Instead of associations, the IRAP is theorized to measure relational response probabilities in context. The key difference between the IRAP and the IAT is that the IRAP includes specific relations, rather than general associations. For example, instead of a participant selecting that vegetables

are associated with fruit, the IRAP would have the participant select a specific relation between fruits and vegetables, such as “better than” or “similar to.”

As specified previously, the IRAP measures implicit responses, but the term “implicit” has no technical or explanatory meaning in RFT. It has been proposed by Barnes-Holmes et al. (2006) that a relational response that is controlled by immediate contextual cues in the absence of elaboration can be considered “implicit.” This definition would make the definition of implicit consistent with the Relational Elaboration and Coherence (REC) model’s definition of a brief and immediate relational response (BIRR) (Barnes-Holmes, Barnes-Holmes, Stewart, & Boles, 2010). The IRAP has a time pressure element in order to induce responses that do not have time to be elaborated on. As such, the IRAP attempts to capture BIRRs, rather than extended and elaborated relational responses (EERR). A clear example of a BIRR and EERR may be illustrated in the context of a participant responding to a self-report survey about prejudice. A participant may be asked to report what he thinks about a particular demographic. The participant’s brief and immediate relational response may be “African Americans are inferior to European Americans,” but may not write that as his response on the survey. The participant may briefly and immediately relationally respond to an African American as being inferior, but on a survey, may write that the demographic is equal to all other demographics. This may happen because the participant’s brief and immediate relational response did not cohere with his other relevant relational networks, such as “it is not socially acceptable to compare races.” Because self-reports do not include time pressure, they allow for elaborated and extended relational responses. Under conditions of time pressure, like in the IRAP, the participant does not have time to engage in a response that coheres with other relational responses such as “it is not socially acceptable to

compare races." Such a pattern of elaborations highlight potential issues regarding the predictive value of self-reports with respect to overt, non-verbal behavior.

Indeed, there is some evidence to suggest that BIRRs may be more predictive of overt, non-verbal behavior than EERRs. A study was conducted in which overt behavior was shown to correlate with IRAP results (Nicholson & Barnes-Holmes, 2012). Participants first completed a self-report on whether or not they feared spiders. Based on the results of the self-report, participants were assigned to one of two groups: anti-spider and pro-spider. Participants were then exposed to an IRAP that assessed the way they related to spiders. The IRAP included pictures of spiders and phrases such as "I can approach," and "scares me." The response options were "true" and "false." After completing the IRAP, participants were exposed to a Behavioral Approach Task (BAT). The BAT involved approaching a live tarantula in a terrarium quantified in six steps. The steps involved (1) opening the door to the room with the spider, (2) verbally agreeing to enter the room and look at the spider, (3) approaching the spider and looking at it for under 2 minutes, (4) approaching the spider and looking at it for at least 2 minutes, (5) touching the terrarium for under 2 minutes, and (6) touching the terrarium for at least 2 minutes. Participants' behavior was measured on a scale from 1-5 based on which step they reached.

Results showed that while both the self-report (EERR) and the IRAP (BIRR) correlated with the BAT (overt behavior) results, there was a discrepancy between the predictive accuracy of the self-report and IRAP. Contrary to self-report, seven participants who were assigned to the anti-spider group, completed all six BAT steps. Their IRAP scores, however, were more similar to IRAP results of participants from the pro-spider group. Therefore, the IRAP scores were more consistent with the BAT results than those of the self-report. It may be the case

that BIRRs correspond to overt behavior better than EERRs. While that may be true, whether or not changes to BIRRs correspond to changes in overt behavior has yet to be fully determined.

Malleability of Relational Responding

While limited, there is some research concerning the malleability of BIRRs. Cullen et al. (2009) found BIRRs, as measured by the IRAP, to be malleable under certain conditions. Participants who were exposed to multiple exemplar training involving pictures of admired elderly people responded more favorably to elderly people on the IRAP, but their self-report surveys were unaffected. The REC model supports these results with two assumptions. First, immediate or automatic responses may sometimes and sometimes not cohere with further relational responses. Said less technically, the first assumption is that initial BIRRs are typically rejected if they are not consistent with further elaborated relational responses. If a BIRR is rejected, that means that explicit (i.e., self-report) and implicit (IRAP) measures will diverge. Second, repeated stimulus exposures will impact BIRRs, but will not largely impact EERRs. In other words, exposure to positive elderly exemplars would increase positive responses to the elderly on the IRAP (BIRR), but not on the self-report survey (EERR). The study did not indicate how many exposures to the positive elderly exemplars were conducted, so it is unclear how many exposures are required to yield such results. It may be possible that the intervention would have had a larger effect if more exposures were contacted. Furthermore, while the IRAP results changed after the intervention, it remains to be seen if the participants' overt, as opposed to relational, responses would be any different as a result of these exposures. If the

participants' overt behavior was altered as a result of the exposures, it may be the case that the exposures functioned as a motivating operation.

Motivating Operations and RFT

Motivating operations are environmental events, operations, or stimulus conditions that affect organisms in two ways. First, they alter the reinforcing or punishing value of other events and stimuli. Second, they alter the frequency of an organism's repertoire relevant to such consequences (Michael, 1993). There are two types of motivating operations: establishing operations and abolishing operations. Establishing operations are evocative while abolishing operations are abative. Establishing operations are motivating operations that increase the reinforcing or punishing value of a consequence. As such, without an establishing operation, a behavior will not occur. Abolishing operations are motivating operations that decrease the reinforcing or punishing value of a consequence (Laraway, Snycerski, Michael, & Poling, 2003). Without abolishing operations, a behavior would never cease to occur. Common examples of establishing and abolishing operations are deprivation and satiation of a reinforcer, respectively.

Motivating operations are also relevant to rule-governed behavior. For example, verbal motivating operations may be in place if a consumer is more likely to buy a product after reading an advertisement indicating the superior quality of the product. While overt behavior was not measured, the multiple exemplar training implemented in the study mentioned previously by Cullen et al. (2009) may have functioned as a motivating operation for overt behavior. In order to assess rule-governed behavior, it is important to have a conceptual basis by which it can be analyzed. Relational Frame Theory (RFT) provides a conceptual basis for examining the functions of verbal stimuli (Hayes, Barnes-Holmes, &

Roche, 2001). RFT posits that there are three types of rule-governed behavior: pliance, tracking, and augmenting. Rule-governed behavior that alters the reinforcing value of a consequence is referred to as an augmental. Augmentals are verbal events that transform the stimulus functions of a consequence. There are two types of augmentals: those that are formative and those that are motivative. Formative augmentals establish a consequence as a punisher or reinforcer. An example of a formative augmental would be if someone gave out a ticket and said, "If you bring this back to me tomorrow, I will give you 100 dollars." However, it would only be considered a formative augmental if the ticket had not previously functioned as a reinforcer in the individual's history. Motivative augmentals temporarily alter the reinforcing or punishing strength of a consequence. As such, motivative augmentals are a type of motivating operation. An example of a motivative augmental would be if someone said, "Doesn't a cold glass of water sound nice?" and, as a result, the reinforcing value of water increased.

There is some research to support the role of motivative augmentals, or rule-governed motivating operations, on overt behavior. Ju and Hayes (2008) conducted an experiment in which children were put in a free operant condition. The children had free access to various reinforcers, including edibles and stickers. A hidden experimenter would say the name of a particular reinforcer, such as "Cheerio," on a variable interval schedule. The most frequently selected item was always the one that was being targeted. That is, when a particular food name was said on the interval schedule, that particular food was selected the most often, as were stickers, when "stickers" was being said on the interval schedule. Additionally, when nothing was said on an interval schedule, less selections were made overall. The voice did not function as a discriminative stimulus, because the items were always freely available. It is conceptualized by the researchers that the

voice functioned as a motivative augmental because the word was in a frame of coordination with the sensory properties of the physical item which was being referred to by the word. Ju and Hayes replicated their findings when they conducted equivalence training on the stimuli used as reinforcers with nonsense words (i.e., “spaks”).

Verbal statements have also been shown to function as establishing operations for water-drinking and stretching behaviors due to their sensory functions. A study on motivative augmentals found that when children were told a story about being in a desert, which utilized many words relating to heat and thirst, the children drank more water (Valdivia, Luciano, & Molina, 2006). Similarly, the same study showed that when children were told a story about being trapped inside a small box, they exhibited more stretching behaviors.

Advertisements and labels on different consumer products are likely to function as motivative augmentals for specific individuals with particular histories. Food products are commonly associated with labels, such as “sugar free,” “organic,” and “natural” which may function as motivative augmentals, similar to the way the words used in the study conducted by Ju and Hayes (2008) did. A banana may function as a reinforcer, but if the label “organic” increases the reinforcing value of the banana, then the label is functioning as a motivative augmental. While there is extensive research on the addition of stimuli to influence healthy eating, particularly at the point-of-purchase, much of it remains conceptually vague as to how these stimuli function with respect to the target behavior.

Point-of-Purchase Interventions as Motivative Augmentals

Sonnenberg et al. (2013) used a labeling system in a hospital cafeteria to indicate which foods were healthy, somewhat healthy, and unhealthy. In addition to the primary independent variable, pamphlets containing information on healthy eating, as well as on-site nutritionists, were made available to consumers. According to self-report data during baseline, 46% of the surveyed participants said they considered nutritional value to be an important factor involved when determining what to buy, whereas after the intervention the amount increased to 61%. During baseline, 15% of the surveyed participants said they checked labels for nutritional value. After the intervention, 33% reported that they checked labels for nutritional value. It is possible, that this intervention impacted the relational networks of participants such that particular ingredients or nutrients began to function as motivative augmentals. This interpretation would explain why participants were more likely to check the nutrition labels after participating in the intervention. One limitation of the experiment was that it relied exclusively on self-report data. Additionally, because individual observations were not performed, it is unclear how many times each individual was exposed to the pamphlets and nutritionists and what kind of contact each individual had with the pamphlets and nutritionists.

Another point-of-purchase study that intervened on healthy eating in a cafeteria setting may have utilized stimuli that functioned as motivative augmentals. When a sign was placed in a cafeteria that equated low-fat foods with lower cholesterol and a healthier heart, consumers selected more low-fat foods (Mayer, Heins, Vogel, Morrison, & Jacobs, 1986). During the first and second baselines, low-fat entrees were selected 20% and 27% respectively. During the intervention, and the additional replication phase of the intervention, low-fat

entrees were selected 37% and 34% respectively. It is possible that the relational networks of some of the participants were altered in such a way that lead “low-fat” to function as a motivative augmental. This may have happened because the participants may have related to their hearts as important through a rule such as “If I don’t maintain a healthy heart, I will die.” The sign stated a causal relationship between low cholesterol and a healthy heart as well as a causal relationship between low-fat foods and low cholesterol. If a person contacts a rule such as “If I don’t maintain a healthy heart, I will die” in addition to “maintaining low cholesterol will help maintain a healthy heart” and “eating low-fat entrees will help maintain low cholesterol,” stimulus functions for low-fat food may transform in such a way that the low-fat entrees become more reinforcing than alternative food choices. A limitation of this study is that it is unclear which aspects of the sign were effective. The sign included a causal relation between “low-fat food” and “low cholesterol” as well as a causal relation between “low cholesterol” and a “healthy heart.” It is not known if the intervention would have had the same effect without mentioning a “healthy heart.” Alternatively, it is possible that the intervention would have had the same results if the sign included only a causal relationship between “low-fat food” and a “healthy heart.”

Verbal interventions on healthy eating have also been effective in store settings. An experiment in a convenience store demonstrated that a sign with the phrase “Dried fish is good for your health, builds up your muscles and helps to keep you in shape” increased sales of dried fish (Larsen & Gunnarsson, 2014). However, the statement was never analyzed as an independent component; the dried fish display was moved to the front of the store during this condition of the experiment. Without analyzing the sign component of the intervention on its own, it is not possible to know if the sign alone was responsible for the increased sales.

However, if it had an effect, it is likely that either being healthy, strong (having muscles), in shape, or a combination of the three were reinforcing events for the participants whose behavior changed. If one or more of the three events functioned as a reinforcer for an individual, then contacting a rule that specifies a causal relationship between consuming the product and an established conditioned reinforcer should increase the reinforcing value of the product.

Similar effects were found when interventions were applied in restaurant settings. When menu choices at a restaurant were manipulated to include labels indicating particular foods as “low in calories” or “calorie conscious,” consumption of healthier food options increased among self-reported dieters but not among non-dieters (Papies & Veling, 2012). These results can be explained on a conceptual level by motivative augmentals. “Low in calories” functioned as a motivative augmental for people who were dieting because they related to “low in calories” in a positive way, thus increasing the reinforcing value of the items associated with such a label. Those who were not on a diet did not relate to “low in calories” in a positive way, hence the non-significant change in results relative to baseline.

Previous research indicated the malleability of relation responding (Cullen et al., 2009). The studies just cited demonstrate that stimulus presentations, which may function as motivative augmentals, can alter overt behavior (purchasing). However, as shown by Papies and Veling (2012), how a person relates to a stimulus may determine if it functions as a motivating operation. Because the way an individual relates to stimulus may predict if the stimulus functions as a motivating operation, some studies have investigated utilizing the IRAP to identify potential motivative augmentals.

The IRAP and Identifying Motivative Augmentals

Jackson et al. (2016) conducted a study in which the IRAP was used to assess how participants related to different long-term positive outcomes of working out, specifically aesthetic and health benefits. The results of the IRAP determined if an aesthetic or health phrase would be written on a card, which the participants would read during the motivational condition. Participants were exposed to three different conditions in an alternating treatment design. During baseline, participants took part in a cycling class without being exposed to any cards with phrases. During the instructional condition, participants were exposed to a card with a phrase related to the instructor's description of the proper exercise topography (e.g., "keep your shoulders down and push through your heels"). During the motivational condition, participants were exposed to a phrase based on their IRAP results. Participants worked harder during the motivational condition relative to other conditions, as evidenced by their heart rates. As such, the authors concluded that the motivational phrases on the cards functioned as motivative augmentals. These findings support the use of the IRAP as a method for identifying stimuli that may function as motivative augmentals.

Rafacz (2010) also utilized the IRAP to identify motivative augmentals. They conducted a study in which a variation of the IRAP was used to assess how participants related to stimuli within cooperative and individual stimulus classes. More specifically, the IRAP was used to identify stimuli within each of the stimulus classes that the participants related to most positively. The effect of these pro-individual and pro-cooperative stimuli on cooperative and individual responding during a data-entry task was then assessed. The messages that included stimuli identified by the IRAP, relative to neutral messages, temporarily altered responding under the different conditions. These results further validate the utility

of the IRAP as a method for identifying stimuli that may function as motivative augmentals.

While Jackson et al., (2016) and Rafacz (2010) found that the IRAP was useful in identifying stimuli that served a motivative function, no attempts were made to change the function of other stimuli. What remains to be seen is the effect of putting a potential motivative augmental, in a frame of coordination with a secondary verbal stimulus that does not function the same way. Therefore the current study evaluated the effects of placing a stimulus that functions as an establishing operation in a frame of coordination with a secondary stimulus that functions as an abolishing operation, to see if the secondary stimulus would still function as an abolishing operation. The effect of this procedure on both overt and relational responding was evaluated.

CHAPTER 3: METHOD

Participants and Setting

Fifteen participants were recruited by posting flyers on the campus of California State University, Fresno (see Appendix A). Participants were all between the ages of 18 to 25. The human rights board reviewed the proposed experiment and participants completed informed consent forms (see Appendix B) prior to beginning the study.

The experiment took place in a small lab room on the campus of California State University, Fresno. The room included a chair, desk, computer, and one-way mirror. The researcher was inside the room while delivering instructions to the participant; subsequently, the researcher waited outside the room watching through the one-way mirror while the participant completed procedures on the computer.

Materials

Two types of software were installed on the computer: the IRAP software and shopping simulation software. The specific IRAP software used was The Open Source IRAP 0.9.8.1 (2015) developed by Ian Hussey. The IRAP software was used to measure changes in relational responding. The shopping simulation software was used to measure the second dependent variable, which was shopping behavior. Further details of both are provided below.

Experimental Design and Procedures

The purpose of the current study was to investigate the relationship between attitudes and shopping behavior. Specifically, this experiment was intended to evaluate the change in attitude and shopping behavior after making

contact with the IV. Pre and post assessments of explicit (EERR) and implicit (BIRR) measures of relational responding were conducted to determine the effect of the IV on attitudes, while a non-concurrent multiple baseline across subjects design was conducted to determine the effects of the independent variable on shopping behavior.

The experiment took place across three sessions. These sessions occurred across 3 days of the same week. During the first session, participants completed a survey, and two IRAPs. The survey determined pre-intervention levels of EERR and the first IRAP determined pre-intervention levels of BIRR, also known as attitudes. The second IRAP (evaluating attitudes towards health and aesthetics) was initially involved in determining which independent variable would be selected, but was removed from the decision-making process before the study was conducted. Specifically, while these attitudes were tracked, they did not contribute to the IV stimulus selection. After finishing the IRAPs and survey, participants completed either one, two or three blocks of shopping simulation trials, which served as baseline for the overt response.

The independent variable was introduced during the second session. This involved multiple stimulus exposures to health information videos over the course of three blocks of the shopping simulation. After the shopping simulation blocks, participants completed the survey and the IRAP again as post-intervention measures of self-report and attitudes.

As a maintenance probe of shopping behavior, participants completed one final block of the shopping simulation trials during the third session. Participants then completed the survey and the IRAP for the third and final time to assess maintenance of self-report and attitude effects before being debriefed.

Pre-Intervention Measures and IV Identification

As mentioned previously, before beginning baseline for overt responding, a survey and IRAP were administered.

Survey

Participants completed a short survey asking them to rate how important individual macronutrients are on a scale of 1-3 (see Appendix C). Specifically, participants were asked to rate whether it is "bad," "okay," or "good" to consume fats, carbs, and proteins. Again, this served as a pre-intervention assessment of EERR, and will be referred to henceforth as "self-report."

IRAP

Figure 1 is an example of an IRAP trial. The purpose of the IRAP is to assess how an individual relates to a sample stimulus ("unsaturated fat" in Figure 1). The word below the sample stimulus is the target stimulus that the sample stimulus is being related to ("good" in Figure 1). Two relational terms options are indicated on the bottom left and right ("similar" and "different" in Figure 1). Using Figure 1 as an example, to relate "unsaturated fat" to "good" the participant could indicate that the sample stimulus and target stimulus are "similar" by pressing the "D" key or "different" by pressing the "K" key. Additionally, there are two types of IRAP blocks (a series of IRAP trials): consistent and inconsistent. At the start of a consistent block, text appeared on the screen to prompt the participant to respond with respect to a rule, such as "respond as if fat is good." If the participant is on a consistent block, they would need to select "similar" given the target stimulus "good", or "different" given the target stimulus "bad", in order to move on to the next trial. If a participant selected the incorrect response, a red "x" would appear on the screen until the correct response was selected. During an

inconsistent block, the participant would be prompted to respond with respect to a rule that is the opposite of the consistent trial, such as “respond as if fat is bad.” If a participant was on an inconsistent block, they would need to select “different” given the target stimulus “good,” or “similar” given the target stimulus “bad,” in order to move on to the next trial. The dimension of measurement used by the IRAP is latency. Latency is the duration of time between the initial stimulus presentation, and the first correct response. Latencies during consistent blocks were compared with inconsistent blocks to determine a D-value, which represents the strength of a relational response (see Data Analysis below for details). It is hypothesized that longer latencies indicate that the relational response has less coherence with the participants’ relational network.

