

**SUPERMARKET DECISION-MAKING: THE EFFECTS OF JUSTIFICATION, SELF-
CONTROL DEPLETION, AND RESTRAINED EATING BEHAVIOR**

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Abstract

Individuals classified as restrained eaters focus more on the nutritional impact of their food decisions, and are more susceptible to external rather than internal factors driving these decisions, than unrestrained eaters. The food choices of both restrained and unrestrained eaters can be influenced by a justification effect (e.g., feeling that it is acceptable to eat an indulgent item after going to the gym) and self-control depletion (e.g., choosing healthier items when self-control is diminished at the end of a lengthy shopping trip), which may have wide ranging implications for consumer health. In the present study, the influence of restrained eating behavior, justification (manipulated by altering the order in which participants shopped), and self-control depletion (operationalized by the number of prior shopping decisions that had been made) on the nutritional content of food chosen during an online supermarket trip was examined. Overall, restrained eaters chose healthier items than unrestrained eaters, but there was no impact of shopping order or trip length on the nutritional content of food choices. In a follow-up study conducted at Hamilton College, there was no effect of restrained eating behavior or food order on the healthiness of the items that students chose from a buffet line. The scale used to differentiate between restrained and unrestrained eaters was reliable in both studies, indicating that it is a useful tool in diverse populations. However, the justification and self-control depletion manipulations employed were not effective. In order to successfully examine the nuanced effects of both phenomena, additional studies should be conducted using a field study paradigm at an actual supermarket.

Supermarket Decision-Making: The Effects of Justification, Self-Control Depletion, and Restrained Eating Behavior

Imagine standing in the frozen foods section of your local supermarket. Directly in front of you, there are four freezer cases filled with ice cream that comes in fifteen different flavors produced by upwards of twenty manufacturers. Some varieties claim to be “low-fat” or “light,” while others tout a “creamy texture” or “real ingredients.” Turning around, you are faced with a similar dilemma as you search for a frozen dinner. It’s getting late, you’ve been grocery shopping for over an hour, and you want to get home. “It shouldn’t be so difficult to make a choice,” you think to yourself, and finally settle on frozen chicken fingers and full-fat rocky road ice cream. Although these choices may seem arbitrary, they were likely influenced in large part by your previous decisions in the produce, dairy, and meat sections, your own patterns of eating behavior, and even the order in which you went shopping.

The number of decisions that consumers are faced with during a typical trip to the grocery store is astonishing. They must make numerous choices, not only concerning what types of food to buy, but also about what varieties and brands they desire. On average, Americans visit the supermarket 1.5 times per week (Food Marketing Institute, 2015), or over 75 times per year. An average supermarket carries 42,214 items (Food Marketing Institute, 2015), which means consumers come into contact with over 3 million food products during the course of their yearly shopping experiences. Complicating matters further, there are price and nutritional differences between foods, which are often at odds with each other. With all of these decisions to make, it is no wonder that consumers often feel overwhelmed.

The choice between healthy and unhealthy products has become more salient over the past decade as consumers worry about the potential impact that food can have on their well-

being. In a 2012 survey by the International Food Information Council Foundation, over half of respondents indicated that they put “a lot of thought” into the healthfulness of their food choices, and at least 60% specified that they consider the nutritional label when buying packaged foods. For every variety of junk food or indulgent pastry that a store offers, there is at least one (supposedly) healthy counterpart (e.g., 100 calorie snack packs or low-fat cookies). Although it is almost impossible to avoid buying something healthy, as stores are offering a greater variety of fresh produce and affordable organic options, bypassing unhealthy foods is not as simple as it may seem. It is difficult to go through an entire shopping trip without buying any indulgent items, even if people know they are bad for them. The factors that influence food decisions in a supermarket can be broken down into three general categories: prior decisions made in the shopping trip, the number of decisions made, and individual eating behaviors. Through the *licensing effect* (Khan & Dhar, 2006), choosing healthy foods at the beginning of a supermarket trip justifies the subsequent selection of unhealthy foods; *self-control depletion* (Muraven and Baumeister, 2000) predicts that making a large number of consecutive decisions depletes the cognitive resources necessary to resist temptation; and individuals’ intrinsic *restrained eating behavior* (Herman & Mack, 1975) influences their food choices differently at various points in the shopping trip.

Justification and the Licensing Effect

Variety and choice. On the surface, having more choices in the supermarket seems positive. It ensures everyone can find something that is pleasing and reduces the potential for boredom in frequent shoppers. Yet, research contradicts the notion that more variety is better. Choosing from a large assortment of products has been found to be more difficult than choosing from a smaller variety (Sela, Berger, & Liu, 2009). Individuals are actually less likely to make