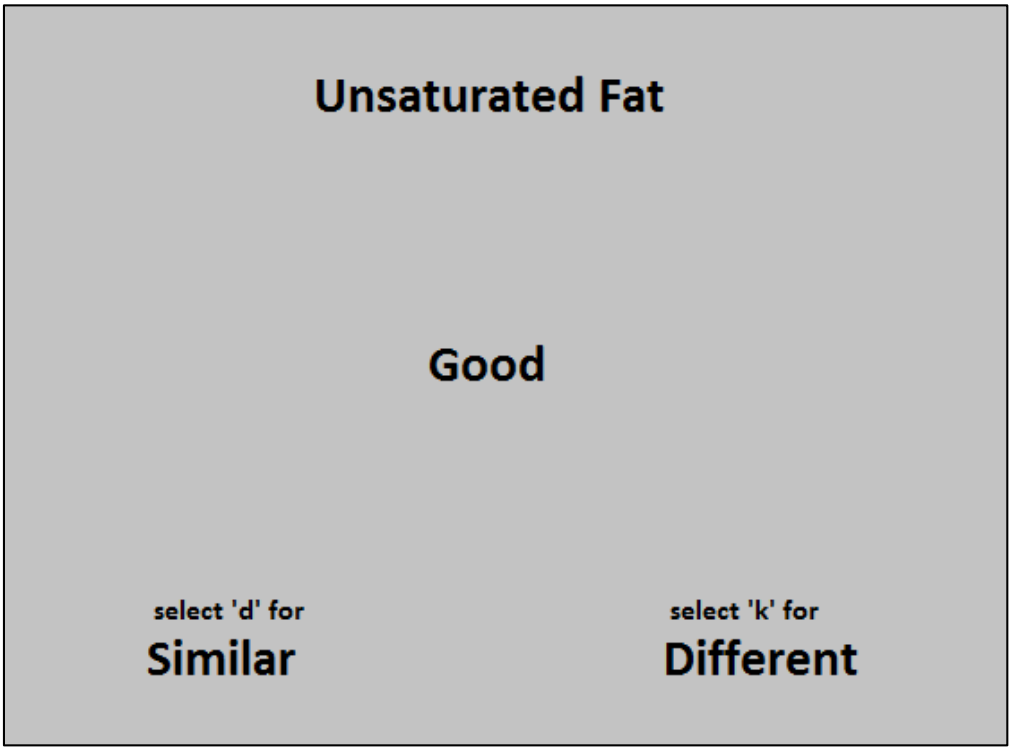

Figure 1. Example of an IRAP trial.

The target stimuli for the IRAP were “good” and “bad” and the relational terms were “similar” and “different.” There were two categories of sample stimuli during the IRAP: four that were related to carbohydrates and four related to fats (see Appendix D for sample stimuli).

Baseline of Overt Responding

Shopping Simulation

During the shopping simulation, the participant sat at a computer, similar to shopping online, and were provided with products to purchase. The products were arranged in a series of 20 paired-choices between similar food options. Six out of the 20 paired choices were between identical products. The only difference between products in these six paired-choices was that one product was labeled “fat-free” or “low-fat.” See Appendix E for a full list of the food products. Each paired choice included a picture of two food products. Each picture included a nutritional information label with the total amount of carb, fat and protein content. After the participant selected which item to purchase, a new paired choice would appear on the screen. The participant did not have the option to return to any previous selections. This process continued until 20 choices were made, at which point the shopping simulation block ended.

Intervention

Following baseline, participants were exposed to sets of short videos before completing each subsequent block of shopping simulation trials. These videos were animated and included a person, indicated as a nutritionist, giving a talk. The nutritionist gave a short speech about the macronutrient fat. Participants were exposed to six unique videos. That is, no video content was repeated. The content

of the videos was determined by their baseline results (see details below and in Figure 2). At the end of each video, the participant was required to correctly answer a question concerning the content of the video in order to move on (see Appendices F-I). If the participant selected an incorrect answer, the video would replay and another opportunity to answer the question would be provided.

Participants whose baseline results indicated that they were more likely to select full-fat products contacted the Fat Detriments Stimulus Exposure (see Appendix F and G). During the Fat Detriments Stimulus Exposure, participants watched videos that included information about the negative long-term consequences associated with eating fat. The negative long-term-consequences described were associated with aesthetics (see Appendix F) and health (see Appendix G).

Participants whose baseline results indicated that they were less likely to select full-fat products contacted the Fat Benefits Stimulus Exposure (see Appendix H and I). During the Fat Benefits Stimulus Exposure participants watched videos that included information about the positive long-term consequences associated with eating fat. The positive long-term-consequences were associated with aesthetics (see Appendix H) and health (see Appendix I)

Figure 2 is a decision tree regarding how participants were placed into conditions. Participants were assigned to conditions first based on shopping selection data, then IRAP results, and finally survey data. Specifically, if a participant selected an average of 3.4 or more full-fat products (versus low-fat) they contacted the Fat Benefits Stimulus Exposure. Conversely, if a participant selected an average of 2.5 or less products with full-fat they contacted the Fat Detriments Stimulus Exposure. If a participant selected an average of 2.6 to 3.3 products with full-fat (a neutral response), their baseline IRAP data (D-values)

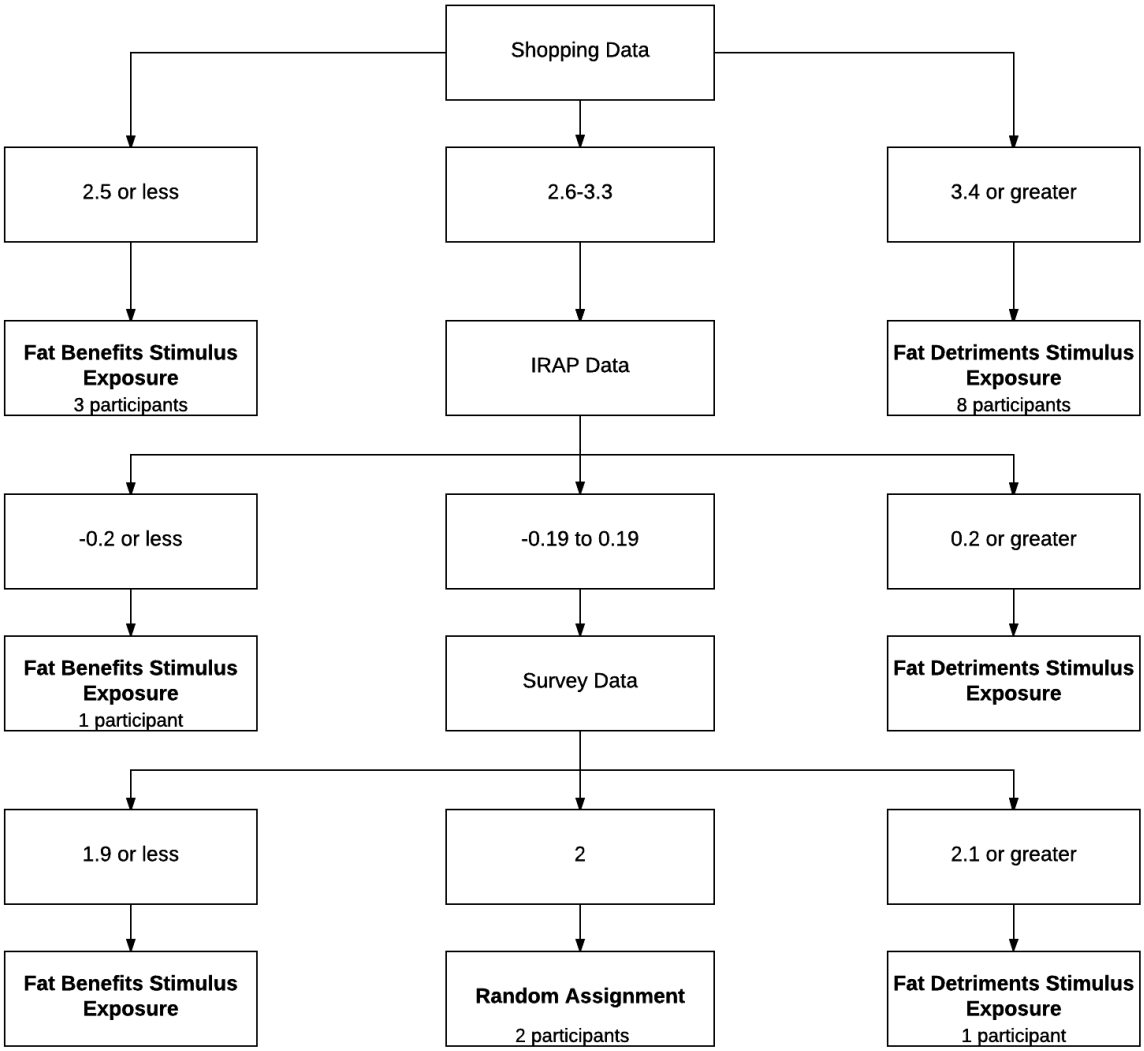

Figure 2. Decision tree for determining which independent variable the participants were exposed to and the number of participants who ended up in each condition.

would determine which stimulus exposure would be contacted. If a participant scored a D-value of 0.2 or higher on the IRAP, they contacted the Fat Detriments Stimulus Exposure, and a -0.2 or lower, they contacted the Fat Benefits Stimulus Exposure. If a participant scored a D-value from -0.19 to 0.19 (a neutral response), their survey (self-report) baseline data would determine which stimulus exposure they contacted. If a participant's self-reported rating of fat was 2.1 or higher they contacted the Fat Detriments Stimulus Exposure. If a participant's self-reported rating of fat was 1.9 or less, they contacted the Fat Benefits Stimulus Exposure. If a participant's self-reported rating of fat was 2, they were randomly assigned to either the Fat Benefits Stimulus Exposure or the Fat Detriments Stimulus Exposure.

The Fat Detriments Stimulus Exposure was intended to shift all dependent variables (self-reported ratings from the survey, D-values from the IRAP and full-fat selections from the shopping simulation) to lower values. The Fat Benefits Stimulus Exposure was intended to shift all dependent variables to higher values. In total, 5 participants contacted the Fat Benefits Stimulus Exposure and 10 participants contacted the Fat Detriments Stimulus Exposure.

Post-Intervention and Maintenance

Post-intervention and maintenance assessments of self-reports and attitudes were conducted via the survey and IRAP. Maintenance of shopping behavior was assessed with a final block of shopping simulation trials. Maintenance assessments took place between 24 to 48 hours after the intervention to replicate data collection methods of past IRAP research (Cullen et al., 2009).

Data Analysis

Attitudes: IRAP

As mentioned previously, the primary measure of attitudes for the IRAP is latency. This is defined as the amount of time that passes between the stimulus presentation and the first correct response. If a participant's IRAP data included latencies less than 300ms for more than 10% of test trials, all of that participant's IRAP data were omitted, and the participant was excused from the study. All trials that included latencies greater than 10,000ms were also omitted. D-values were calculated by subtracting the mean latencies of block A (consistent) from block B (inconsistent), then subsequently dividing that value by the standard deviation of latencies from both blocks A and B.

D-values were calculated for each individual's IRAP data. The D-values were used to determine the strength of an attitude. A higher D-value indicated a positive attitude towards fat, while a lower D-value indicated a negative attitude towards fat. Specifically, a D-value from -0.19 to 0.19 indicated a neutral attitude towards fat. A D-value from 0.2 to 0.4, 0.5 to 0.7, and 0.8 and above indicated a weak, medium, and strong positive attitude towards fat respectively. A D-value from -0.2 to -0.4, -0.5 to -0.7, and -0.8 and below indicated a weak, medium, and strong negative attitude towards fat respectively

The D-values from the IRAPs that were completed before and after the intervention were analyzed visually. The participants' D-values before and after the intervention were also compared using a paired sample T-test to assess statistical significance.

Self-Report: Survey

Self-reports ratings were measured by calculating the average rating of each macronutrient. For example, if a participant gave fat a rating of 1, fatty acid a rating of 2 and saturated fat a rating of 3, then their average fat rating would be measured as 2. Values of 2 were considered neutral. Values above 2 were considered pro-fat. Values below 2 were considered anti-fat.

Overt Responding: Shopping Simulation

A change in shopping behavior was measured as the percentage of full-fat products selected and the total fat content purchased. Data were analyzed visually within and across participants. Within participants, data from each baseline condition was compared to data from the stimulus exposure condition and at follow-up. Across participants, data from ongoing baseline was compared to data from the stimulus exposure condition on a block-by-block basis. For example, if participant one was in a stimulus exposure condition during shopping block five, and participant two was in baseline during shopping block five, these data points were compared. Lastly, Pearson R tests were conducted to assess the correlations between the IRAP D-values, shopping behavior, and the survey self-report responses.

CHAPTER 4: RESULTS

Effects of the Independent Variable

A summary of baseline responding for all dependent variables across baseline, treatment, and maintenance can be found in Table 1. The blue in baseline indicates that there was correspondence between the measures. The purple in treatment indicates that the measure shifted in the expected direction. The red in treatment and maintenance indicate that the measure shifted in the opposite of the expected direction. The green in maintenance indicates that the measure maintained treatment-level responding and the dark blue indicates that the measure continued to shift in the expected direction. The yellow in maintenance indicate that the measure shifted back to baseline levels. See Appendix J (participants who contacted the Fat Detriments Stimulus Exposure) and K (participants who contacted the Fat Benefits Stimulus Exposure) for individual graphs for each participant.

Ten participants (1, 3, 5, 9, 10, 11, 12, 13, 14, 15) changed their shopping behavior in the expected direction after contacting the stimulus exposure. Of those 10 participants, 6 (1, 5, 9, 10, 12 and 14) contacted the Fat Detriments Stimulus Exposure and the other 4 (3, 11, 13 and 15) contacted the Fat Benefits Stimulus Exposure. Nine of those participants (all mentioned previously, excluding participant 13) maintained treatment-level responding during maintenance. In addition, participant 1's shopping behavior moved further into the expected direction during maintenance relative to treatment levels. The remaining five participants who did not shift shopping behavior in the expected direction maintained baseline shopping levels during both the treatment and maintenance conditions.

Table 1

A Summary of Each Participants' Data for Average Number of Full-Fat Selections During the Shopping Simulation, IRAP D-Values, and Self-Reported Ratings of Fat on the Survey from Each Condition

	Baseline Day				Treatment Shift Day			Maintenance Day		
Participant	Number of full-fat selections	IRAP DValue	Self-Reported Fat Rating	Expected Shift	Number of full-fat selections	IRAP DValue	Self-Reported Fat Rating	Number of full-fat selections	IRAP DValue	Self-Reported Fat Rating
3	AF (1)	N (0.05)	AF (1.3)	PF	N (3)	PF (0.31)	PF (2.6)	N (3)	N (0.18)	N (2)
8	N (2.9)	N (0.001)	N (2)	PF	N (3)	PF (0.48)	N (2)	N (3)	PF (0.47)	N (2)
11	AF (0)	PF (0.3)	AF (1.3)	PF	PF (6)	N (-0.14)	PF (3)	PF (5.7)	N (-0.05)	PF (3)
13	N (3.3)	AF (-0.25)	AF (1.3)	PF	PF (6)	N (0.13)	PF (3)	N (3)	PF (0.33)	PF (3)
15	AF (1.8)	AF (-0.20)	AF (1.3)	PF	PF (4)	N (0.02)	N (2)	PF (4)	PF (0.26)	N (2)
1	N (3)	N (0.05)	PF (2.3)	AF	AF (2.4)	N (-0.1)	AF (1.6)	AF (1)	N (0.11)	AF (1.6)
2	PF (6)	N (-0.17)	AF (1.3)	AF	PF (6)	N (0.0)	AF (1.6)	PF (6)	N (-0.02)	PF (2.3)
4	PF (5.9)	N (0.09)	AF (1.6)	AF	PF (6)	PF (0.28)	N (2)	PF (6)	PF (0.41)	N (2)
5	PF (6)	AF (-0.26)	PF (2.3)	AF	AF (0)	N (-0.17)	AF (1.6)	AF (0)	N (-0.14)	AF (1.6)
6	PF (6)	N (-0.16)	N (2)	AF	PF (6)	N (-0.14)	N (2)	PF (6)	PF (0.26)	AF (1.6)
7	PF (4)	N (0.001)	AF (1.6)	AF	PF (4)	PF (0.22)	AF (1.3)	PF (4)	PF (0.32)	AF (1.3)
9	PF (6)	N (0.19)	PF (2.3)	AF	AF (0)	PF (0.5)	AF (1.3)	AF (0)	N (0.10)	AF (1)
10	PF (3.2)	N (0.04)	N (2)	AF	AF (0)	PF (0.32)	AF (1)	AF (0)	N (-0.11)	AF (1)
12	PF (4.7)	N (-0.08)	N (2)	AF	AF (0)	N (-0.09)	AF (1)	AF (0.3)	AF (-0.21)	AF (1)
14	PF (5.4)	N (-0.18)	N (2)	AF	AF (0.3)	N (-0.06)	AF (1)	AF (1)	N (0.00)	AF (1)

Correspondence between measures

Moved in the opposite of the expected direction

Continued to move in the expected direction, but during maintanence

Moved in the expected direction

Back to baseline levels

Measure	Anti-Fat (AF)	Neutral (N)	Pro-Fat (PF)
Shopping Simulation Full-Fat Selections	0-2.5	2.6-3.3	3.4-6
IRAP D-Value	-0.2 or lower	-0.19 to 0.19	0.2 or higher
Self-Reported Fat Rating	1-1.9	2	2.1-3

Note: Refer to Figure 2 for a decision tree regarding treatment placement.

After contacting the stimulus exposure, 12 participants (1, 2, 3, 5, 7, 9, 10, 11, 12, 13, 14, 15) changed their self-reports in the expected direction. These 12 participants include all 10 of the participants whose shopping behavior moved in the expected direction. Additionally, 9 of the 12 participants (1, 5, 7, 10, 11, 12, 13, 14, 15) maintained treatment-level responding during the maintenance condition. As for the other three participants' self-reports during maintenance, one (9) shifted further in the expected direction, one (3) reverted to baseline levels, and one (2) moved in the opposite of the expected direction.

After contacting the stimulus exposure, four participants' (3, 8, 13, 15) IRAP results shifted in the expected direction. During maintenance, two of those four participants' (13, 15) IRAP results continued to shift in the expected direction, while the other two participants' IRAP results returned to baseline levels (participant 3) and maintained treatment levels (participant 8). After contacting the stimulus exposure, six participants' (4, 5, 7, 9, 10, 11) IRAP results shifted in the opposite of the expected direction. During maintenance, two of those six participants' (4, 7) IRAP results continued to shift in the opposite of the expected direction, while another two participants' (9,10) IRAP results shifted back to baseline levels, and the last two participants' (5, 11) IRAP results maintained treatment levels. Two participants' (6, 12) IRAP results did not shift until maintenance, at which point IRAP results shifted in the expected direction for participant 12, and the opposite of the expected direction for participant 6.

Paired sample T-tests were run to test for statistical significance between IRAP scores before and after the stimulus exposures. Additionally, we ran paired sample T-tests to test for statistical significance between the baseline and maintenance IRAP scores. A two-tailed T-test for all participant data (N = 15) yielded a statistically significant result pre to post treatment (p=0.028) and from baseline to maintenance (p=.03) (see Appendix L for full statistical analysis). One-tailed T-tests were also conducted for participants who contacted the Fat Detriments Stimulus Exposure (N = 10), and while the pre-post difference was statistically significant, (p=.022) the change was in the wrong direction. This means that we expected IRAP results (D-values) for participants who contacted the Fat Detriments Stimulus Exposure to decrease overall, but they increased. However, the difference between baseline and maintenance was not statistically significant (p=0.089) (see Appendix M for full statistical analysis). Similar one-

tailed T-tests conducted for the Fat Benefits Stimulus Exposure group (N = 5) did not yield statistically significant results (see Appendix N for full statistical analysis).

Correspondence Between Dependent Variables

Pearson correlation coefficients were calculated to analyze relationships between the shopping behavior, self-reports and attitudes during baseline, treatment, and maintenance. Matrixes were made for all participants (see Table 2), participants who contacted the Fat Detriments Stimulus Exposure (see Table 3), and participants who contacted the Fat Detriments Stimulus Exposure (see Table 4). In general, attitudes did not have a strong correspondence with shopping behavior or self-reports. In other words, IRAP results were not predictive of shopping behavior. Calculating a Pearson correlation coefficient for IRAP results and shopping behavior results for all participants yielded values of -0.39, -0.12, and 0.49 for baseline, treatment and maintenance conditions respectively. Correlations for the IRAP and survey results were 0.02, -0.04, and 0.32 for baseline, treatment and maintenance conditions respectively. Correlations for shopping behavior and survey results yielded values of 0.49, 0.70, and 0.63 for baseline, treatment and maintenance conditions respectively. Therefore, the strongest, consistent relationship was between shopping behavior and survey results. This is true for all participants as well as when participants are separated by stimulus exposure (see Tables 3 and 4).