purchases when faced with a large (rather than small) number of products, and they are more satisfied in their choices when deciding between a smaller range of options (Iyengar & Lepper, 2000). When making a difficult decision, consumers will look for whatever option is easiest to justify in order to facilitate the decision-making process (Mukhopadhyay & Johar, 2009; Sela et al., 2009). Normally, utilitarian (or virtuous) goods are easier to justify than hedonic (or vice) goods. Okada (2005) found that when asked to choose between a utilitarian (\$50 grocery certificate) and hedonic (\$50 dinner certificate) product, individuals were more likely to select the utilitarian option, even though they had rated it lower than the hedonic option when presented with them separately. When products are jointly evaluated, the flaws of the hedonic good are highlighted through contrast with the virtuous utilitarian good, making it more difficult to justify (Okada, 2005). This finding implies that even though consumers may view an unhealthy (hedonic) product as more desirable, they will generally choose a healthy (utilitarian) product when they are presented together in the supermarket (i.e., on the same shelf or in the same aisle). When asked whether they hoped a friend would choose the dinner or grocery gift certificate for them, participants in Okada's (2005) study indicated the dinner certificate more often. Because a third party is making the decision for them, there is no need for individuals to justify the purchase, leading to a preference for the hedonic good that they rated higher initially and presumably value more (Okada, 2005).

When the size of a food assortment was varied (e.g., two varieties of ice cream vs. ten varieties), individuals were more likely to select a healthy option in the high variety condition (Sela et al., 2009). This result was independent of the make-up of the assortment and only depended on the total number of products offered, such that even if the "high variety" condition contained mostly hedonic goods, participants were still more likely than those in the low variety

condition to choose a utilitarian product. It seems that the difficulty of a decision (and therefore the propensity to choose healthy items) may be directly related to the number of products one is deciding between, which is an important consideration in supermarkets where a typical aisle can contain ten varieties of chips or twelve brands of barbeque sauce. However, there are factors other than variety that influence each decision, many of which are dependent on choices made in previous aisles.

Justification overview. When faced with a decision, individuals are likely to make the choice that is easiest to rationalize (Mukhopadhyay & Johar, 2009). The rationalization can be based on a variety of factors and acts as a *justification* for the choice. Hedonic goods are more difficult to justify than utilitarian goods, so what drives consumers to sometimes choose them when faced with a multiple options? A phenomenon termed the *licensing effect* has been demonstrated in a variety of studies, and essentially relies on the assumption that most “real world” decisions are not made in a vacuum. Decisions tend to occur in a series (especially during a typical shopping trip), and the licensing effect arises because each prior choice has an effect on subsequent ones (e.g., Khan & Dhar, 2006; Mukhopadhyay & Johar, 2009). When a consumer makes a choice or performs an act (often called a licensing task) that increases her positive self-concept (e.g., donating to charity or buying a healthy snack), it can act as a justification for her to participate in subsequent hedonic behavior (e.g., spending money on a luxury vacation or stopping at the ice cream stand) by attenuating the negative feelings about the self normally associated with it (Khan & Dhar, 2006). In other words, individuals look for a way to justify a purchase that normally would be forbidden.

Justifications arising from licensing tasks can be extremely varied, and are often broken down into categories such as altruistic and laudable acts (e.g., community service), effort and

achievement (e.g., reaching a weight loss goal), or prior restraint (e.g., passing on an unhealthy appetizer; De Witt Huberts, Evers, & De Ridder, 2014). Additionally, the justification itself does not have to be related to the act that it is licensing (De Witt Huberts et al., 2014). For example, it is possible to justify eating an indulgent piece of cake at a wedding by focusing on the celebratory aspects of the event, rather than on any specific facet of the cake itself. Oftentimes, justifications are not even overly convincing when examined alone, likely because decisions are more frequently based on the availability of a reason rather than its quality (De Witt Huberts et al., 2014). All justifications occur prior to the hedonic act, unlike a cognitive dissonance mechanism in which an individual justifies a questionable choice only after having made it (De Witt Huberts et al., 2014). Moreover, justification generally occurs through a careful reflective process, unlike indulgent choices that are made on impulse (De Witt Huberts et al., 2014). These characteristics make it clear that justification is a distinct phenomenon from other similar cognitive processes that can potentially influence decision-making, and therefore must be analyzed independently. Justification is likely adaptive in the long-term, as it allows individuals to indulge occasionally (which is inevitable in a world filled with continuous temptations) while still maintaining a sense of overall control (De Witt Huberts et al., 2014).

Implications of justification and licensing in the supermarket. When individuals engage in a licensing task prior to making decisions, their behavior can be altered from what the normal justification difficulty of hedonic vs. utilitarian goods would predict. For example, participants asked to imagine that they had spent time completing community service were more likely to choose a luxury (hedonic) item than those in the control condition (Khan & Dhar, 2006), even when the variety of products was large (Sela et al., 2009). These findings demonstrate multiple facets of justifications discussed previously: they occur prior to the hedonic

act, they don't have to be related to the hedonic act, and they often involve altruistic behavior. More relevant to a supermarket context, Mukhopadhyay and Johar (2009) found that restraining from buying an item at Time 1, as opposed to purchasing one, led participants to choose an indulgent item at Time 2 more often. Importantly, this effect was only found when participants were reminded of their prior restraint. In a typical trip to the grocery store, consumers often forgo buying a sugary cereal or fatty snack for health reasons. The simple act of passing on the cereal or snack earlier in the trip—which is likely to be salient since a supermarket trip generally lasts under an hour (Hui, Bradlow, & Fader, 2009)—may license the consumer to buy a full-fat ice cream or indulgent cake later in the trip that would normally be difficult to justify. Some research has found that the licensing effect is a largely nonconscious process, such that individuals do not recognize the link between performing a licensing task and choosing a hedonic product (Khan & Dhar, 2006). However, other studies have shown that participants can articulate the connection between prior restraint and subsequent indulgence (Dhar & Simonson, 1999). Regardless of whether consumers are aware of the licensing effect, it still plays a large role in their shopping behaviors.