This lack of correspondence is also indicated when looking at the participants on an individual basis (see Table 1 for a summary; see Appendix J and K for individual graphs for all participants). During baseline the IRAP results were only predictive of shopping behavior for three participants (1, 8, 15). Survey

Table 2

Pearson Correlation Coefficient Matrix for All Participants

All Participants (N = 15) Pearson Correlation Coefficient Matrix			
Relationship	**Baseline**	**Treatment**	**Maintenance**
IRAP and Shopping	-0.39	-0.12	0.49
IRAP and Survey	0.02	-0.04	0.32
Survey and Shopping	0.49	0.7	0.63

Table 3

Pearson Correlation Coefficient Matrix for Participants Who Contacted the Fat Detriments Stimulus Exposure

Fat Detriments Stimulus Exposure Participants (N = 10) Pearson Correlation Coefficient Matrix			
Relationship	**Baseline**	**Treatment**	**Maintenance**
IRAP and Shopping	-0.34	-0.07	0.68
IRAP and Survey	0.11	-0.17	0.35
Survey and Shopping	-0.17	0.77	0.75

Table 4

Pearson Correlation Coefficient Matrix for Participants Who Contacted the Fat Benefits Stimulus Exposure

Fat Benefits Stimulus Exposure Participants (N = 5) Pearson Correlation Coefficient Matrix			
Relationship	**Baseline**	**Treatment**	**Maintenance**
IRAP and Shopping	-0.8	-0.77	-0.83
IRAP and Survey	0.05	-0.49	-0.46
Survey and Shopping	0.45	0.77	0.47

results were predictive of shopping behavior for two of those participants (8, 15) and for an additional three participants (3, 5, 9).

Four participants' (5, 9, 10, 11) shopping behavior shifted towards the expected direction during the treatment condition while their IRAP results shifted in the opposite direction. Three participants' (3, 13, 15) shopping behavior shifted with their IRAP results in the expected direction during the treatment condition. All 10 participants (1, 3, 5, 9, 10, 11, 12, 13, 14, 15) whose shopping behavior shifted in the expected direction during the treatment condition also shifted their self-reports in the expected direction. Of the 6 participants (4, 5, 7, 9, 10, 11) whose IRAP results shifted in the opposite of the expected direction, only participant 4 had another dependent variable (survey results) shift in the same direction.

During maintenance, every dependent measure that continued to shift did so in isolation. For example, participant 1's shopping behavior continued to shift in the expected direction during maintenance, but their IRAP results and self-report did not. The same pattern occurred for participants whose IRAP data continued to shift (12, 13, 15) and for participants whose survey results continued to shift (6, 9). The same pattern can also be seen for dependent variables that shifted in the opposite of the expected direction during maintenance. For example, participant 2's survey results shifted in the opposite of the expected direction, but their IRAP results and shopping behavior did not covary with it. This also occurred for the 3 participants (4, 6, 7) whose IRAP results shifted in the opposite of the expected direction during the maintenance condition.

CHAPTER 5: DISCUSSION

Effects of the Independent Variable

The data show that the independent variable had an effect on responding. Specifically, 66% of participants' shopping behavior shifted in the expected direction after contacting the stimulus exposures. While the effect on shopping behavior is clear, how the stimulus exposure functioned is more difficult to determine. It may be the case that the stimulus exposures transformed the stimulus functions of low-fat in such a way that the low-fat labels began to function as motivative augmentals. In other words, the stimulus exposure changed the way participants view fat, and as a result, their shopping behavior with respect to products with low-fat labels changed. However, due to the fact that IRAP results often did not correspond with shopping behavior while the survey results did, it is unlikely that the stimulus exposure functioned as a motivative augmental for most participants.

An alternative possibility is that contact with the stimulus exposures led to contact with a ply. RFT defines a ply, or pliance, as a type of rule-governed behavior that is controlled by an individual's history of social reinforcement contingent on a frame of coordination between the rule itself and the individual's behavior (Hayes et al., 2001). In other words, pliance is following a rule because following the rule can be detected by others. A ply is the specific rule itself. The content of the stimulus exposures was information regarding either negative or positive health and aesthetic consequences of fat consumption, and the flyers recruiting participants referred to the experiment as a marketing study. In such a context it may have been clear to some participants that the stimulus exposures were intended to shift their responding on the shopping simulations. Additionally,

if a ply is responsible for the change in shopping behavior, it is likely that the ply had a similar effect on the survey results. While pliance cannot be ruled out as a possibility, it could explain responding for participants 1, 12, and 14, whose shopping behavior shifted in the expected direction, but whose IRAP results maintained baseline levels during the treatment condition.

In addition, the stimulus exposures stretched the truth. The Aesthetics (see Appendix F) and Health Detriments (see Appendix G) Stimulus Exposures emphasized the negative long-term effects of consuming too much trans-fat, but only referred broadly to fat rather than trans-fat. Similarly, the Aesthetics (see Appendix H) and Health Benefits (see Appendix I) emphasized the positive long-term effects of consuming omega fatty acids, but only referred broadly to fat rather than omega fatty acids. Because of this, it may be the case that contact with the stimulus exposures, for some participants, did not cohere with pre-established relational networks. As such, some participants' extended and elaborated relational responses to the stimulus exposure may have in fact functioned as motivative augmentals for the opposite of the expected shopping behavior. In other words, because we stretched the truth some participants might have not believed the stimulus exposure, and instead, contact with it may have bolstered their own beliefs regarding fat. A combination of contact with incoherence between the verbal stimuli and pre-established relational networks and pliance could be a better explanation for participants 5, 9, 10 and 11. These participants' shopping behavior and survey results shifted towards the expected direction while their IRAP results shifted in the opposite of the expected direction.

Correspondence Between Dependent Variables and Limitations of the IRAP

Self-reports had moderate to strong correspondence with shopping behavior (R = 0.49 to 0.70) throughout the study. However, the IRAP had poor correspondence and in some cases, predicted the opposite of actual shopping results. Some of this variability could be explained by pliance and incoherence between the stimulus exposures and pre-established relational networks as described previously, but not the baseline levels, since the stimulus exposures had not yet been contacted. A meta-analysis of the IRAP found that it had test-retest reliability similar to other implicit measures, which is relatively low compared to explicit measures (Golijani-Moghaddam, Hart, & Dawson 2013). As such, some of the variability in IRAP responding from pre to post-treatment and during the maintenance phase may be due to low test-retest reliability. As such, it may be better to use self-reports to assess relational responding rather than IRAPs in applied settings. However, there are several concerns with the stimuli utilized in the IRAP that may have also contributed to a lack of correspondence with other measures. These include a lack of familiarity with the stimuli by participants, dissimilar stimuli between the different assessments, and complexity of the term "fat."

Regarding lack of familiarity, the sample stimuli on the IRAP (see Appendix D) included various types of fats and carbs, such as fructose. One participant mentioned that he did not know if fructose was a fat or a carbohydrate until he derived the relationship by completing IRAP trials. Indeed, most of the participants were college students who may have infrequent contact with such stimuli and therefore may not relate to them significantly. This is consistent with the fact that 73% of participants scored neutral D-values on the IRAP during baseline. It is also possible that participants relate to fat in general differently than

they relate to specific types of fat. If a participant had a strong relational response to “fat” but not “monosaturated fat,” “fatty acids,” or “saturated fat” their D-score would be skewed.

Another important distinction is found with the response options for each assessment. Specifically, the IRAP’s response options were “similar” and “different” with respect to the target stimuli “good” and “bad.” The survey response options were “bad to consume,” “okay to consume,” and “good to consume.” The response options for the shopping simulation were selecting one of two food products, some of which had low-fat labels. Past research attempting to analyze the relationship between IRAP data and overt behavior used response options on the IRAP such as “I will approach” in response to pictures of spiders instead of words (Nicholson & Barnes-Holmes, 2012) and the over behavior measure was approaching a real spider. Therefore, the IRAP in the study conducted by Nicholson and Barnes-Holmes had response options that were more similar to the overt behavior response options than found in our current study.

Finally, there is some concern regarding the complexity of the stimulus functions of “fat” used in the IRAP. There are various long and short-term consequences associated with consuming fat, including aesthetic and health consequences, immediate taste, the different specific types of fat (saturated, trans, etc.), some of which are healthy and some of which aren’t. Additionally, “fat” can also mean “overweight.” These factors make it more difficult to pinpoint the specific relation to fat an individual is making, and therefore, it is unclear which relations were actually being measured. The study conducted by Nicholson and Barnes-Holmes (2012) used pictures of spiders as the sample stimulus, which have less complex stimulus functions. Spiders only refer to the insect, spider. This complexity, combined with the fact that IRAP response options were dissimilar to

the shopping simulation response options may be responsible for the variability of the IRAP results. “I will approach” is much more specific than “good” and “bad.”

Limitations and Future Research

While the stimulus exposure did have an effect on shopping behavior for 66% of participants, it is unclear whether such responding would generalize to natural settings. Future research should investigate whether similar verbal interventions would prove effective in a natural shopping context. In particular, the shopping simulation was different from naturally shopping in a number of ways. The shopping simulation was similar to a forced-choice preference assessment, in which an option must always be chosen, and there are no alternatives to the two presented stimuli. Natural shopping is more similar to a free-operant preference assessment except for the fact that the items cost money. Additionally, if responding was maintained by pliance in the current study, it is unlikely to generalize to natural settings. Future research could evaluate this by exposing participants to verbal interventions before they enter a store and tracking their shopping behavior. Alternatively, future studies may be able to create conditions more similar to natural settings by giving participants a predetermined amount of money to use in an online shopping context. Including the consequences of shopping, such as receiving the actual product purchased, may reduce pliance.

Future IRAP research should also continue to investigate the relationship between IRAP results and overt behaviors. It may be more fruitful to use less complex sample stimuli and response options that are more similar to the overt behavior than the current study. Additionally, more specific sample stimuli may yield better results. For example, if purchasing high-fat food is a dependent variable for overt behavior, then a specific high-fat food may be a better sample

stimulus than a specific type of fat. Finally, response options should be more similar to the overt behavior. For example, instead of the response options "similar" and "different" given the target stimulus "good" or "bad," it may be better to use response options such as "true" and "false" given the target stimulus "I will purchase" or "I will not purchase."

Future research could also investigate consumption behavior rather than simulated shopping behavior. For example, a study could involve consumption of a specific candy, such as jelly beans. The sample stimuli on the IRAP could be pictures of jelly beans, the target stimuli could be "I would eat" and "I would not eat" and the response options could be "true" and "false." For the overt behavior measure, participants could be put in a free operant condition in which they have access to eat as many jelly beans as they'd like during a break. During the intervention condition, participants could contact a stimulus exposure which would emphasize unpleasant information about jelly beans, such as "one of the ingredients in jelly beans is bugs." Following the intervention, additional IRAPs and overt behavior measures could be collected.

The IRAP has been shown to be a useful procedure in previous research (Jackson et al., 2016; Nicholson & Barnes-Holmes, 2012) with respect to both changing and predicting behavior. It is important to continue similar research. While currently, the subtleties of the IRAP may make accurate prediction of overt responding somewhat difficult when it comes to complex stimuli, future research may be able to define better guidelines for optimizing the predictive value of the IRAP.

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APPENDICES

APPENDIX A: FLYER

Earn up to $50.00!

We are conducting a study on marketing and how advertisements impact what you buy. We are looking for participants between 18-25 years of age. The study will include 30-90 minute sessions, on 3 separate days, of the same week. Times are flexible so we can work around most schedules.

Please contact Kian at nofic@mail.fresnostate.edu for more information.

Note: This study has been approved by the Committee on the Protection of Human Subjects at California State University, Fresno.

APPENDIX B: INFORMED CONSENT

INFORMED CONSENT FORM

You are invited to participate in a study conducted by Dr. Sharlet Rafacz and psychology students from California State University, Fresno. This study is designed to examine how marketing impacts what you buy.

If you decide to participate, you will attend three research sessions. During the first session, you will fill out a survey related to food nutrients. After completing the survey, you will participate in a computer task involving reactions to various words and images related to food. Following the completion of the first computer task, you will participate in a shopping simulation. During the second and third sessions you will complete the computer task and shopping simulations again while also watching videos related to food that you purchase. Each session will last approximately between 30-90 minutes.

There are no anticipated risks involved in this study.

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. All data collected will remain anonymous when presented to other members of the university or when disseminated through presentation or publication of the results of the study.

If you chose to participate in this study you will be paid $50.00 for attending and completing all three sessions. If you are excused from the study before the final session, you will receive $15.00 per session attended. However, if you choose to drop out of the study, there will be no compensation.

Participation is completely voluntary and refusal to participate will not impact your relationship with California State University, Fresno. If you decide to participate, you are free to withdraw your consent and to discontinue participation at any time without penalty. The Committee on the Protection of Human Subjects at California State University, Fresno has reviewed and approved the present research

If you have any questions, either now or at a later time, they can be directed to Dr. Rafacz at (559) 278-2479 or srafacz@csufresno.edu. Questions regarding the rights of research participants may be directed to the Fresno State Committee for the Protection of Human Participants: Dr. Kris Clarke at (559) 278-2985. You will be given a copy of this form to keep.

YOU ARE MAKING A DECISION WHETHER OR NOT TO PARTICIPATE. YOUR SIGNATURE INDICATES THAT YOU HAVE DECIDED TO PARTICIPATE, HAVING READ THE INFORMATION PROVIDED ABOVE.

_____	_____
Participant Signature	Print Name of Participant
_____	_____
Signature of Investigator	Date

APPENDIX C: SURVEY

Survey

Please rate each macronutrient listed below on a scale from 1-3 with the numbers representing the following:

1: Bad to consume

2: Okay to consume, but not necessarily bad or good

3: Good to consume

Carbohydrates	1	2	3
Sugar	1	2	3
Fructose	1	2	3
Complex Carbohydrates	1	2	3
Fats	1	2	3
Fatty Acids	1	2	3
Saturated Fats	1	2	3
Unsaturated Fats	1	2	3
Proteins	1	2	3
Plant Proteins	1	2	3
Whey Proteins	1	2	3
Casein Proteins	1	2	3

APPENDIX D: IRAP SAMPLE STIMULI

IRAP Sample Stimuli

- Carbohydrate-related sample stimuli
    - Carbohydrates
    - Sugar
    - Fructose
    - Complex carbohydrates
- Fats-related sample stimuli
    - Fat
    - Fatty acid
    - Saturated fat
    - Unsaturated fat

APPENDIX E: FOOD LIST

Shopping Simulation Food List

Choice 1	Choice 2
Lays Kettle Cooked Chips	Lays Kettle Cooked Chips (40% Less Fat)
Breyer's Vanilla Ice Cream	Breyer's Vanilla Ice Cream (Fat Free)
Hellman's Mayonnaise	Hellman's Mayonnaise (Low Fat)
Market Pantry Milk (Whole)	Market Pantry Milk (1% Low Fat)
Jif Peanut Butter	Jif Peanut Butter (Reduced Fat)
Act II Popcorn (Light Butter)	Act II Popcorn (94% Fat Free)
Oreos	Chips Ahoy! Chocolate Chip Cookies
Wold Brand Chilli Beans	Ortega Black Beans
Nature's Own Whole Grain Bread (Sugar Free)	Brownberry Whole Wheat Bread
Kellogg's Corn Flakes	Kellogg's Frosted Flakes
Hidden Valley Ranch Dressing	Hidden Valley Italian Dressing
Nature Valley Crunchy Granola Bars	Nature Valley Fruit and Nut Granola Bars
Heinz Ketchup	Hunts Ketchup
Barilla Farfalle Pasta	Barilla Rotini Pasta
Smucker's Red Raspberry Preserves	Smucker's Red Raspberry Preserves (No Sugar)
Minute Instant White Rice	Great Value Instant White Rice
Dole Country Ranch Salad Kit	Dole Spring Mix Salad Kit
Kraft Original Barbeque	Kraft Sweet Honey Barbeque Sauce
Campbell's Chicken Noodle Soup	Campbell's Tomato Soup
Planters Nut and Chocolate Trail Mix	Planters Sweet and Nutty Trail Mix

APPENDIX F: AESTHETIC DETRIMENTS STIMULUS EXPOSURE SCRIPTS

PRO-FAT

Aesthetics

It has been found that high fat consumption increases vulnerability to skin diseases. Eating too much fat decreases a person's skin's resistance to ultra violet radiation from the sun. The sun's ultra violet radiation can damage the skin's elastin and collagen. If elastin and collagen are damaged, skin's framework becomes weaker, resulting in caves, bends and wrinkles.

Fat consumption increases vulnerability to _____

[A] general illnesses [B] strokes

[C] skin diseases [D] dryness

Answer: C

Consuming high amounts of fat leads to increased weight gain around the waist. Consuming 100 calories from fat will lead to higher weight gain than calories from other macronutrients. This happens because a high fat diet causes the body to redistribute of fat tissues into the abdomen which leads to a higher body weight.

High amounts of fat consumption lead to increased _____

[A] muscle growth [B] weight gain around the waist

[C] liver functioning [D] energy

Answer: B

High fat consumption is bad for muscles. Firstly, consuming too much fat can cause weight gain which can make muscles less visible. Secondly consuming fat can have an effect on the way muscles grow. This happens because high fat consumption decrease amino acid uptake and compromises the cell membrane of muscles. This causes a blunting in protein synthesis; in other words, this inhibits the growth of muscles.

Fat consumption inhibits _____

[A] estrogen production [B] cognitive functioning

[C] muscle growth [D] weight gain

Answer: C

Consuming fat has effects that indirectly cause weight gain. Fat consumption is bad for your metabolism. Additionally, a study found that if people consume fat they are more likely to overeat even when they are satiated. The study concluded that fat consumption can have a drug-like effect on the brain that causes us to crave more food.

Fat indirectly causes weight gain, because it is bad for your _____

[A] thyroid [B] pancreas

[C] heart [D] metabolism

Answer: D

APPENDIX G: HEALTH DETRIMENTS STIMULUS EXPOSURE SCRIPTS

PRO-FAT

Health

Consuming too much fat can lead to loss of good health. Fat does not increase HDL (good cholesterol) but it does increase LDL (bad cholesterol). Bad cholesterol can lead to heart disease. It has also been found that high fat consumption can cause insulin resistance, abdominal obesity, and high blood sugar. There is also some evidence that links high fat consumption with diabetes.

Fat increases LDL (bad cholesterol), which can lead to _____

[A] heart disease [B] liver disease

[C] kidney problems [D] skin conditions

Answer: A

Consumption of products with high fat has been correlated with many chronic diseases. High fat consumption has been found to be linked with inflammation. While inflammation may not sound very scary, low grade inflammation can be the underlying cause of heart disease, cancer, and diabetes.

Fat consumption is linked with inflammation, which can be an underlying cause of heart disease, cancer, and _____

[A] lethargy [B] diabetes

[C] a bad appetite [D] blindness

Answer: B

Fat is bad for blood vessels. Fat can damage endothelium, which is the inner lining of blood vessels. A high fat diet has been found to be correlated with endothelium dysfunction. Endothelium dilates and constricts blood vessels in order to protect tissues from toxic substances and to regulate blood clotting and inflammation. Endothelium dysfunction can reduce the ability to do any of these functions and can lead to more serious health concerns.

Fat can damage endothelium, which is _____

[A] the middle of the liver [B] the surface of the heart

[C] the inner lining of blood vessels [D] part of the pancreas

Answer: C

High fat consumption can lead to Arteriosclerosis. Arteriosclerosis is a disease that occurs in arteries. It involves the buildup of plaque in blood vessels which results in constricted blood flow. This plaque buildup is susceptible to bursting which can cause a blood clot. Blood clots can cause serious health problems because they have the potential to completely block off blood flow, which can trigger a stroke or heart attack.

Fat consumption can cause blood clots, which may completely block off blood flow. Blocking off blood flow that trigger _____

[A] a stroke or heart attack [B] psychological disorder

[C] cancer [D] spikes in glucose levels

Answer: A

APPENDIX H: AESTHETIC BENEFITS STIMULUS EXPOSURE SCRIPTS

ANTI-FAT
Aesthetics

A lot of people think that avoiding fat content in food is a good way to lose weight. The truth is that diets that are high in fat and low in carbs result in more weight lose than avoiding fat. In 1977, the low fat diet started being recommended in America. Shortly after this the obesity epidemic began in 1980, and has been steadily rising. High carb consumption has a higher correlation with obesity. Consuming more fat and less carbs can promote weight loss. Additionally, fat is more filling than carbs, and longer satiation periods result in less caloric intake.

Compared to diets high in carbs, diets high in fat and low in carbs result in _____

[A] more weight loss [B] less weight loss

[C] more muscles [D] less muscles

Answer: A

It is often thought that fat content shouldn't be consumed if a person is trying to get into shape. The human body actually requires fat in order to remain lean. Consuming fat helps support the thyroid hormone's functioning. The thyroid hormone is involved in body fat regulation, and having low levels of the thyroid hormone is a common reason for people having trouble losing weight. Fat also supports the hormonal balance of testosterone and estrogen, and a greater balance of these hormones promotes weight loss. Additionally, fat consumption helps maintain reproductive health.

Fat consumption supports the thyroid hormone, which helps regulate _____

[A] blood sugar [B] body fat

[C] glucose levels [D] liver functions

Answer: B

Avoiding fat content can actually contribute to weight gain. Fat is required in order to maintain a steady metabolism. If a person doesn't consume any fat, his body will begin to cannibalize its own lean mass to produce energy in order to burn fat mass. While it may sound paradoxical because the macronutrient is referred to as "fat," fat consumption actually promotes the loss of fat mass.

Fat is required in order to maintain a steady _____

[A] hand [B] supply of energy

[C] heart rate [D] metabolism

Answer: D

A lesser known cause of dry skin, hair and eyes is inadequate fat consumption. A deficiency in fat consumption can lead to wrinkles. This is because fat consumption promotes the production of oil-producing glands that function as a natural moisturizer.

Inadequate fat consumption can lead to _____

[A] hair loss [B] heart failure

[C] loss of hearing [D] dry skin and wrinkles

Answer: D

APPENDIX I: HEALTH BENEFITS STIMULUS EXPOSURE SCRIPTS

ANTI-FAT

Health

A lot of people think that fat content in food is unhealthy, and that it should be avoided. The truth is that eating more fat is correlated with a lower risk of heart disease. It used to be thought that saturated fats were a cause of heart disease. Because of this, nutritionists began to recommend replacing butter with margarine due to a lower content of saturated fat. Studies later found that people who replaced butter with margarine actually increased their chances of getting heart disease. The American Heart Association recommends that at least 25% of calorie intake should be from fats.

Question: Eating more fat is correlated with _____

[A] a lower risk of heart disease [B] a higher risk of heart disease

[C] better respiratory health [D] worse respiratory health

Answer: A

From an evolutionary perspective, it makes sense for us to consume more fat content. Humans evolved consuming fish, animals and plants that were high in fat. Early humans ate all of an animal's parts. This included tissues from the animals such as blubber, brains and eggs. Consumption of fat is a behavior that has been shown to have survival value. Fat provides protection and insulation for vital organs.

Question: Fat provides _____

[A] protection from headaches [B] warmth

[C] protection and insulation for vital organs [D] stronger bones

Answer: C

Fat is important to consume in order to regulate the transportation of vitamins in a person's body. Vitamins A, D, E and K are fat soluble. Without consuming fat, these vitamins would not function properly. Neglecting such vitamins can lead to health problems. Inadequate consumption of vitamin A can lead to blindness. Without vitamin D, bones can become weak and brittle. Deficits of vitamin E can lead to blood and muscular issues.

Question: Fat consumption is required for vitamin E to function properly. What is a consequence associated with inadequate vitamin E consumption?

[A] frequent headaches [B] illness

[C] better blood pressure [D] blood and muscular issues

Answer: D

Eating fat optimizes macronutrient intake for glucose management and helps decrease inflammation which reduces one's risk for cancer. Fat consumption has been found to be associated with a lower risk of cancer, while low fat diets aimed at reducing cancer risk have not been found to be effective. Additionally, fat consumption helps decreases insulin levels and helps blood sugar regulation.

Fat consumption is associated with _____

[A] a higher risk of cancer [B] a lower risk of cancer

[C] a higher metabolism [D] a lower metabolism

Answer: B

APPENDIX J: INDIVIDUAL DATA GRAPHED (FAT DETRIMENTS STIMULUS EXPOSURE PARTICIPANTS)

Participant 1 Data

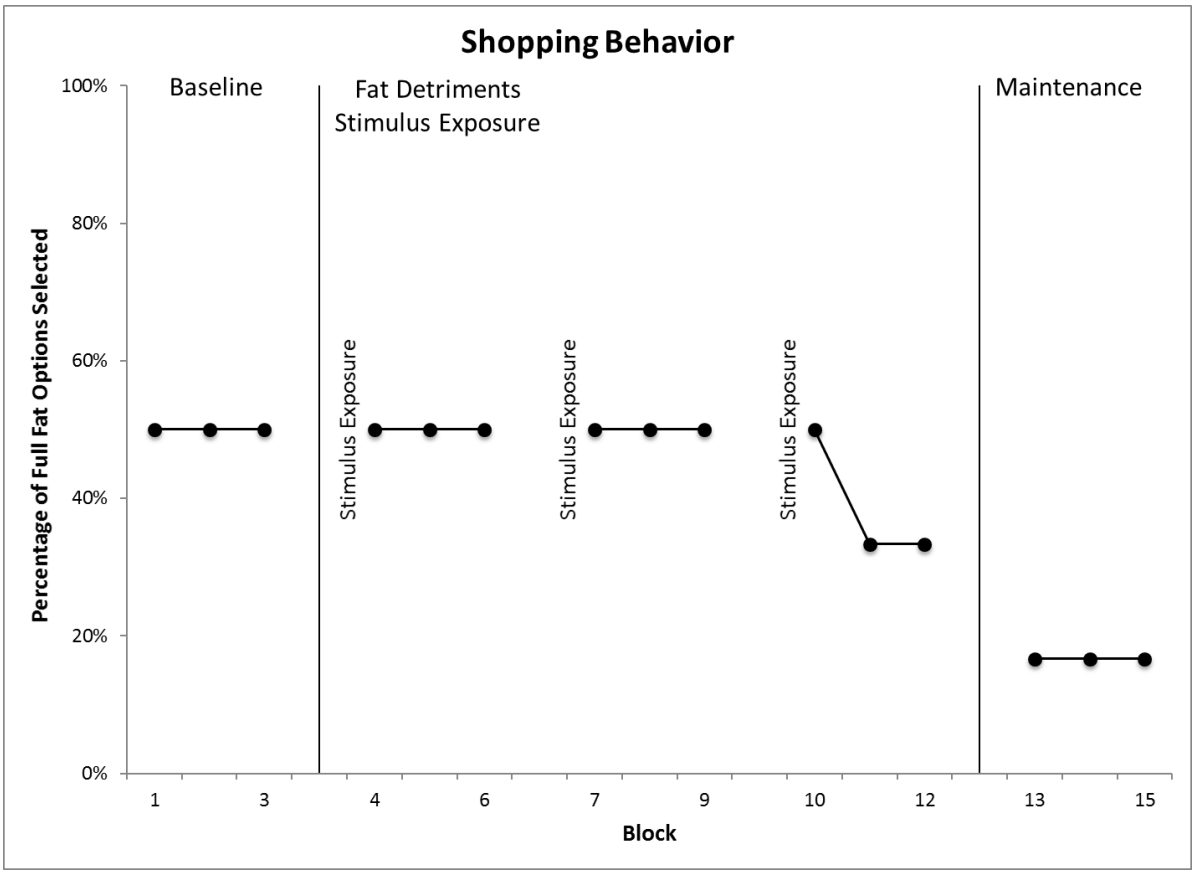

Figure 3. Percentage of full-fat selections on each block of the shopping simulation during baseline, stimulus exposure (treatment) and maintenance conditions for participant 1.

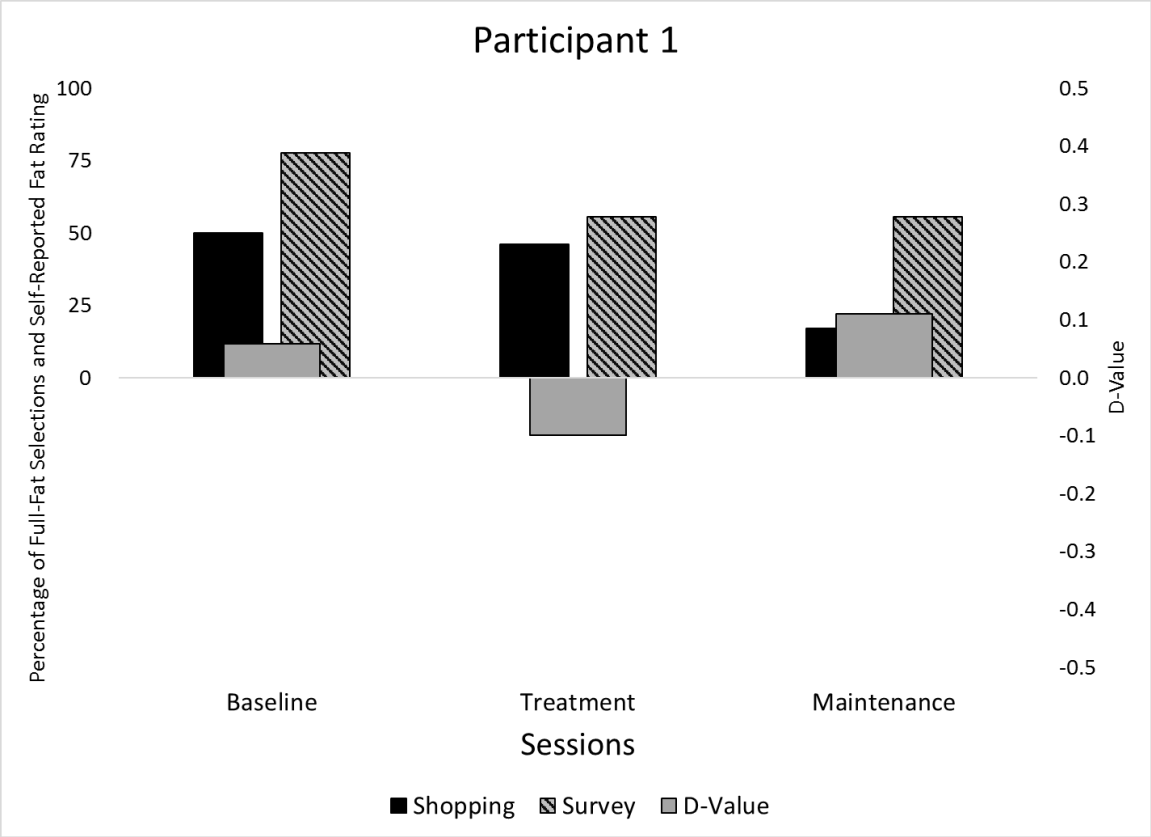

Figure 4. Percentage of full-fat selections during shopping simulations, self-reported fat ratings from the survey and D-values from the IRAP during baseline, treatment and maintenance conditions for participant 1. This participant contacted the Fat Detriments Stimulus Exposure.

Participant 2 Data

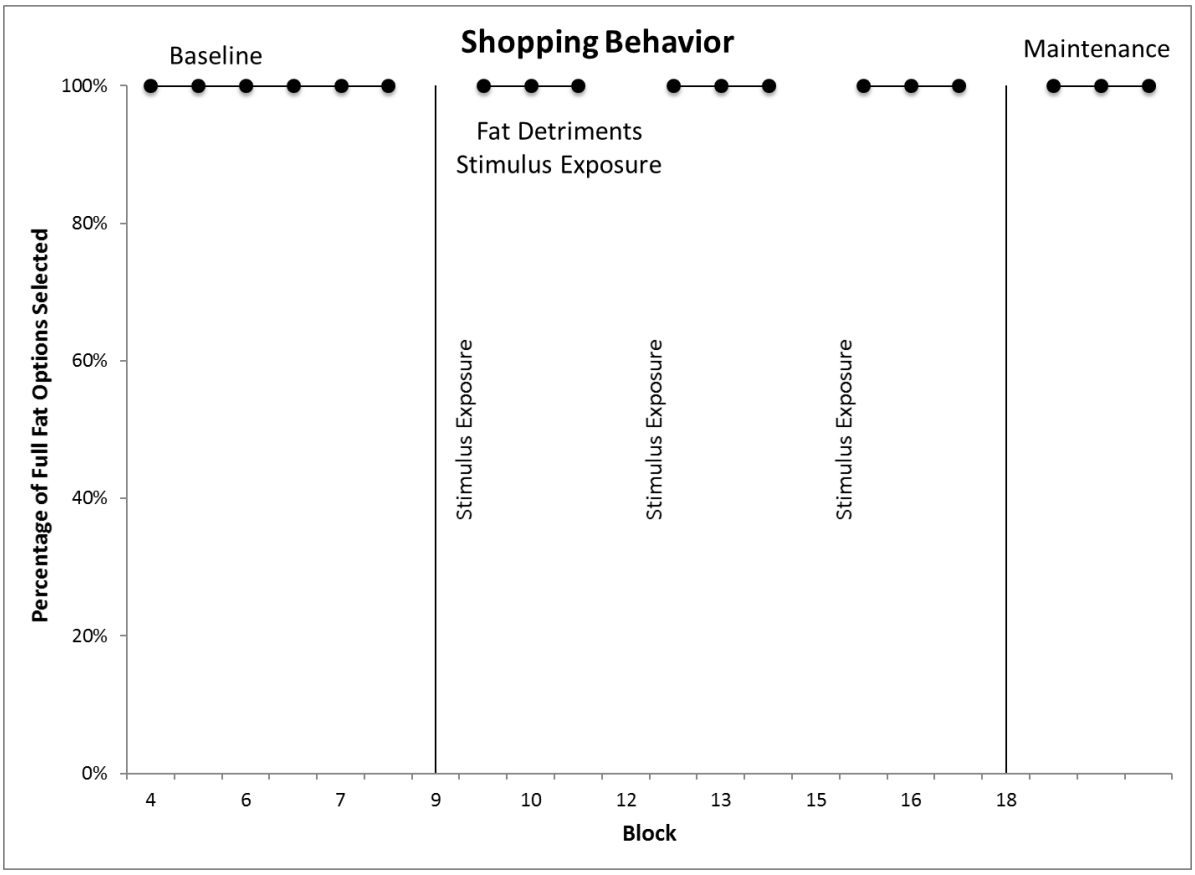

Figure 5. Percentage of full-fat selections on each block of the shopping simulation during baseline, stimulus exposure (treatment) and maintenance conditions for participant 2.

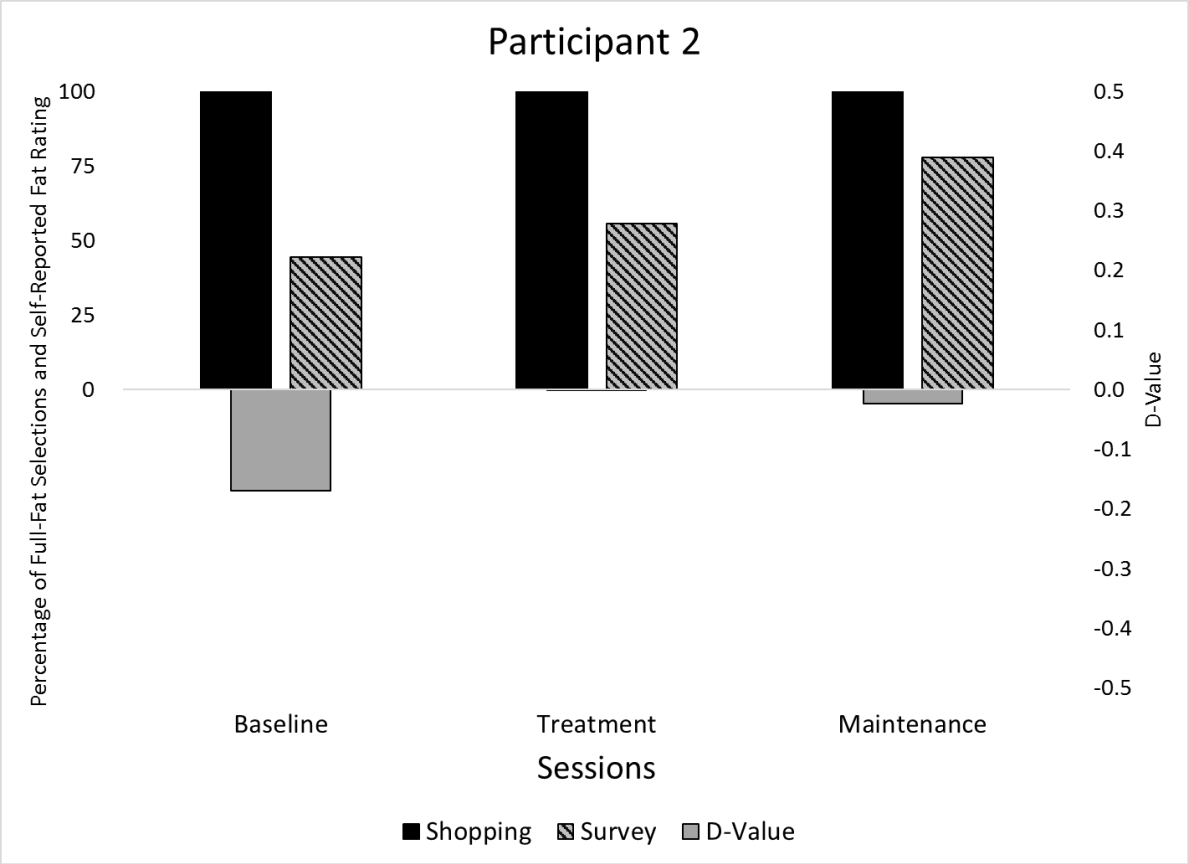

Figure 6. Percentage of full-fat selections during shopping simulations, self-reported fat ratings from the survey and D-values from the IRAP during baseline, treatment and maintenance conditions for participant 2. This participant contacted the Fat Detriments Stimulus Exposure.

Participant 4 Data

Figure 7. Percentage of full-fat selections on each block of the shopping simulation during baseline, stimulus exposure (treatment) and maintenance conditions for participant 4.