To further substantiate the claim that the licensing effect is present during a typical grocery shopping experience, some research has examined supermarket field data by tracking consumers' shopping routes and purchasing behavior. Gilbride, Inman, and Stilley (2013) found that when individuals purchase a utilitarian product, it increases the likelihood that their next purchase will be unplanned. Although an unplanned purchase is not necessarily hedonic, it does demonstrate that the consumer is veering from his original shopping plan, an occurrence aided by the justification provided by the initial utilitarian purchase. Gilbride et al.'s study examined purchasing behavior on an itemized and sequential basis, providing evidence for how quickly the

licensing effect can manifest itself. Hui et al. (2009) conducted similar research by examining purchasing behavior at an itemized level using trackers attached to shopping carts, but found only weak support for the licensing effect. The ratio of vice to virtue products in consumers' carts influenced their subsequent decisions to browse in locations containing hedonic products (e.g., the snack food aisle), but did not affect their propensity to visit these locations or buy from them. Although this finding would seem to imply that the licensing effect is not highly influential in supermarket purchasing decisions, Hui et al. propose that their results arose because they made virtue/vice distinctions on the product level (e.g., fruit vs. ice cream) and were not able to examine product differences within each category (e.g., full-fat vs. low-fat ice cream). In a typical supermarket, it is difficult to call any product category completely utilitarian or completely hedonic, as there are so many different varieties available. This methodological limitation will be addressed in the current study.

Goals and justification. The goals that an individual holds can have a substantial impact on the type of justification strategies she exhibits, therefore contributing to the licensing effect. *Goal progress* is defined as the pursuit of a goal through specific actions, whereas *goal commitment* is an inference about the strength of a particular goal, which normally has more bearing on self-concept (Fishbach & Dhar, 2005). Individuals generally hold multiple goals at one time, which are often in direct competition (e.g., losing weight vs. eating a tasty meal; Dhar & Simonson, 1999; Fishbach & Dhar, 2005). Somewhat counterintuitively, when participants perceived progress toward one goal (e.g., eating an apple or studying more than the average student), they were more likely to choose subsequent goal incongruent activities (e.g., eating a chocolate bar or socializing with friends) than those who had perceived little or no goal progress (Fishbach & Dhar, 2005). This result implies that goal progress can act as a sort of justification,

licensing individuals to counteract the goal they just worked toward in favor of a competing, potentially more pleasing, goal (De Witt Huberts et al., 2014). In a supermarket setting, consumers with strong nutritional goals will likely choose healthy products initially, but once they perceive sufficient goal progress they may feel licensed to make unhealthy decisions.

It appears that goals can also be fulfilled vicariously for some consumers. Wilcox, Vallen, Block, and Fitzsimons (2009) found that merely including a healthy choice in a list of food options led some individuals to choose unhealthy products more often than when there was no healthy choice included. Importantly, this effect was only found among individuals high in self-control. A subsequent test established that for those high in self-control, healthy eating goals were more accessible when no healthy product was included in the list of options compared to when one was. Therefore, it appears that when all food options are hedonic, healthy eating goals are activated for individuals high in self-control, as the noticeable absence of anything healthy (a tempting situation) serves as a trigger for competing goals through a self-regulation mechanism (Wilcox et al., 2009). However, including one healthy option makes the nutrition goals less salient, as the selection is more balanced and no longer a temptation cue. In other words, the simple act of considering a healthy option can act as a justification and licenses the subsequent purchase of a hedonic product for those high in self-control. This finding is surprising on the surface, but it makes more sense when considering that individuals high in self-control are more likely to rely on external cues to justify indulgence (Wilcox et al., 2009), indicating that individual differences among consumers may affect how much influence the licensing effect has in the supermarket.

Goals are also important to consider even when the licensing effect is not involved. When making two consecutive choices (e.g., ordering multiple courses in a restaurant) that involve

competing goals, it is possible to *highlight* one goal (e.g., choose a healthy entrée and healthy dessert) or *balance* them both (e.g., choose a healthy entrée and unhealthy dessert; Dhar & Simonson, 1999). If decisions must be made with no prior justification present, such as at the beginning of a supermarket trip, the highlighting vs. balancing distinction is particularly important. Dhar and Simonson (1999) found that individuals were more likely to balance, rather than highlight, when making decisions involving a trade-off between two competing goals. Highlighting only one goal (e.g., healthy eating) is an “extreme” solution, as it completely contradicts the competing goal (e.g., having a delicious meal). The act of sacrificing a goal likely ruins the experience of highlighting the other one, leading to the preference for balancing (Dhar & Simonson, 1999).