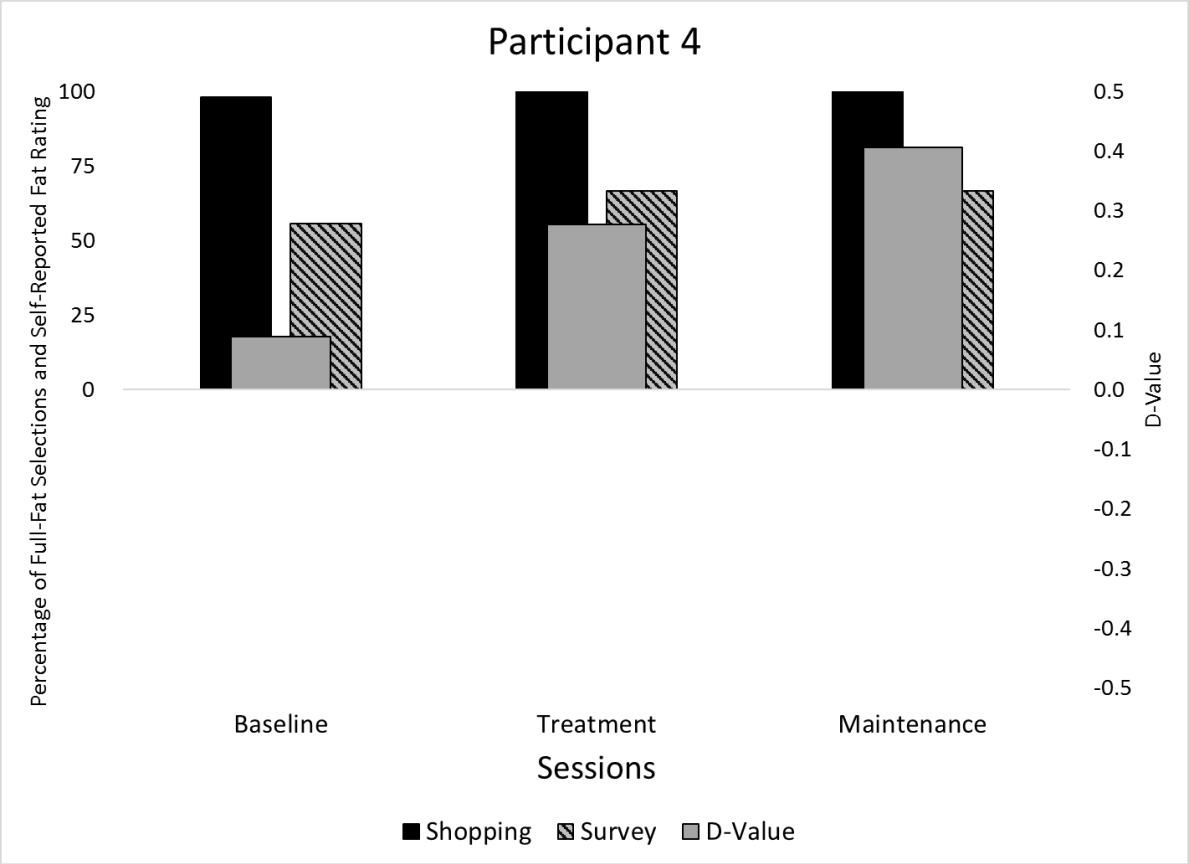

Figure 8. Percentage of full-fat selections during shopping simulations, self-reported fat ratings from the survey and D-values from the IRAP during baseline, treatment and maintenance conditions for participant 4. This participant contacted the Fat Detriments Stimulus Exposure.

Participant 5 Data

Figure 9. Percentage of full-fat selections on each block of the shopping simulation during baseline, stimulus exposure (treatment) and maintenance conditions for participant 5.

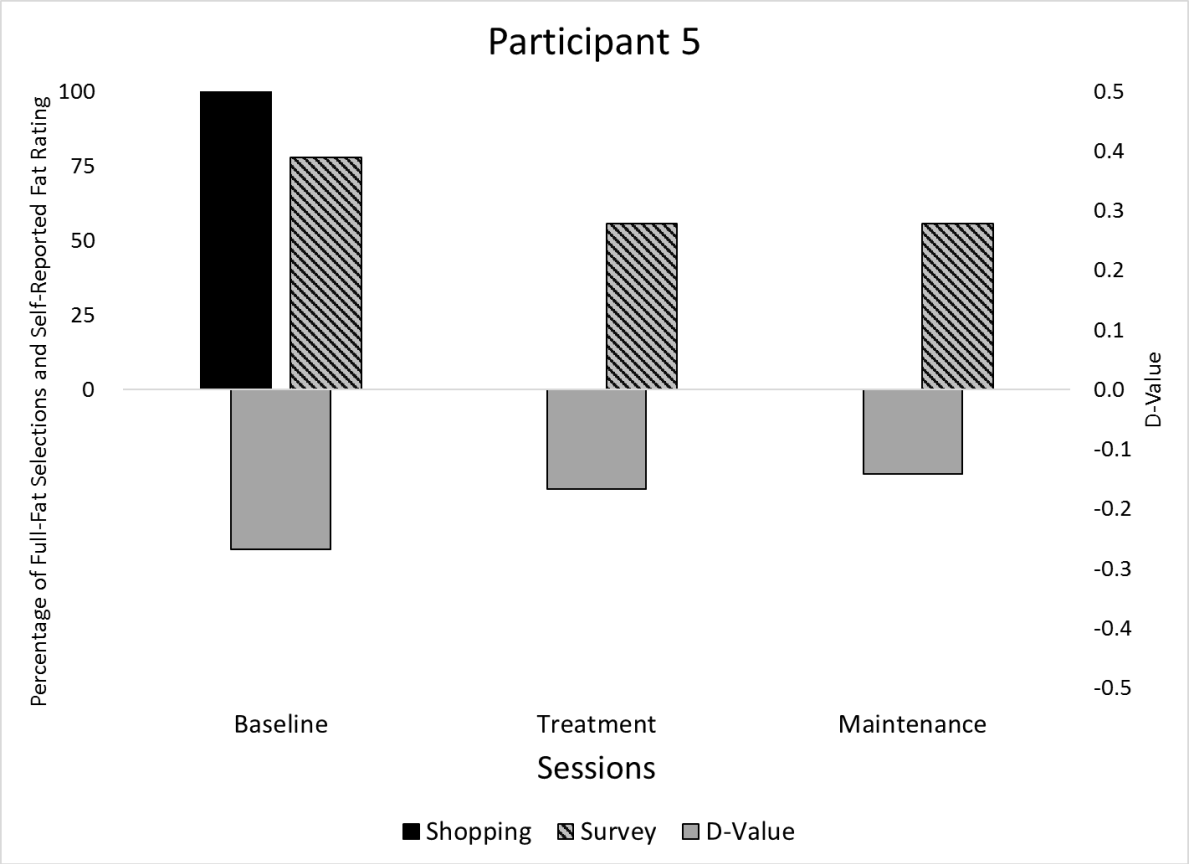

Figure 10. Percentage of full-fat selections during shopping simulations, self-reported fat ratings from the survey and D-values from the IRAP during baseline, treatment and maintenance conditions for participant 5. This participant contacted the Fat Detriments Stimulus Exposure.

Participant 6 Data

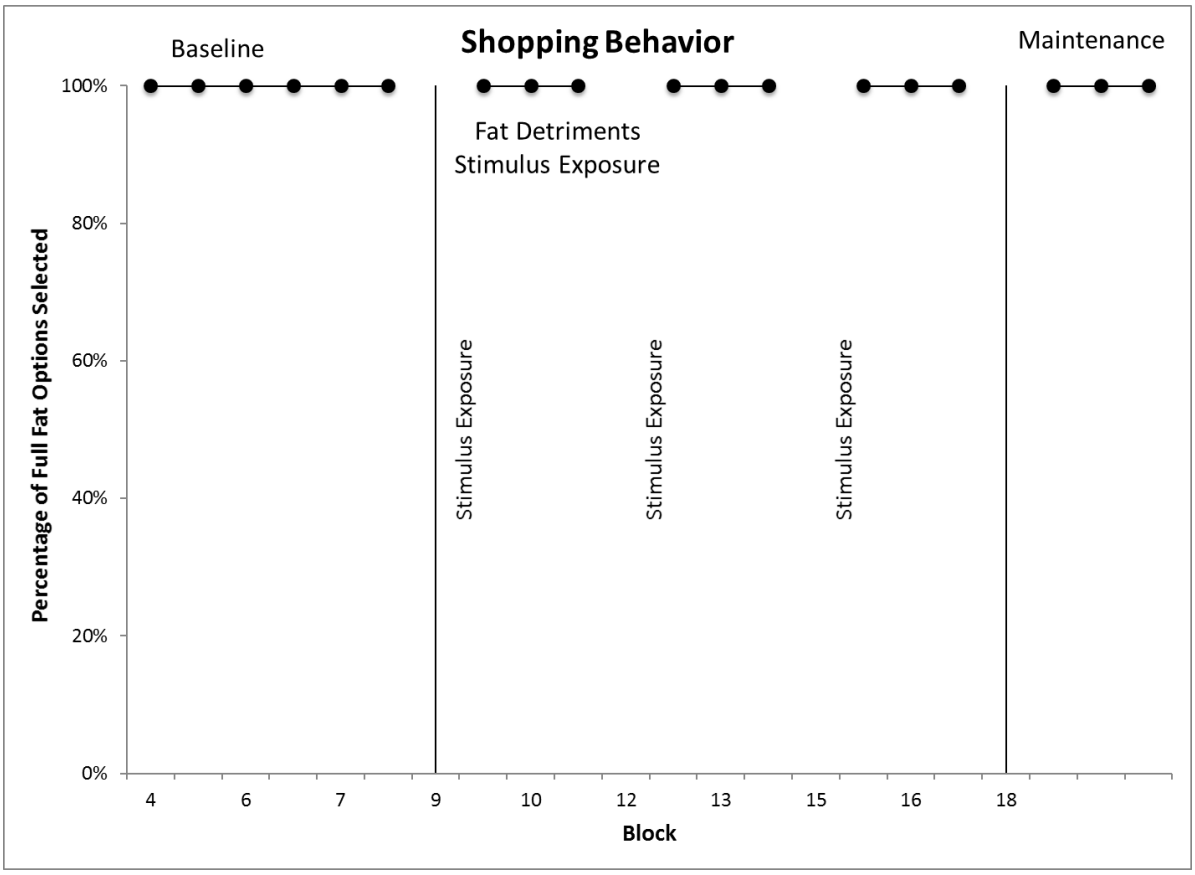

Figure 11. Percentage of full-fat selections on each block of the shopping simulation during baseline, stimulus exposure (treatment) and maintenance conditions for participant 6.

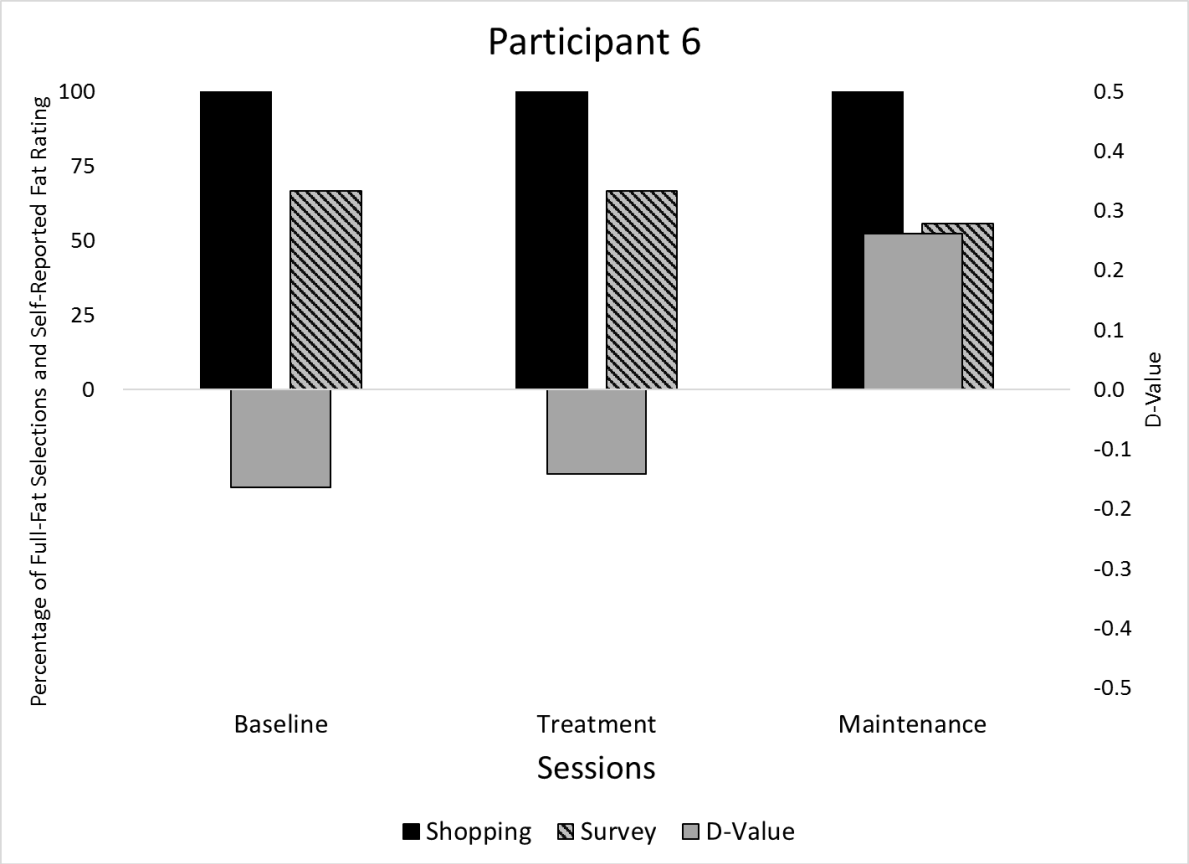

Figure 12. Percentage of full-fat selections during shopping simulations, self-reported fat ratings from the survey and D-values from the IRAP during baseline, treatment and maintenance conditions for participant 6. This participant contacted the Fat Detriments Stimulus Exposure.

Participant 7 Data

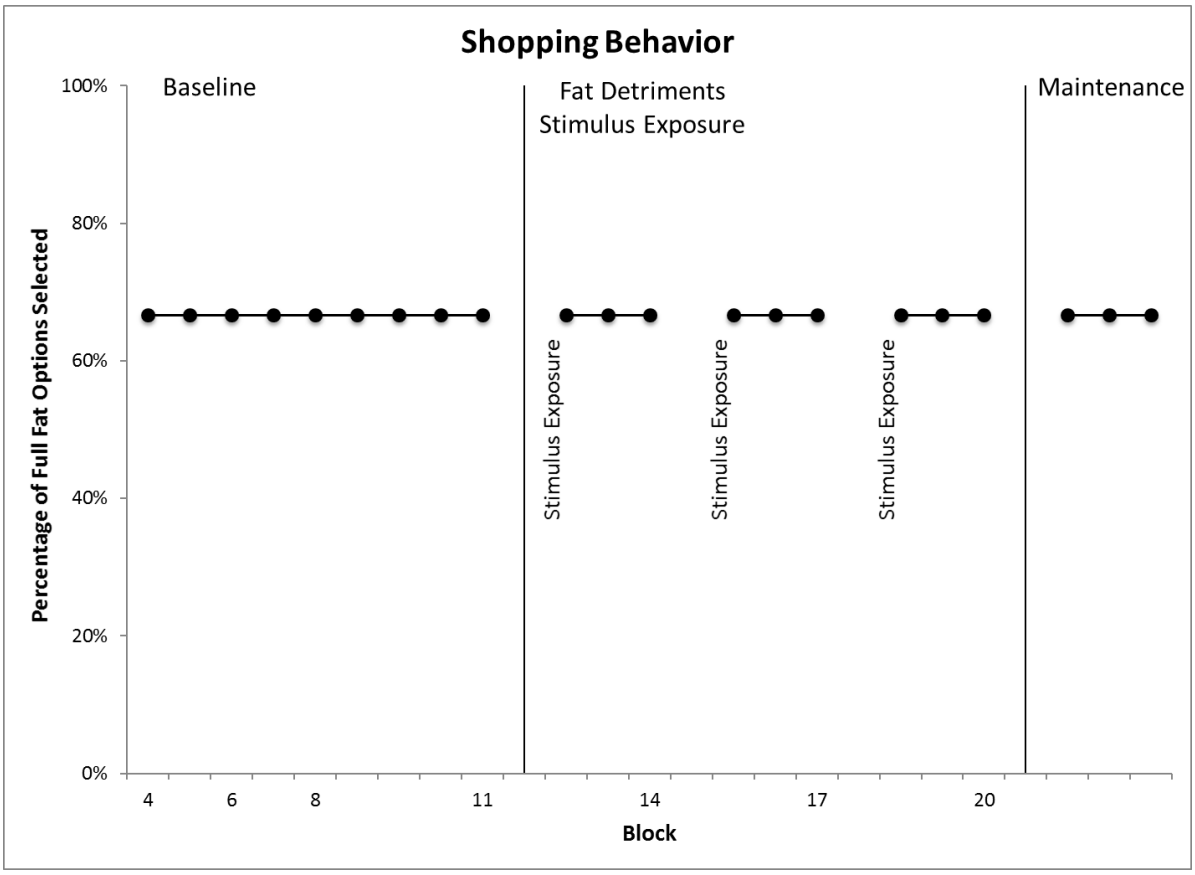

Figure 13. Percentage of full-fat selections on each block of the shopping simulation during baseline, stimulus exposure (treatment) and maintenance conditions for participant 7.

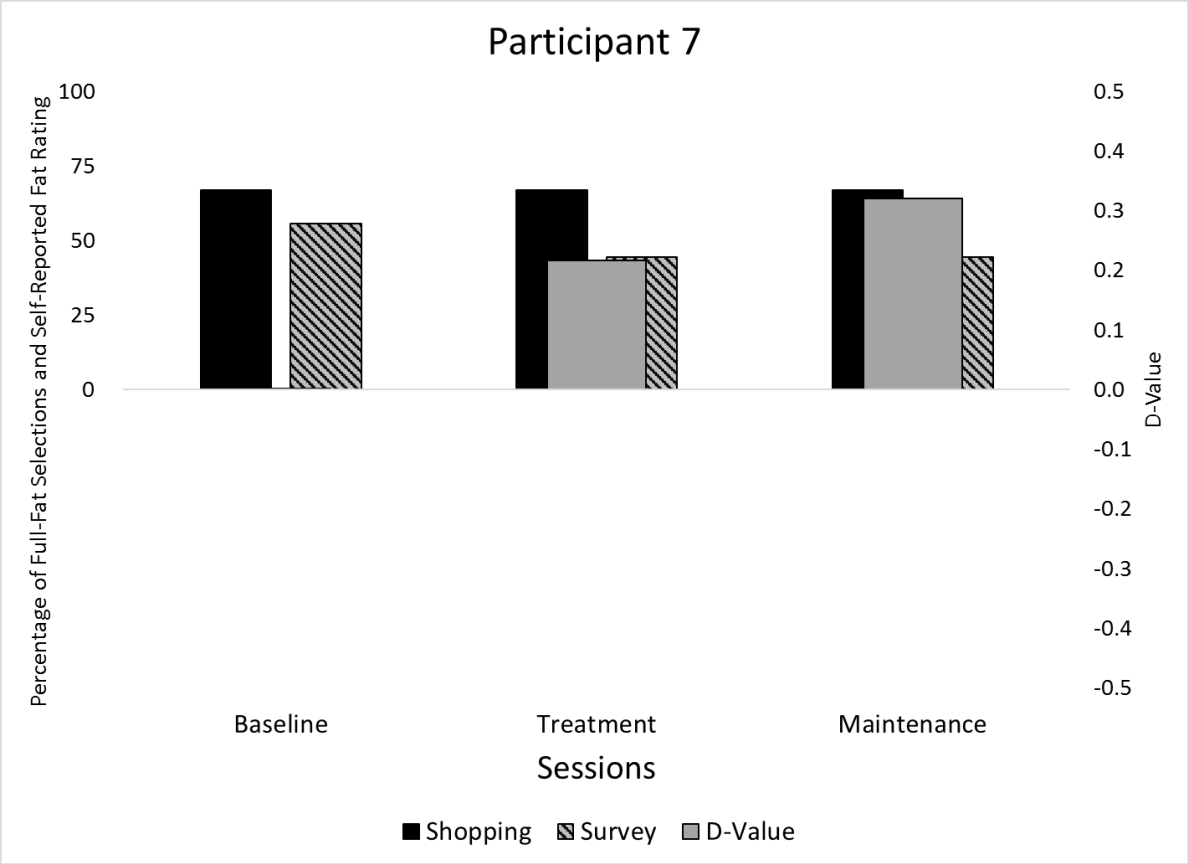

Figure 14. Percentage of full-fat selections during shopping simulations, self-reported fat ratings from the survey and D-values from the IRAP during baseline, treatment and maintenance conditions for participant 7. This participant contacted the Fat Detriments Stimulus Exposure.

Participant 9 Data

Figure 15. Percentage of full-fat selections on each block of the shopping simulation during baseline, stimulus exposure (treatment) and maintenance conditions for participant 9.