Guilt and temptation as motivators of self-regulation. The licensing effect explains the preference for hedonic goods following a utilitarian purchase, but it is logical to inquire about the opposite situation: how does buying an indulgent product affect subsequent decisions? The preference for balancing rather than highlighting goals is often explained in terms of guilt, a type of “reverse licensing effect.” As one participant in Dhar and Simonson’s (1999) study said when explaining the decision to balance, “Because after you have a big, fatty, gourmet main dish you probably feel a little guilty and probably wouldn’t go for the fatty dessert.” Individuals recognize the guilt associated with hedonic purchases—just as they recognize the good feeling that comes from utilitarian choices—and adjust their consumption patterns accordingly. Similarly, in their supermarket field study, Gilbride et al. (2013) found that at the beginning of a shopping trip (up until about the 11th purchase), an unplanned purchase decreased the likelihood that a subsequent purchase would be unplanned. The researchers suggest that this occurrence is a result of a self-regulation mechanism used by consumers to balance a shopping cart. Potential guilt can also

directly influence self-regulation, as priming dieters with negative self-conscious emotion words (e.g., guilty and regret) led them to eat less than when they were primed with positive words (Giner-Sorolla, 2001).

Exposure to temptations (e.g., hedonic products) likely induces guilt, but it also leads to effective self-regulation in another way. Kroese, Evers, and De Ridder (2009) found that female college students who were exposed to a temptation picture (chocolate cake) rated their weight loss goal as more important than those who were not exposed to the temptation. Additionally, exposure to the temptation led to goal-directed behavior (i.e., choosing a healthy snack over an indulgent one). These results are in line with Wilcox et al.'s (2009) finding that high self-control individuals had more salient healthy eating goals when exposed to a list of completely hedonic goods rather than a mixture of hedonic and utilitarian ones. This phenomenon has been termed counteractive self-control theory (Trope & Fishbach, 2000), which posits that temptations (or any short-term cost) contribute to effective self-regulation by automatically activating long-term goals (relating to health in this case). Although there are some limitations to this theory (e.g., different effects among restrained and unrestrained eaters), it provides another potential mechanism for self-regulation in the supermarket, even though it is not clear how much influence it would have over a competing licensing effect.

Justification and guilt. Although the guilt associated with hedonic purchases or the exposure to a temptation can lead to effective self-regulation, a prior licensing task can help alleviate this feeling and thus justify the indulgent purchase. In fact, De Witt Huberts et al. (2014) hypothesize that one of the main driving forces behind justification is the potential to eliminate negative emotions (e.g., guilt) associated with hedonic choices. Before an individual makes a decision, it is possible to imagine how he will feel after it. Therefore, by preempting any

negative affect with a justification, he can ensure he will not feel guilty even after an indulgence (in essence, he can have his cake and eat it too). In support of the relationship between justification and guilt, Khan and Dhar (2007) found that participants in a repeated choice condition (i.e., they were told they would be choosing between the same two snacks again next week) selected a hedonic product (cookie) more often and felt less guilty about it than those in an isolated choice condition. The repeated choice acts as a license for participants to choose an unhealthy product, as they imagine that they can make a better decision the next time. Therefore, it appears that although guilt and temptation can be powerful motivators to potentially increase self-regulation, a readily available justification can quickly counteract these effects.

Self-Control Depletion

Although the opportunities to justify hedonic purchases are plentiful during a typical trip to the supermarket, consumers will always make a number of utilitarian choices as well, possibly to fulfill healthy eating goals, balance their cart, or lessen the guilt they imagine stemming from future choices. No matter what the reasons that consumers choose to forgo temptations, some degree of self-control is necessary. Self-control relies on a cognitive resource that is also utilized by other executive functions, such as decision-making and action initiation (Vohs, Baumeister, Schmeichel, Twenge, Nelson, & Tice, 2008). This resource is limited and becomes consumed over time with use, commonly referred to as ego depletion. Muraven and Baumeister (2000) outline a self-control strength model that relates self-control to a fatigable muscle. They posit that the success of an act requiring self-control depends on an individual's current level of self-control strength. All acts of self-control draw from the same common cognitive resource, and performing one depletes the "reservoir" of self-control that is available at any given time. Importantly, this reservoir needs time to replenish before it is again at full strength, unlike other

cognitive reservoirs like working memory. In other words, there is a distinction between limited strength models (e.g., attention and self-control) and limited capacity models (e.g., working memory), which can hold a finite amount of information but do not need any time to recharge after use (Muraven & Baumeister, 2000).

Self-control depletion (often termed cognitive depletion) could also potentially be explained by other mechanisms, such as learned helplessness. Yet, studies have found that even when participants *successfully* complete a task that requires self-control (e.g., being forced to resist an eating temptation), they still perform more poorly on subsequent tests of self-control (Muraven & Baumeister, 2000). This result seems to rule out learned helplessness as an alternative explanation of self-control depletion, as participants are not learning that outcomes are unrelated on actions (i.e., they were successfully able to resist a temptation, so they know that they have the capacity for self-control). It should be noted that not all effortful tasks deplete self-control strength. For example, math problems may be difficult to solve but do not necessarily require any self-control to complete (Muraven & Baumeister, 2000). Muraven, Tice, and Baumeister (1998) found that compared to participants who completed math problems, those who worked on a thought suppression exercise performed more poorly on a subsequent self-control test, although both groups reported expending approximately equal amounts of effort. Therefore, effort exertion is distinct from self-control depletion and cannot be used as an alternative explanation to the self-control strength model.

It is also possible that exerting self-control leads to shifts in motivation, which then affects subsequent task performance (Inzlicht and Schmeichel, 2012). Performing a self-control intensive task requires a great deal of hard work. Consequently, individuals may be demotivated to complete another one shortly after it. This decline in motivation is especially an issue in most

empirical tests of the self-control strength model, which do not offer incentives for completing the various tasks—the depletion group is working harder than the control group but not receiving an additional reward (Inzlicht & Schmeichel, 2012). When depleted participants were offered an incentive to complete a self-control task at Time 2, or made to believe that the task would benefit themselves or others in the future, they were able to perform equally as well as a non-depleted group (Muraven & Slessareva, 2003). Therefore, it appears that there may be a relationship between the licensing effect and cognitive depletion, such that when individuals exert self-control at Time 1, they feel that they deserve a break, and subsequently perform more poorly at Time 2 if they have no reason to exhibit a high degree of effort. This effect is distinct from what is predicted by the self-control strength model, as individuals have the capacity to self-regulate at Time 2, they just are unmotivated to do so (Inzlicht & Schmeichel, 2012). It is likely that both the motivational and limited resource model of self-control depletion are accurate to some extent, and that they affect decision-making in a complementary manner.

Self-control depletion and supermarket decision-making. Because self-control is a limited resource that must be replenished after use, performing tasks that require continuous self-control should become more difficult over time. In support of this theory, various studies have found that participants' performance on vigilance tasks (e.g., detecting a stimulus) declines as the task progresses (Muraven & Baumeister, 2000). Similarly, if (as predicted by the self-control strength model), decision-making relies on the same cognitive reserve as self-control, making consecutive decisions in a short period of time should lead to a decline in self-control ability. Vohs et al. (2008) performed a variety of studies in which participants made multiple successive decisions and then performed a test of self-regulation (e.g., cold pressor task or resisting video games in favor of studying). Those in the decision-making condition performed more poorly on

the tasks than those in a control group, supporting the notion that self-control and decision-making rely on the same resources. In a direct examination of the effects of shopping decision-making, Vohs et al. (2008) asked shoppers at an outdoor mall to indicate how many decisions they had made during their trip and then complete three-digit arithmetic problems (which the researchers deemed difficult enough to require self-control). Those who had made a greater number of decisions performed more poorly on the math problems than those who had made fewer decisions.

In a typical trip to the supermarket, fifty or more food decisions are often made within an hour. Consumers have less self-control resources available at the end of the trip compared to the beginning and may be more likely to give into temptation. Making as few as five decisions between similar products, as opposed to being explicitly told which items to buy, has been shown to lead to a more indulgent choice in the sixth (target) decision (Bruyneel, Siegfried, Vohs, & Warlop, 2006). In their field study of shopping data, Gilbride et al. (2013) found that after consumers' 11th decision, an unplanned purchase increased the likelihood that a subsequent purchase would be unplanned, whereas the opposite effect was seen when examining earlier decisions. In light of these findings, it appears that the simple act of choosing what foods to buy in the grocery store can deplete cognitive resources and lead to a decline in self-control.

Unlike the licensing effect, self-control depletion does not rely on the *types* of decisions that are made, only the total *number* of them. Choosing hedonic or utilitarian goods from a variety of options depletes cognitive resources, which implies that consumers are more likely to give into temptations later in the trip regardless of what products they purchased earlier. Conversely, the licensing effect predicts that only utilitarian, and not hedonic, purchases will lead to subsequent indulgence, as they are able to act as justifications. Results of Gilbride et al.'s

(2013) supermarket study indicate that self-control depletion can take effect after only eleven decisions, much shorter than an average trip to the grocery store. However, it is not clear whether the licensing effect also influences these results. Because of the layout of many supermarkets, the beginning of the store often contains the produce section, where it is almost impossible to make an unhealthy choice. Therefore, it is possible that early shopping decisions not only lead to self-control depletion, but also act as justifications. Both of these factors are associated with a greater propensity for hedonic purchases later in the shopping trip. In order to examine the effects of cognitive depletion and justification separately, it is necessary to alter the order in which each aisle is visited, such that the first decisions made are either completely hedonic or completely utilitarian. This design will be a major component of the present study.