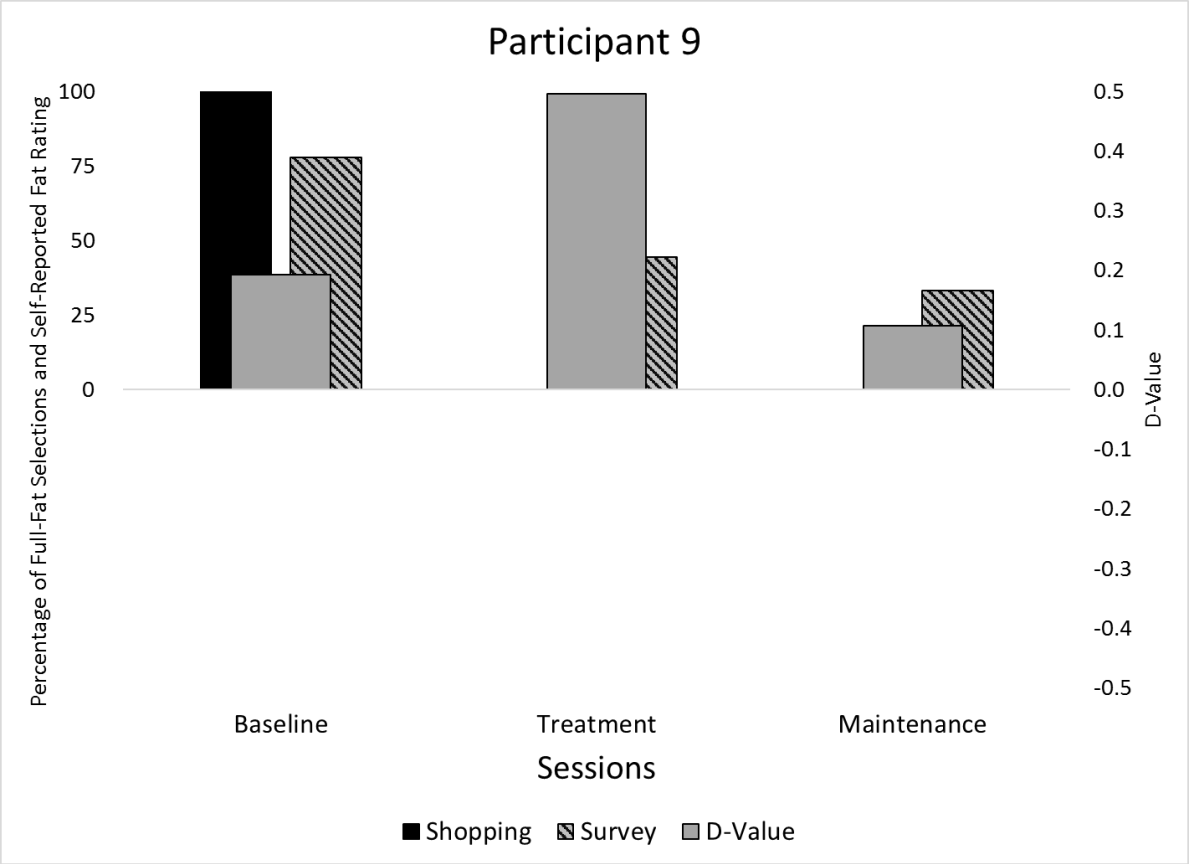

Figure 16. Percentage of full-fat selections during shopping simulations, self-reported fat ratings from the survey and D-values from the IRAP during baseline, treatment and maintenance conditions for participant 9. This participant contacted the Fat Detriments Stimulus Exposure.

Participant 10 Data

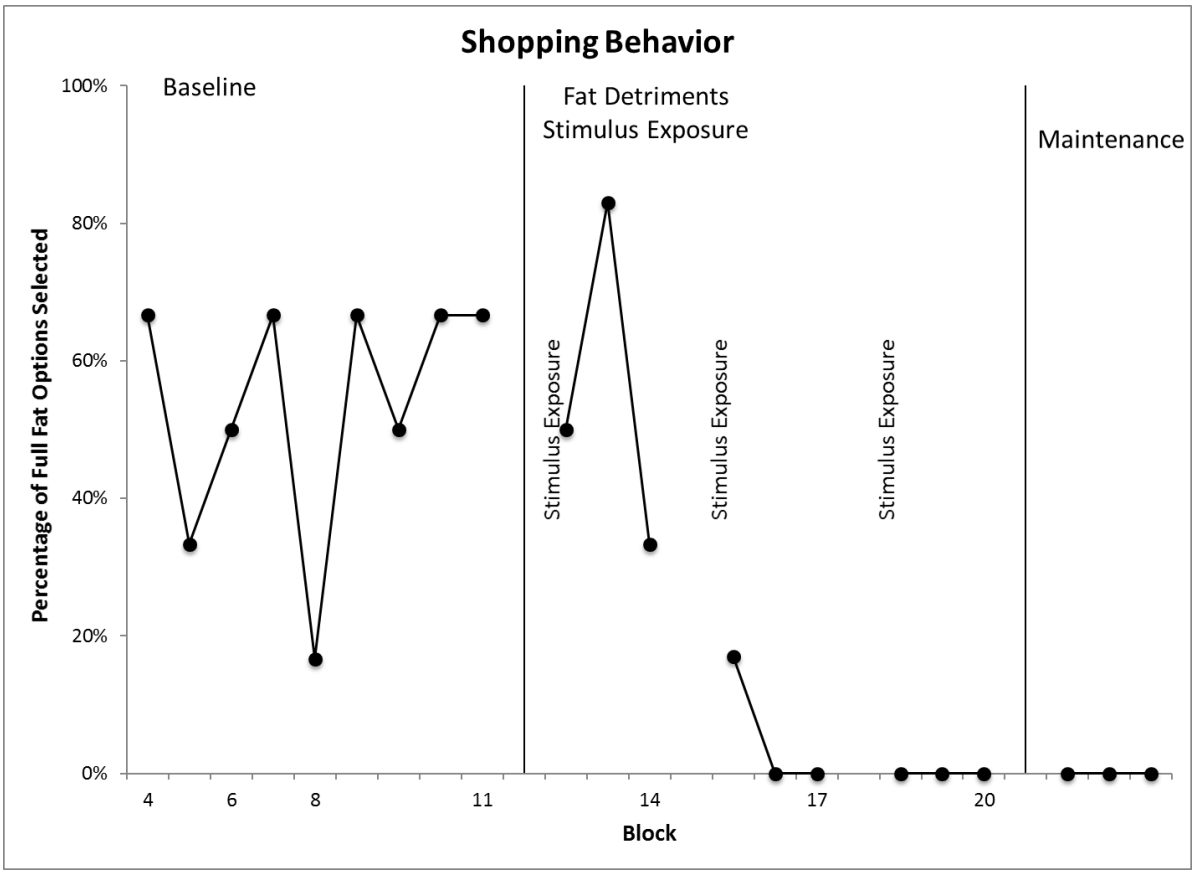

Figure 17. Percentage of full-fat selections on each block of the shopping simulation during baseline, stimulus exposure (treatment) and maintenance conditions for participant 10.

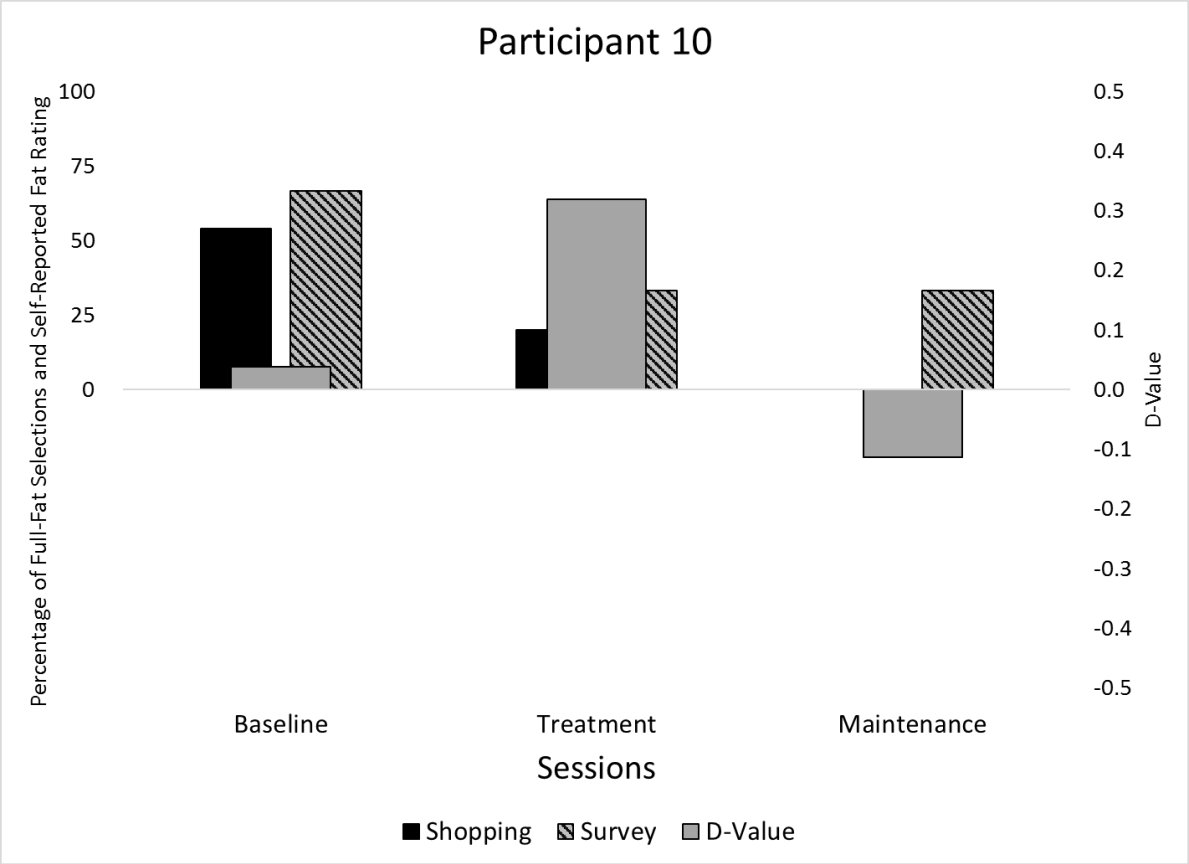

Figure 18. Percentage of full-fat selections during shopping simulations, self-reported fat ratings from the survey and D-values from the IRAP during baseline, treatment and maintenance conditions for participant 10. This participant contacted the Fat Detriments Stimulus Exposure.

Participant 12 Data

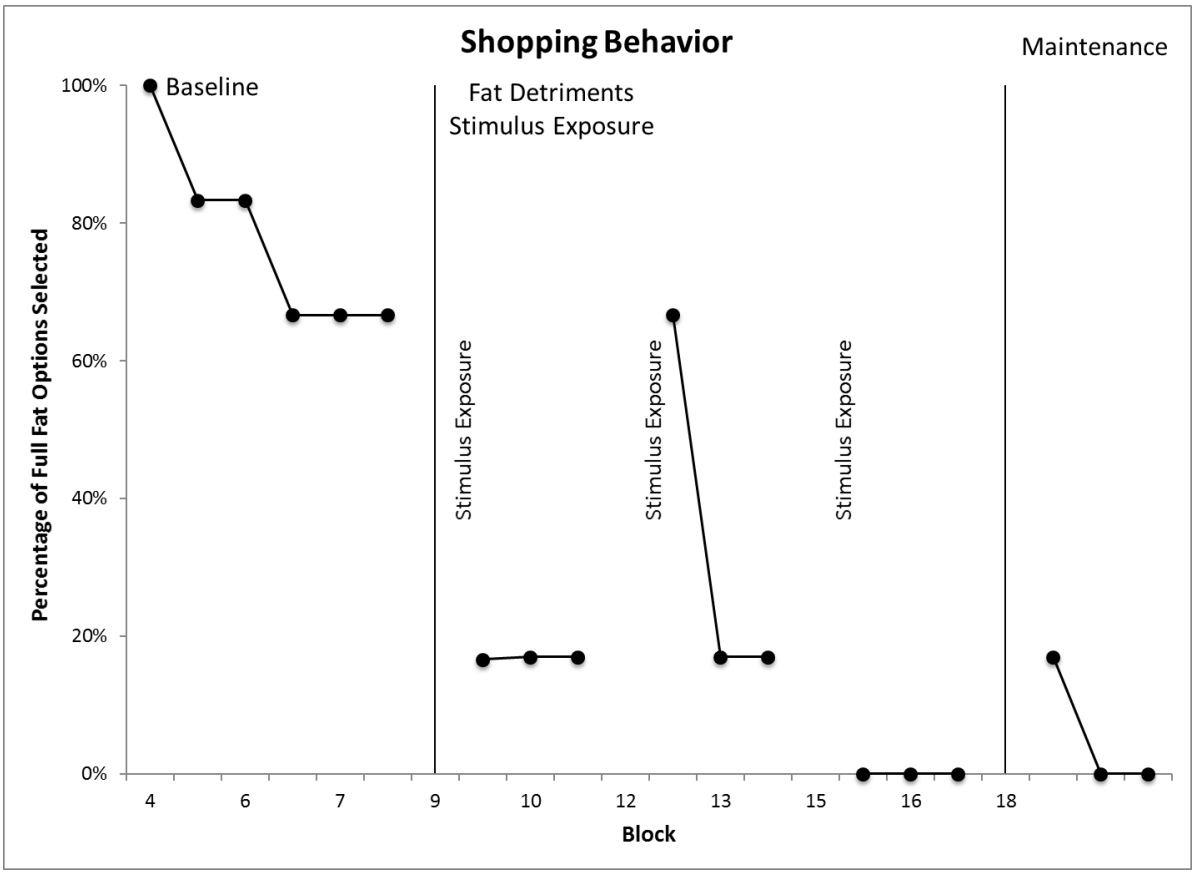

Figure 19. Percentage of full-fat selections on each block of the shopping simulation during baseline, stimulus exposure (treatment) and maintenance conditions for participant 12.

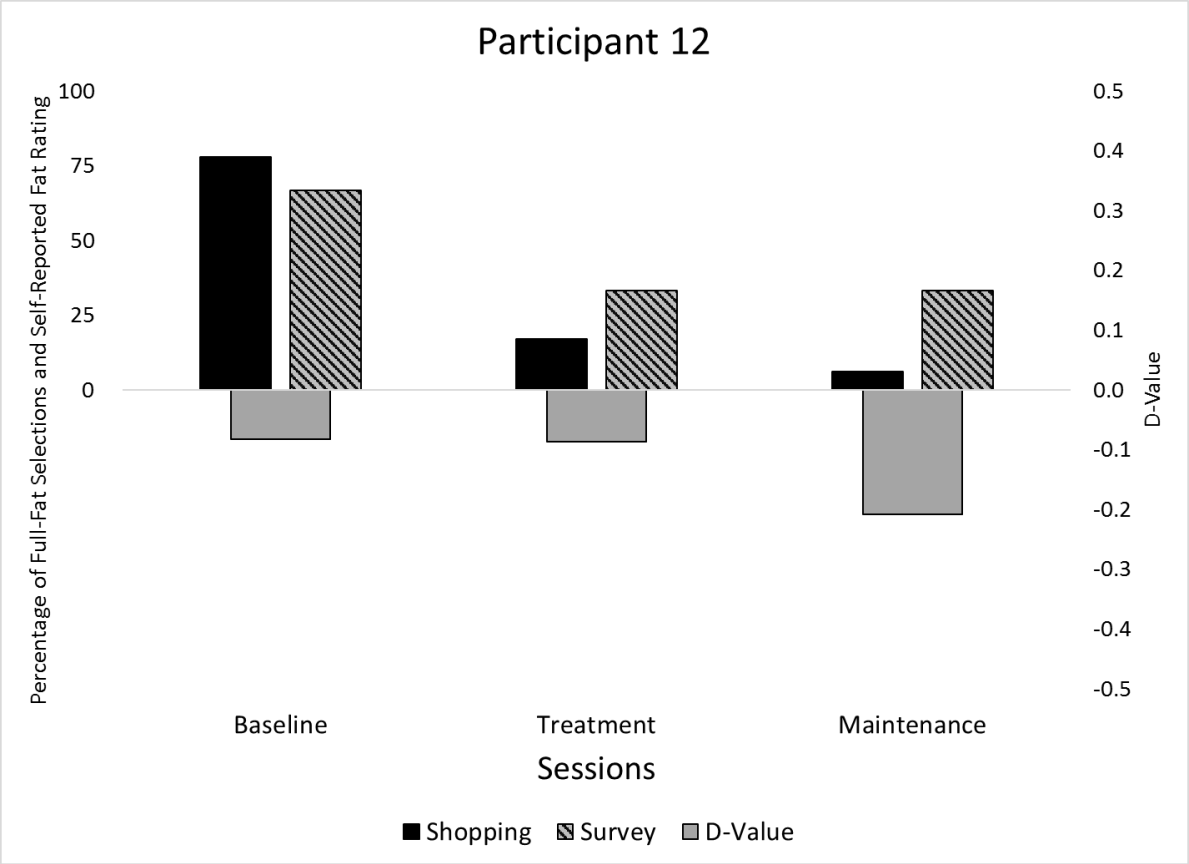

Figure 20. Percentage of full-fat selections during shopping simulations, self-reported fat ratings from the survey and D-values from the IRAP during baseline, treatment and maintenance conditions for participant 12. This participant contacted the Fat Detriments Stimulus Exposure.

Participant 14 Data

Figure 21. Percentage of full-fat selections on each block of the shopping simulation during baseline, stimulus exposure (treatment) and maintenance conditions for participant 14.

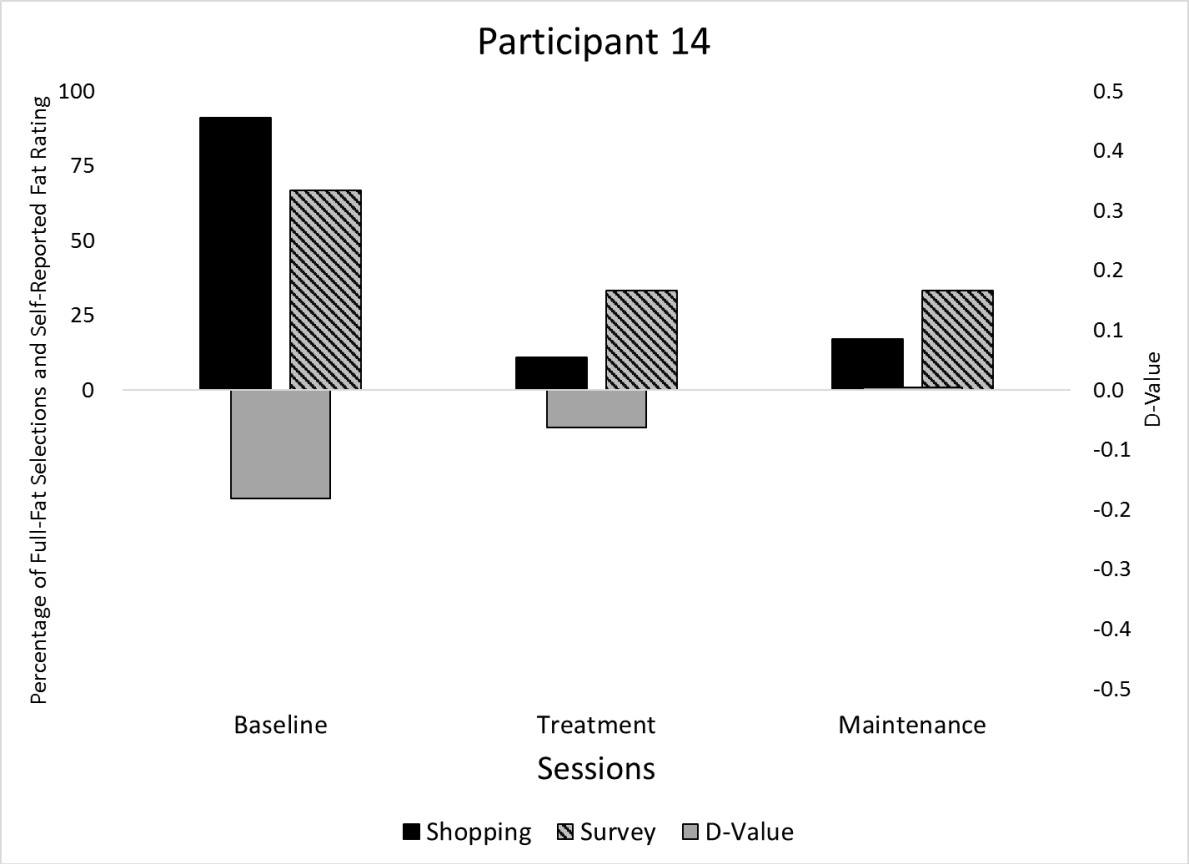

Figure 22. Percentage of full-fat selections during shopping simulations, self-reported fat ratings from the survey and D-values from the IRAP during baseline, treatment and maintenance conditions for participant 14. This participant contacted the Fat Detriments Stimulus Exposure.