Factors influencing self-control depletion in the supermarket. During a grocery shopping experience, there are numerous factors other than the number of decisions made that could potentially lead to self-control depletion. For example, it is logical to assume that the act of shopping may lead to a decline in cognitive resources simply due to fatigue, even if there are not many actual decisions being made. Yet, in Vohs et al.'s (2008) study of shoppers at an outdoor mall, the effect of the number of shopping decisions on subsequent math performance was independent of the total time spent shopping and self-reported degree of tiredness. Bruyneel et al. (2006) also found that cognitive depletion was not dependent on total shopping time. When participants were asked to make a dissimilar amount of decisions in a fixed period of time, the group making a larger number of choices was more likely to make an indulgent purchase than those making fewer choices. Furthermore, Vohs et al. (2008) tested the effects of the three main aspects of decision making (deliberation, choice, and implementation) separately. They found that participants who were asked to make a choice on their own performed more poorly on a

subsequent test of self-control (persistence on an anagram task) than those who only had to deliberate about a choice or implement a pre-assigned decision. Taken together, these findings suggest that there is some unique self-control resource that is specifically required to make and implement decisions, which is not expended when simply becoming tired while shopping or deliberating about potential purchases. This idea is in line with the results indicating that effort exertion is distinct from self-control depletion.

Another influence that is prominent during many supermarket trips is priming from various advertisements or consumer notices. For example, companies touting their health food products may display signs describing the benefits of eating whole grains, unsaturated fats, etc. However, these primes appear to not have a major influence on self-control depletion. Performing a cognitively demanding task (identifying the letter “e” in printed text) led participants to choose a chocolate bar over a granola bar, whereas those who had not performed the task displayed the opposite choice (Walsh, 2014). Importantly, this effect held even when participants were primed with a healthy eating goal at the beginning of the study, indicating the strength of the depleting effect. It may be possible to attenuate self-control depletion by increasing decision enjoyment, though. Participants who were asked to make a series of decisions for a period of four minutes did not show any decline in performance on a self-control task relative to a control group when their self-reported enjoyment of the decisions was at least one standard deviation above the mean (Vohs et al., 2008). Yet, there was no beneficial effect of enjoyment when the decision making task was longer (12 minutes). Therefore, it appears that enjoyable decisions require fewer cognitive resources and deplete self-control more slowly than tedious ones. Simply enjoying a trip to the supermarket—something that is not common amongst

most consumers who view it as another weekly chore— may help individuals to exert more self-control during their purchases and make healthier decisions.

Restrained Eating

Although the effects of licensing and self-control depletion have been exhibited in a wide variety of diverse samples and experimental paradigms, there are also individual differences amongst consumers that affect decision-making. For example, some individuals may be more susceptible to justification or cognitive depletion, depending on their capacity for self-control or goal-directed behaviors. In a supermarket context, the individual difference variable that most directly affects decision-making is restrained eating behavior. Individuals can be categorized as restrained or unrestrained eaters. Restrained eaters are individuals who continually monitor their eating, oftentimes restricting intake, whereas unrestrained eaters rely on physiological hunger to drive their eating patterns. In other words, restrained eaters eat less than they would ideally like to eat, usually due to health or body image concerns, but unrestrained eaters consume food until they are satiated (van Strein, Frijters, van Staveren, Defares, & Deurenberg, 1986). It is important to make the distinction between dieters and restrained eaters. Restrained eaters are in a constant state of deprivation but may not even fully recognize it, therefore not considering themselves dieters. Conversely, many dieters are simply trying to lose weight (maybe for the first time in their lives) and don't have the preoccupation with food that is indicative of a restrained eater (Rand & Kuldau, 1991). Yet, it is true that restrained eating behavior is more prevalent among a population of past dieters than among those who have never dieted (Rand & Kuldau, 1991).

There is also a critical distinction to be made between overweight or obese individuals and restrained eaters. Although restrained eaters make a conscious attempt to restrict their food

intake, their restraint is not continuous. They often rely on external cues to justify disinhibition of restraint and excessive eating, so there are generally more restrained eaters among an overweight population than a normal weight one (Rand & Kulda, 1991). Nevertheless, being overweight does not automatically imply that an individual is a restrained eater (or vice versa). To better explain this difference, it is useful to consider the weight set point theory (Nisbett, 1972), which holds that each individual has a genetically determined number of fat cells (adipocytes), which cannot be altered upon entering adulthood. On average, an obese population likely has a higher weight set point than a normal weight population. However, restrained eaters who have a high set point may be able to maintain a “normal” weight by consciously restricting their food intake (Herman & Mack, 1975). Although this restraint allows them to conform to social and cultural standards, they are biologically underweight and continually ignoring their physiological hunger levels, leading to a state of chronic deprivation. In contrast, unrestrained eaters with the same set point may become obese but not be physiologically deprived. It is also possible that obese restrained eaters would be even more overweight if they didn’t practice restraint. In other words, they are still depriving themselves of their true set point even though they are obese, leading to a (hidden) state of deprivation (Herman & Mack, 1975).

The discussion of weight set point brings up an important consideration about hunger cues. There are *internal* cues, which arise within the body and are likely mediated by the hypothalamus (e.g., feeling hungry after not eating for six hours), and *external* cues, which are environmental or situational variables (e.g., smelling nearby food or seeing a buffet line; Herman & Mack, 1975; Herman & Polivy, 1980). The eating behavior of restrained eaters is mostly determined by external factors, as they often ignore physiological hunger cues. Conversely, unrestrained eaters rely mainly on internal cues to decide when and how much to eat. As an

example of these differences, Fedoroff, Polivy, and Herman (2003) found that when restrained eaters were exposed to the smell of a certain food while writing their thoughts about it (two prominent external food cues), they subsequently ate more of the food than unrestrained eaters who were exposed to the same cues. Similarly, restrained eaters are more susceptible to external factors such as their own caloric intake ideals when making food decisions, which leads to a variety of situations where eating behavior can be altered in somewhat surprising ways.

Disinhibition of restraint: Counter-regulation and the *what the hell effect*. Although restrained eaters are more cognizant of their food choices than unrestrained eaters, this fact does not necessarily imply that they continually restrict their intake. Using an experimental paradigm that has been replicated multiple times, Herman and Mack (1975) randomly assigned female college students (a mix of both restrained and unrestrained eaters) to either consume zero, one, or two 7.5 ounce milkshakes (termed a “preload”). All participants were then asked to sample and rate three different flavors of ice cream for ten minutes. Among unrestrained eaters, participants who had preloaded with one or two milkshakes consumed less ice cream than those who had not preloaded. This finding demonstrates the regulation that is expected of unrestrained eaters. They rely on physiological hunger to determine how much they should eat, and preloading with the milkshakes was enough to satisfy them. Conversely, among restrained eaters, those who had preloaded with one or two milkshakes actually ate more ice cream than those in the no preload condition. This result, which has been termed counter-regulation (Herman, Polivy, & Esses, 1987), demonstrates the reliance of restrained eaters on external cues. Once they have consumed a milkshake, they feel that they have exceeded their self-imposed caloric limit for the day, lifting the feeling of restraint. In other words, the milkshake acts as an external cue (a “trigger”) that

makes it acceptable to consume more food (Herman & Mack, 1975), leading to a motivational collapse (Herman & Polivy, 1980).

Herman et al. (1987) explain counter-regulation amongst restrained eaters in a slightly more detailed way. They posit that restrained eaters possess two eating boundaries: a diet boundary and a satiety boundary. Once the diet boundary has been breached (potentially after a small preload), a restrained eater will eat until his satiety boundary is reached. Rather than predicting a direct relationship between preload size and subsequent consumption, this model implies that larger preloads will lead to less consumption than smaller ones (as long as they both exceed the diet boundary), as the satiety boundary will be closer to being reached. In studies among restrained eaters, this theory has held (Herman et al., 1987), indicating once again that restrained and unrestrained eaters rely on different cues and internal beliefs to drive eating behavior.

Another potential explanation of restrained eaters' response to a preload is the *what the hell effect* (Cochran & Tesser, 1996). When individuals try to attain inhibitory goals (e.g., reducing certain behaviors, such as overeating) and fail, it is viewed as an all-or-none loss (i.e., there is no feeling of success associated with breaking a daily caloric goal) that cannot be undone (Cochran & Tesser, 1996). Additionally, when the inhibitory goal is proximal rather than distal (e.g., a daily rather than weekly caloric intake goal), it tends to be associated with constant negative feedback, which impedes goal progress (Cochran & Tesser, 1996). Therefore, when proximal, inhibitory goals are not reached, it produces a feeling of failure that may prompt individuals to simply say "what the hell" and partake in actions that counteract their initial goals. Once restrained eaters eat a preload that exceeds their diet boundary, their daily goals have already failed so restraint is lifted, leading to more consumption. Unrestrained eaters do not hold

the same goals relating to daily eating behavior, so they should be less susceptible to the *what the hell effect*.

Restrained eating and supermarket decision-making. Although most studies on restrained eating behavior have been limited to consumption rather than food shopping, there are important parallels that can be drawn. Initially, restrained eaters may be more likely than unrestrained eaters to purchase healthy items, as they are especially cognizant of restricting their intake of indulgences. However, when restrained eaters buy a few unhealthy items, it may have the same effect as a caloric preload, leading to counter-regulatory behavior that involves buying even more unhealthy items as the trip progresses. Unrestrained eaters, on the other hand, may view the unhealthy items as fulfilling an internal desire for indulgence and thus try to make the rest of their shopping purchases healthier.

Justification, Self-Control Depletion, and Restrained Eating

Both the licensing effect and self-control depletion involve outside cues that indicate to an individual when it is acceptable to eat a certain food. In the licensing effect, these cues are previous good deeds or healthy food decisions that justify a subsequent hedonic purchase, whereas self-control depletion involves cues such as mental fatigue and tiredness. Therefore, it is reasonable to infer that restrained eaters may be more susceptible to the effects of licensing and self-control depletion, as they rely on external rather than internal cues to drive their food consumption. Wallis and Hetherington (2004) asked participants (both restrained and unrestrained eaters) to complete either a Stroop task (designed to induce self-control depletion) or a control task. They were then allowed to consume as many chocolate candies as they wanted. As expected, there was a main effect of the task, such that those in the depletion group consumed more candy overall than those in the control group. However, a significant interaction effect