APPENDIX K: INDIVIDUAL DATA GRAPHED (FAT BENEFITS STIMULUS EXPOSURE PARTICIPANTS):

Participant 3 Data

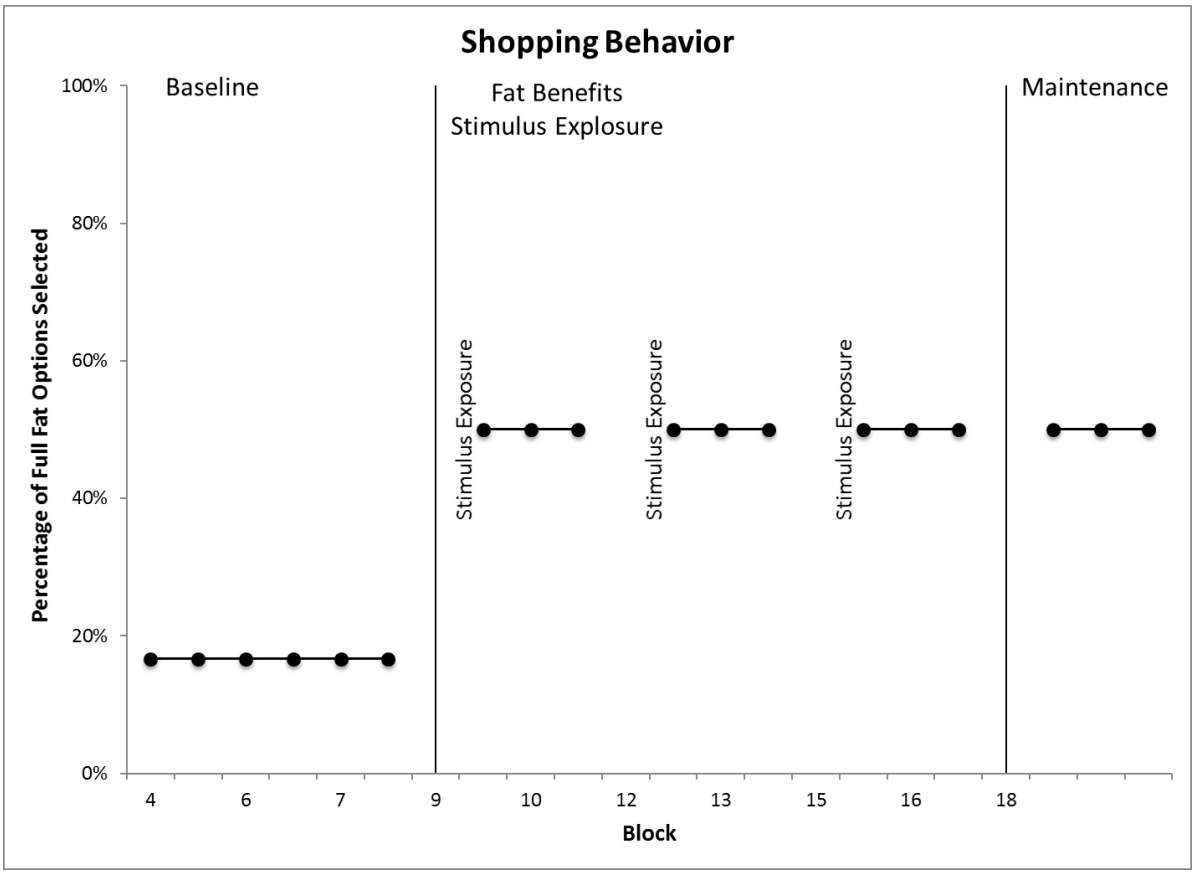

Figure 23. Percentage of full-fat selections on each block of the shopping simulation during baseline, stimulus exposure (treatment) and maintenance conditions for participant 3.

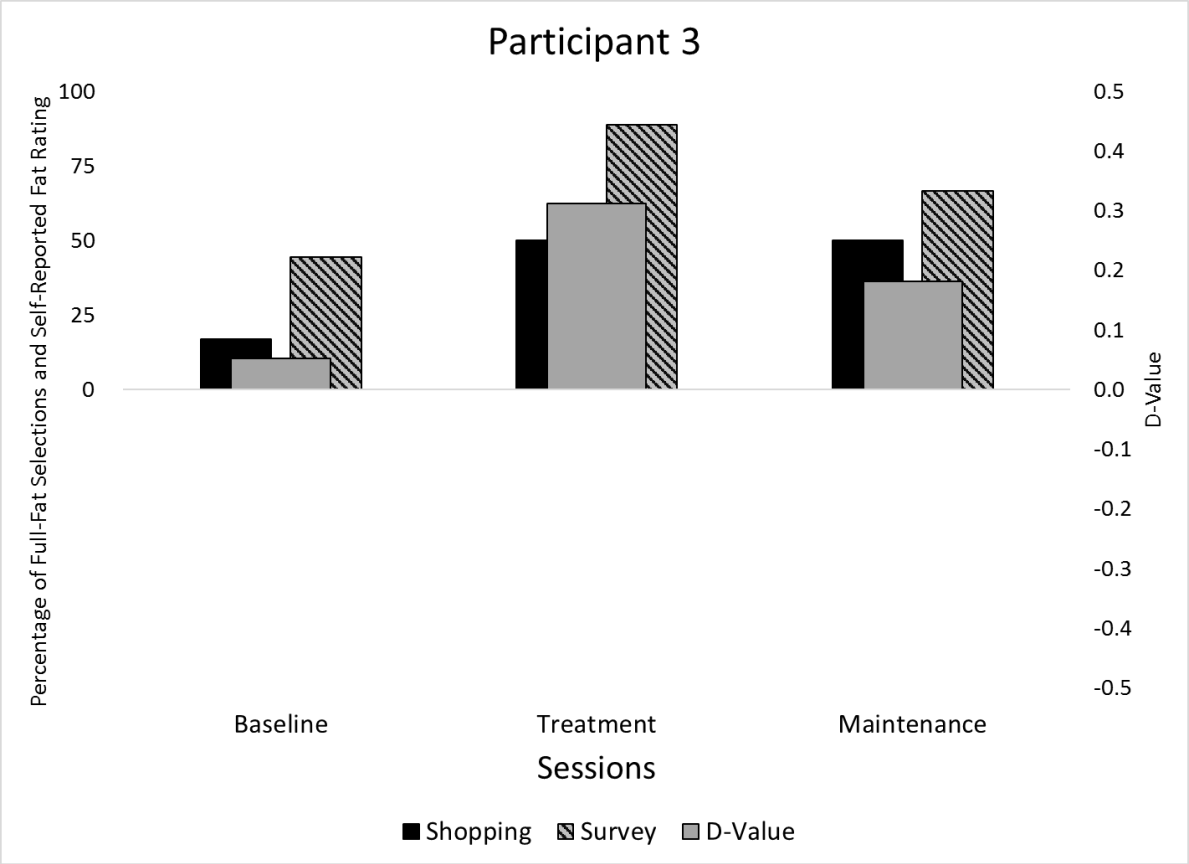

Figure 24. Percentage of full-fat selections during shopping simulations, self-reported fat ratings from the survey and D-values from the IRAP during baseline, treatment and maintenance conditions for participant 3. This participant contacted the Fat Benefits Stimulus Exposure.

Participant 8 Data

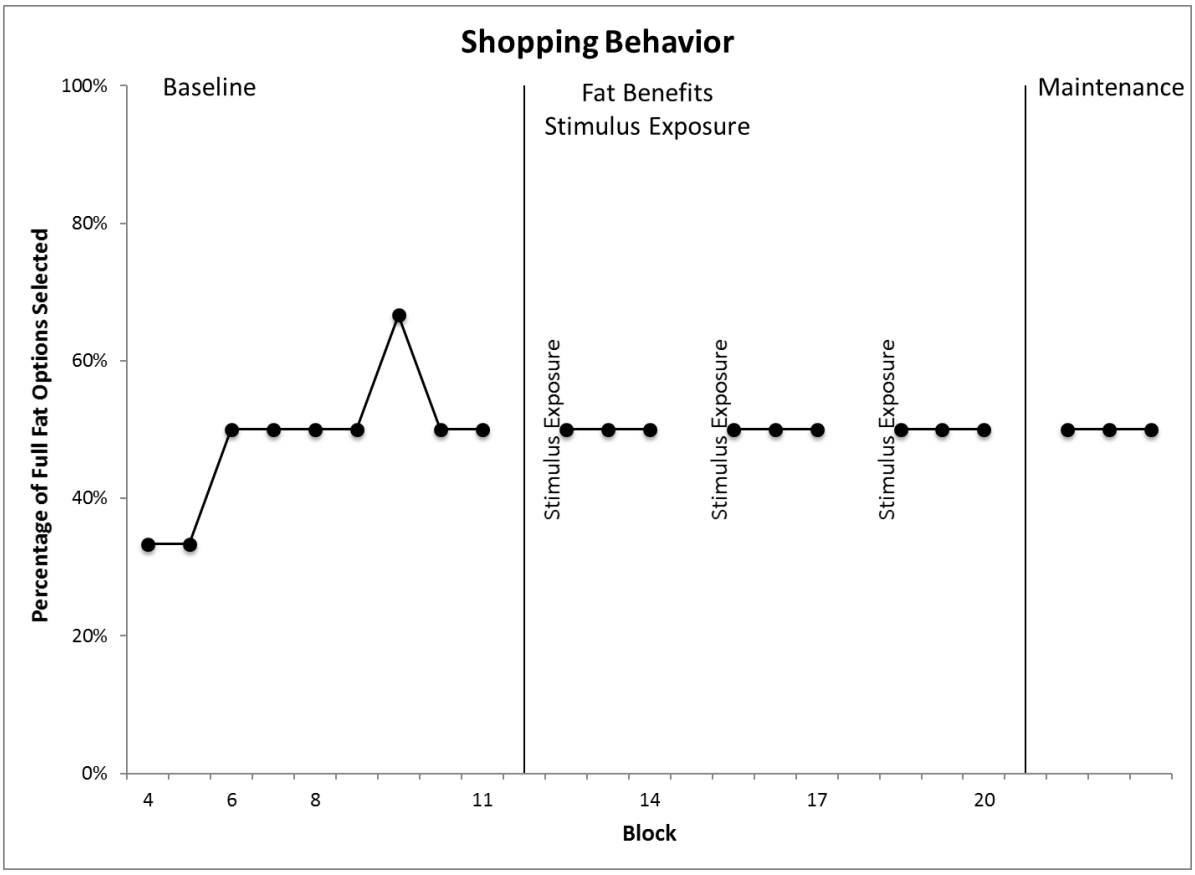

Figure 25. Percentage of full-fat selections on each block of the shopping simulation during baseline, stimulus exposure (treatment) and maintenance conditions for participant 8.

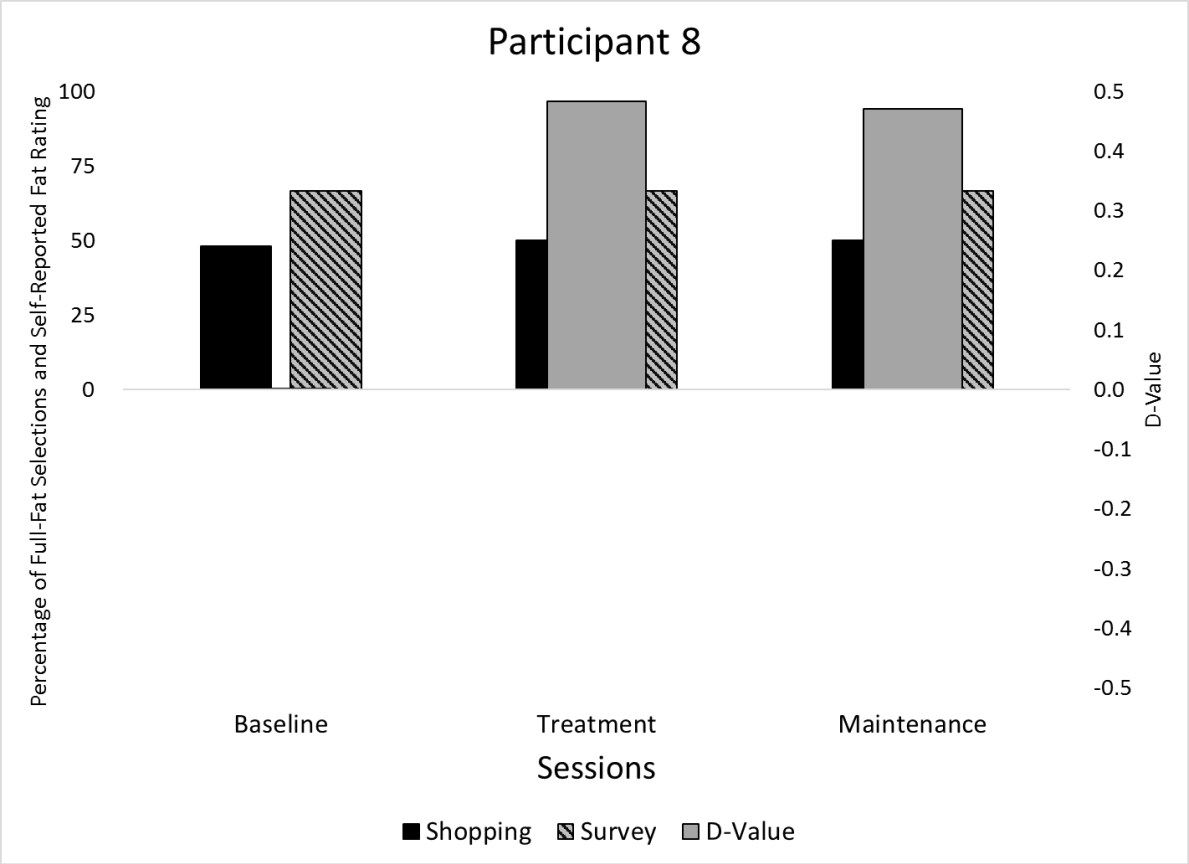

Figure 26. Percentage of full-fat selections during shopping simulations, self-reported fat ratings from the survey and D-values from the IRAP during baseline, treatment and maintenance conditions for participant 8. This participant contacted the Fat Benefits Stimulus Exposure.

Participant 11 Data

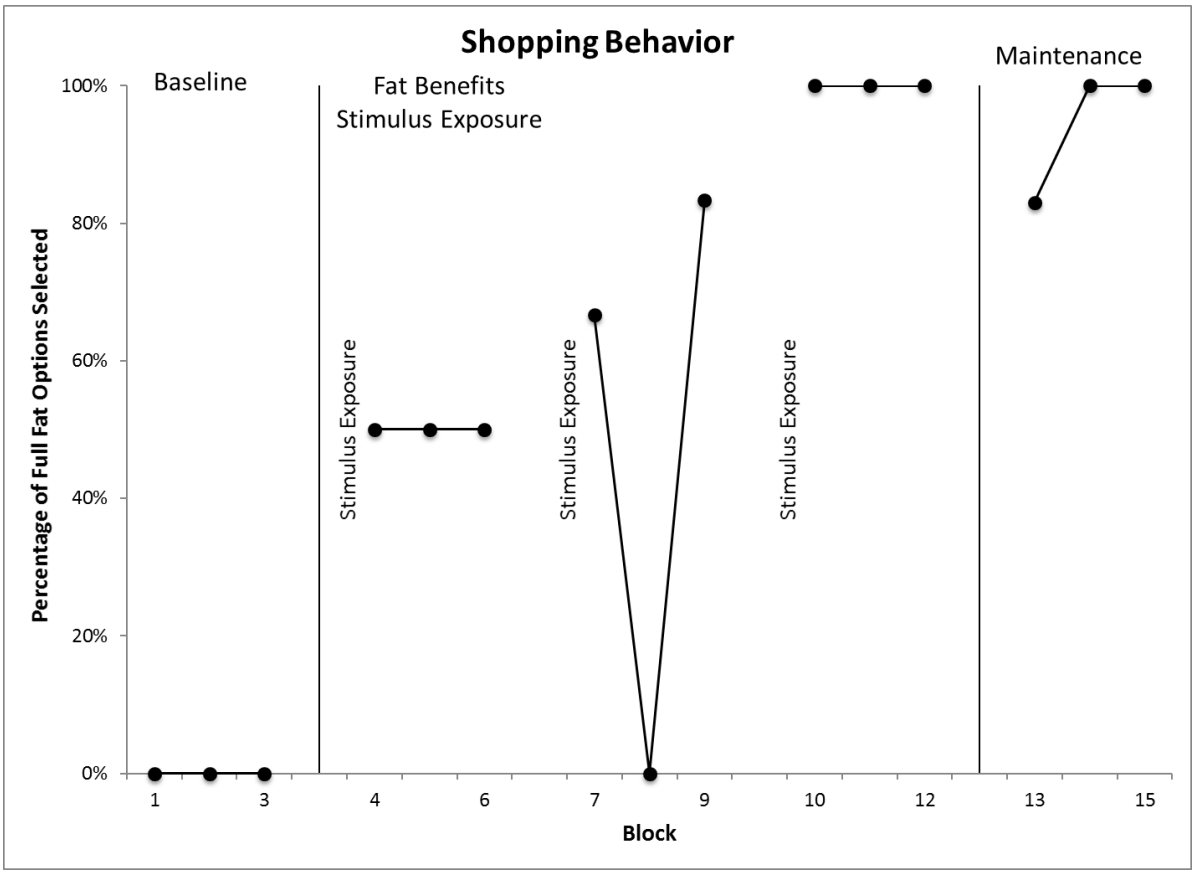

Figure 27. Percentage of full-fat selections on each block of the shopping simulation during baseline, stimulus exposure (treatment) and maintenance conditions for participant 11.

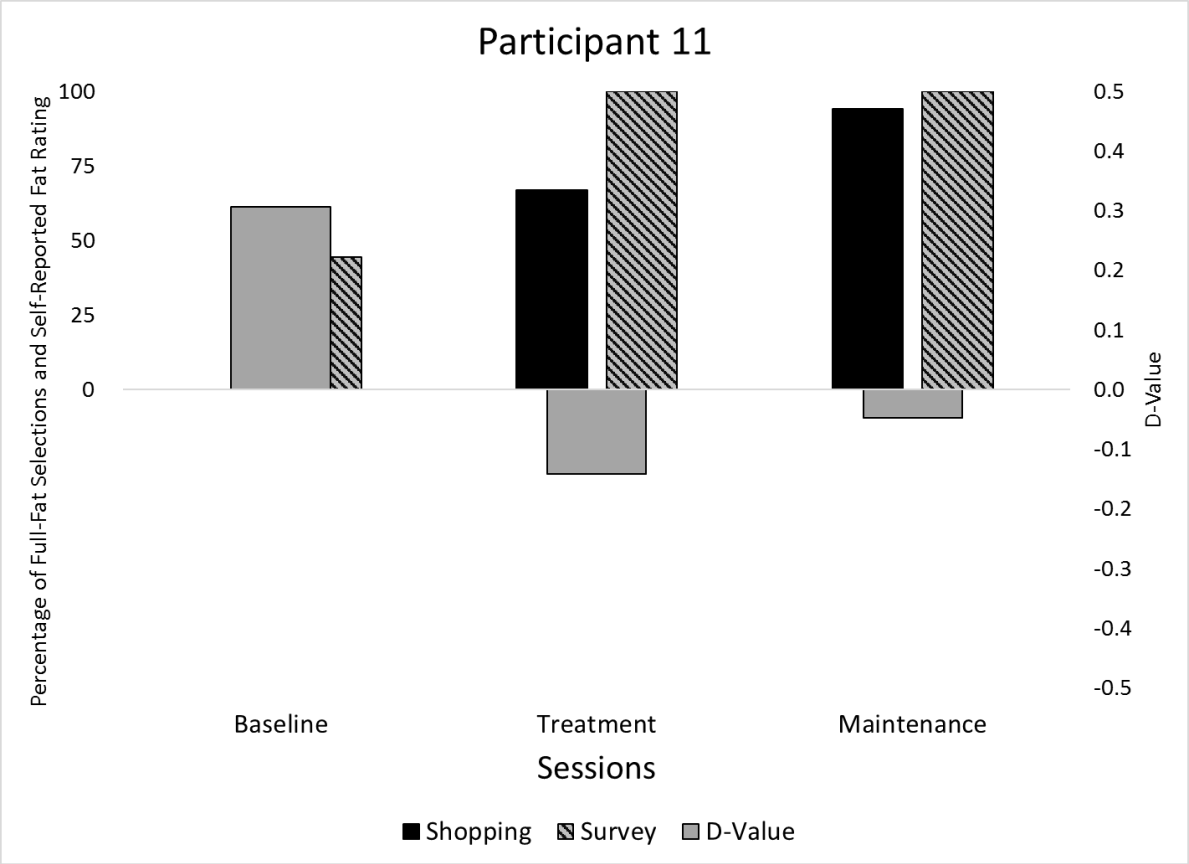

Figure 28. Percentage of full-fat selections during shopping simulations, self-reported fat ratings from the survey and D-values from the IRAP during baseline, treatment and maintenance conditions for participant 11. This participant contacted the Fat Benefits Stimulus Exposure.

Participant 13 Data

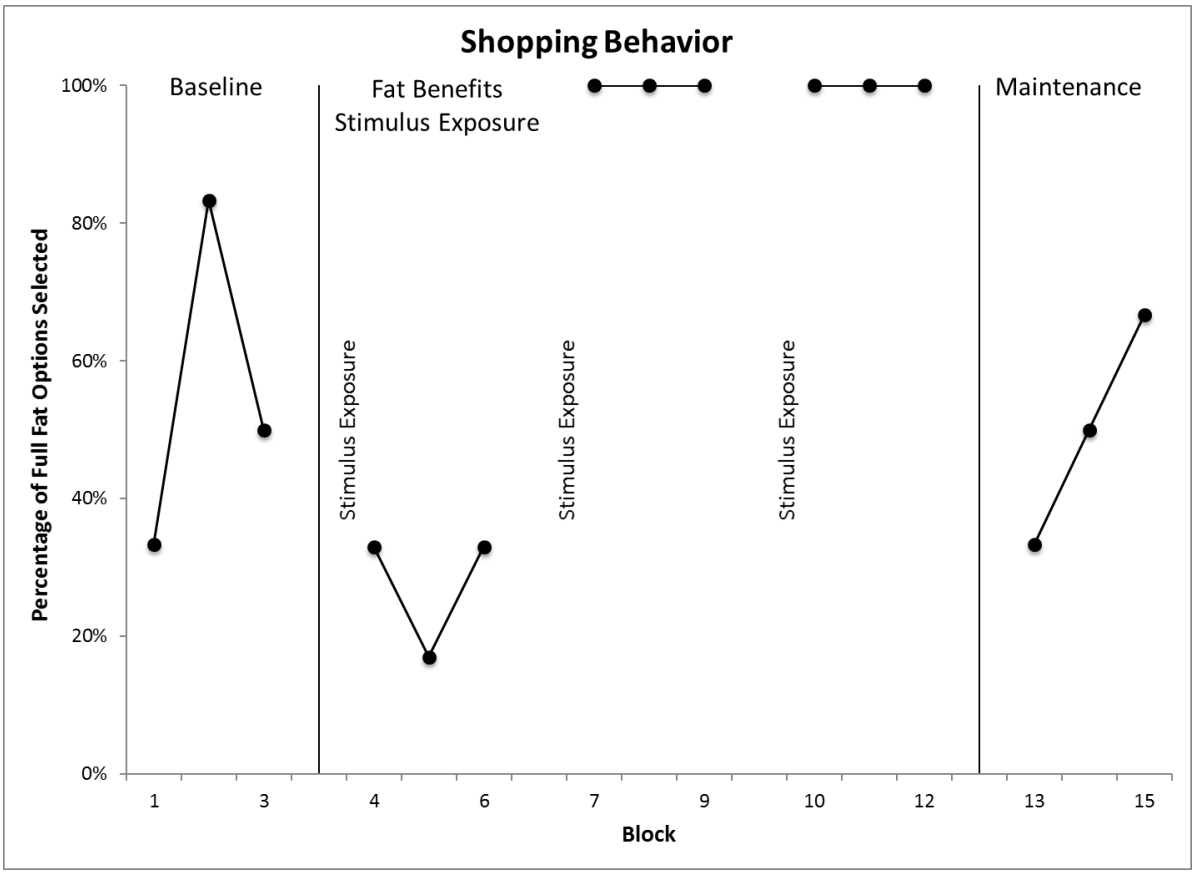

Figure 29. Percentage of full-fat selections on each block of the shopping simulation during baseline, stimulus exposure (treatment) and maintenance conditions for participant 13.

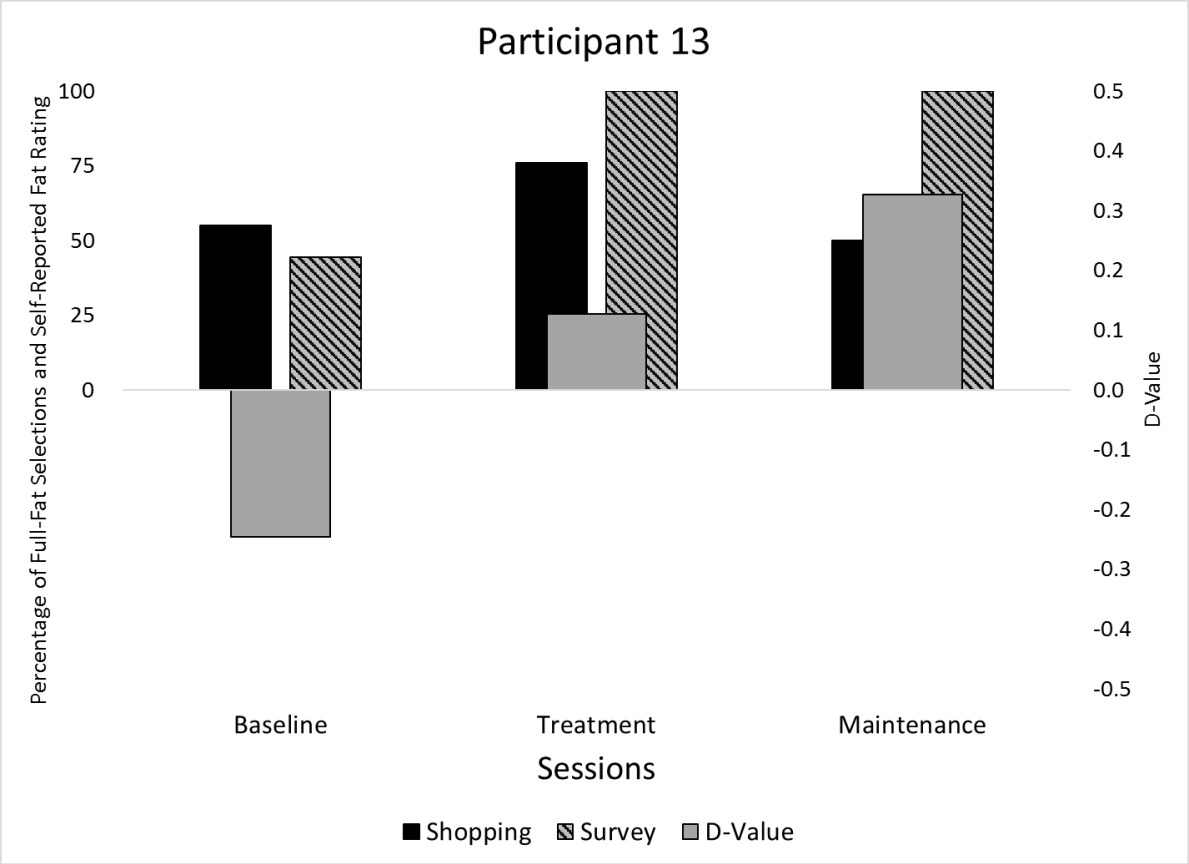

Figure 30. Percentage of full-fat selections during shopping simulations, self-reported fat ratings from the survey and D-values from the IRAP during baseline, treatment and maintenance conditions for participant 13. This participant contacted the Fat Benefits Stimulus Exposure.

Participant 15 Data

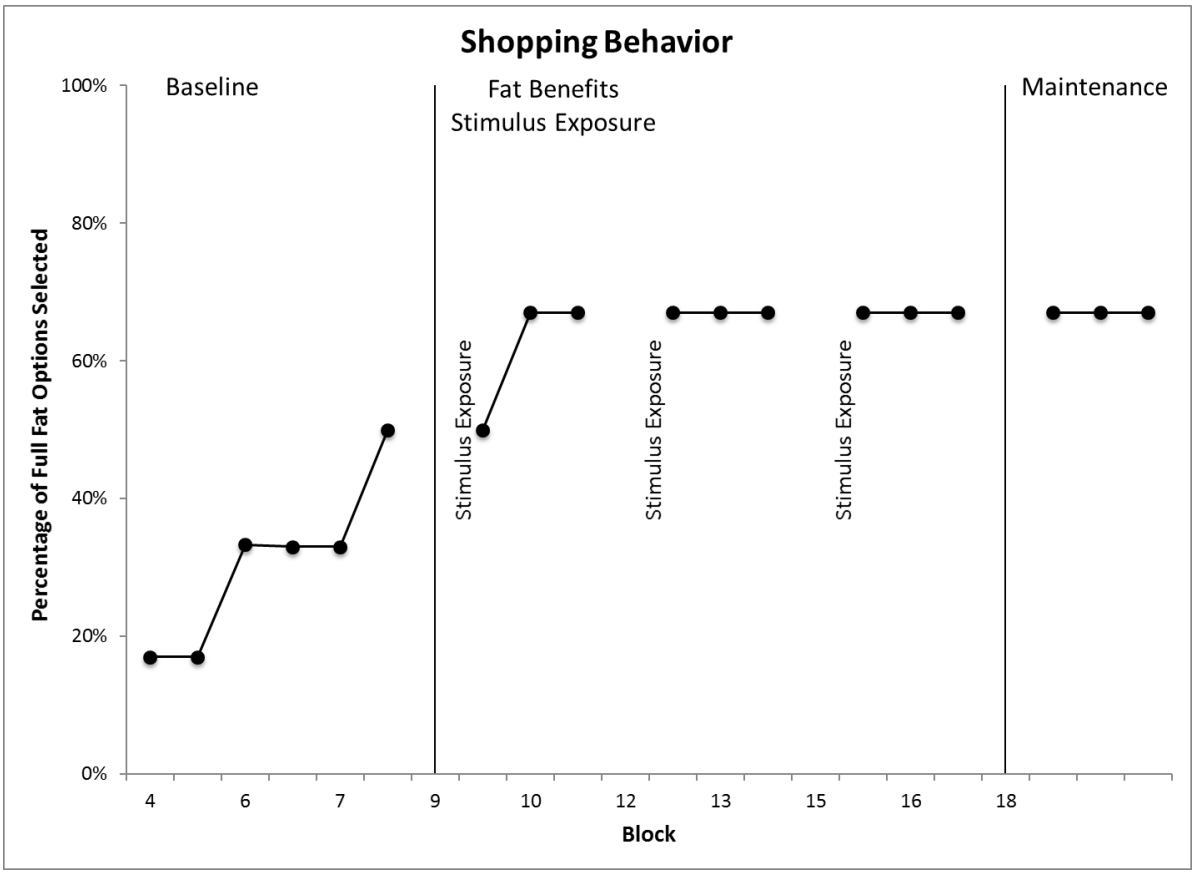

Figure 31. Percentage of full-fat selections on each block of the shopping simulation during baseline, stimulus exposure (treatment) and maintenance conditions for participant 15.

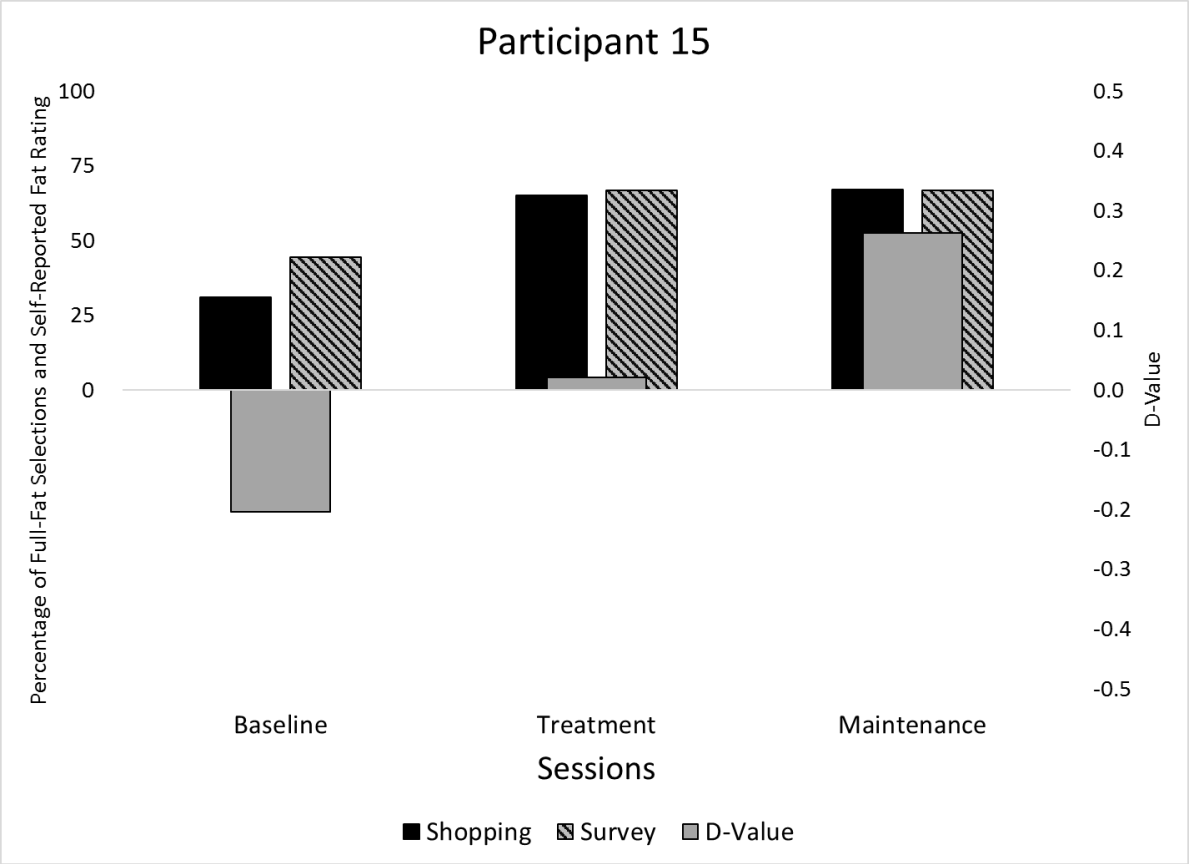

Figure 32. Percentage of full-fat selections during shopping simulations, self-reported fat ratings from the survey and D-values from the IRAP during baseline, treatment and maintenance conditions for participant 15. This participant contacted the Fat Benefits Stimulus Exposure.

APPENDIX L: IRAP STATISTICAL ANALYSIS (ALL PARTICIPANTS)

IRAP Statistical Analysis (All Participants)

All Participants T-Test (Baseline-Treatment)

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Baseline	-.0385	15	.16517	.04265
	Treatment	.1040	15	.23154	.05978

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Baseline & Treatment	15	.393	.147

Paired Samples Test

		Paired Differences				
					95% Confidence Interval of the Difference	
		Mean	Std. Deviation	Std. Error Mean	Lower	
Pair 1	Baseline - Treatment	-.14253	.22546	.05821	-.26739	

Paired Samples Test

		Paired Differences				
		95% Confidence Interval of the Difference				
		Upper	t	df	Sig. (2-tailed)	
Pair 1	Baseline - Treatment	-.01768	-2.448	14	.028	

All Participants T-Test (Baseline-Maintenance)

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Baseline	-.0385	15	.16517	.04265
	Maintenance	.1273	15	.21137	.05458

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Baseline & Maintenance	15	.012	.966

Paired Samples Test

		Paired Differences				
					95% Confidence Interval of the Difference	
		Mean	Std. Deviation	Std. Error Mean	Lower	
Pair 1	Baseline - Maintenance	-.16587	.26668	.06886	-.31355	

Paired Samples Test

		Paired Differences			
		95% Confidence Interval of the Difference			
		Upper	t	df	Sig. (2-tailed)
Pair 1	Baseline - Maintenance	-.01818	-2.409	14	.030

APPENDIX M: IRAP STATISTICAL ANALYSIS (FAT DETRIMENTS STIMULUS EXPOSURE PARTICIPANTS)

IRAP Statistical Analysis (Fat Detriments Stimulus Exposure Participants)

Fat Detriments Group T-Test (Baseline-Treatment)

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Baseline	-.0479	10	.14386	.04549
	Treatment	.0760	10	.23372	.07391

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Baseline & Treatment	10	.824	.003

Paired Samples Test

		Paired Differences			
				Std. Error Mean	95% Confidence Interval of the Difference
		Mean	Std. Deviation		Lower
Pair 1	Baseline - Treatment	-.12390	.14120	.04465	-.22491

Paired Samples Test

		Paired Differences			
		95% Confidence Interval of the Difference			
		Upper	t	df	Sig. (2-tailed)
Pair 1	Baseline – Treatment	-.02289	-2.775	9	.022

Fat Detriments Group T-Test (Baseline-Maintenance)

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Baseline	-.0479	10	.14386	.04549
	Maintenance	.0720	10	.20671	.06537

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Baseline & Maintenance	10	.399	.253

Paired Samples Test

		Paired Differences				
					95% Confidence Interval of the Difference	
		Mean	Std. Deviation	Std. Error Mean	Lower	
Pair 1	Baseline - Maintenance	-.11990	.19922	.06300	-.26241	

Paired Samples Test

		Paired Differences			
		95% Confidence Interval of the Difference			
		Upper	t	df	Sig. (2-tailed)
Pair 1	Baseline - Maintenance	.02261	-1.903	9	.089

APPENDIX N: IRAP STATISTICAL ANALYSIS (FAT BENEFITS STIMULUS EXPOSURE PARTICIPANTS)

IRAP Statistical Analysis (Fat Benefits Stimulus Exposure Participants)

Fat Benefits Group T-Test (Baseline-Treatment)

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Baseline	-.0198	5	.21968	.09824
	Treatment	.1600	5	.24259	.10849

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Baseline & Treatment	5	-.219	.723

Paired Samples Test

		Paired Differences				
					95% Confidence Interval of the Difference	
		Mean	Std. Deviation	Std. Error Mean	Lower	
Pair 1	Baseline - Treatment	-.17980	.36118	.16152	-.62826	

Paired Samples Test

		Paired Differences				
		95% Confidence Interval of the Difference				
		Upper	t	df	Sig. (2-tailed)	
Pair 1	Baseline - Treatment	.26866	-1.113	4	.328	

Fat Benefits Group T-Test (Baseline-Maintenance)

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Baseline	-.0198	5	.21968	.09824
	Maintenance	.2380	5	.19305	.08634

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Baseline & Maintenance	5	-.687	.200

Paired Samples Test

		Paired Differences				
					95% Confidence Interval of the Difference	
		Mean	Std. Deviation	Std. Error Mean	Lower	
Pair 1	Baseline - Maintenance	-.25780	.37916	.16957	-.72859	

Paired Samples Test

		Paired Differences			
		95% Confidence Interval of the Difference			
		Upper	t	df	Sig. (2-tailed)
Pair 1	Baseline - Maintenance	.21299	-1.520	4	.203