revealed that this pattern was only present among restrained eaters. Unrestrained eaters did not differ in chocolate consumption between the control and depletion groups. Not only does this finding suggest that restrained eaters are more susceptible to self-control depletion, but it also calls into question how prevalent the effect is among unrestrained eaters. Because restrained eaters require more self-monitoring than unrestrained eaters to limit their food intake, it makes sense that cognitively demanding tasks lead to disinhibited eating. Additionally, substantial past research has found that restrained eaters consume more calories in stressful circumstances, whereas unrestrained eaters' consumption can actually slightly decrease under the same conditions, providing further support for the differential effects of self-control depletion (Wallis & Hetherington, 2004). During a supermarket trip, restrained eaters likely require more self-control than unrestrained eaters to resist temptations, as they constantly agonize over each food choice. Consequently, the effects of cognitive depletion will set in more rapidly, leading to a greater proportion of hedonic purchases.

It has also been shown that restrained eaters respond to the licensing effect differently than unrestrained eaters. De Witt Huberts, Evers, and De Ridder (2012) exposed participants to justification-related sentences describing effort (e.g., "I worked hard") or control sentences and then asked them to perform a lexical decision task consisting of hedonic and neutral target words. When exposed to justification sentence cues, restrained eaters responded significantly faster to hedonic words than when they were exposed to control sentences, yet there was no difference in response time observed among unrestrained eaters. Furthermore, in a second study, De Witt Huberts et al. (2012) found that restrained eaters gave more attention (measured by eye tracking) to hedonic food products after being exposed to a justification-related sentence as opposed to a control sentence. These findings suggest that simply presenting restrained eaters

with a potential justification can increase their hedonic orientation and attention, leading them to actively seek out indulgence. In unrestrained eaters, self-regulation conflicts need to be activated by temptations in order for an individual to be subject to justification effects, but because restrained eaters have continually salient self-regulation conflicts relating to food, they are sensitive to any justification that is presented, no matter its context (De Witt Huberts et al., 2012).

These results complement Wilcox et al.'s (2009) study, which found that for individuals high in self-control, merely including one healthy product in a list of foods led to more indulgent choices than when the list consisted of only hedonic products. A follow-up study indicated that including the healthy product made nutritional goals less salient for those high in self-control, essentially acting to vicariously fulfill them. These effects were not observed for individuals low in self-control, though. Restrained eaters have a lot in common with high self-control individuals. They both exert a great deal of effort to ensure that specific goals are met and generally have some degree of success. However, because they are continually thinking about their goals (in this case, healthy eating) and deciding how best to achieve them, any opportunity for a "break" is likely to be highly appreciated. Justifications are a perfect excuse for restrained eaters to indulge, and although not explicitly discussed by Wilcox et al., vicariously fulfilled goals also probably act through a justification-type mechanism. In the supermarket, restrained eaters may be more likely than unrestrained eaters to actively seek out potential justifications (e.g., noticing that low-fat ice cream is an available option or buying an extra piece of fruit to compensate for future pastry aisle purchases), therefore making them more susceptible to the licensing effect.

Present Study Overview and Expectations

In the present study, the influences of the licensing effect, self-control depletion, and restrained eating behavior on grocery shopping tendencies were examined. Assessing all three factors simultaneously allowed for a thorough investigation of their influences on food choices and how they may interact with each other. The licensing effect was examined by altering the order in which participants made food decisions, and I expected that those in the justification condition (all healthy choices first) would subsequently make more unhealthy decisions than those in the control (choices involving both healthy and unhealthy products first) and guilt (all unhealthy choices first) conditions. Also, I hypothesized that in the justification condition, restrained eaters would make more unhealthy choices overall than unrestrained eaters, as they are likely more susceptible to the licensing effect. Although I did not predict an overall difference in the amount of unhealthy decisions made in the guilt and control conditions, I anticipated that restrained eaters would make more unhealthy choices in the guilt condition (due to the *what the hell effect*), whereas unrestrained eaters would make more unhealthy choices in the control condition. Based on the theory of self-control depletion, I expected the proportion of unhealthy choices to grow as the total number of decisions increased. I also anticipated that restrained eaters would be more susceptible to depletion effects and thus begin to make unhealthy decisions earlier in the shopping experience than unrestrained eaters.

Study 1

Methods

Participants. One-hundred eighty-two participants (94 female, 87 male, 1 transgender), ranging in ages from 18 to 76 ($M = 37.4$, $SD = 11.9$), completed the study. A majority (84.6 %) identified as White, 7.1 % as Black, 3.3 % as Hispanic, 2.2 % as Asian/Pacific Islander, 0.5 % as

American Indian/Alaskan Native, and 2.2 % as other. The average height in the sample was 67.45 inches ($SD = 4.87$) and the average weight was 174.72 pounds ($SD = 49.28$; two participants chose not to indicate their weight), signifying an average BMI of approximately 27, which is considered overweight.

Mechanical Turk. All participants were recruited via Amazon's Mechanical Turk website. Mechanical Turk is a crowdsourcing web service where researchers (requestors) can recruit workers to complete various tasks (called HITs, or human intelligence tasks; Paolacci, Chandler, & Ipeirotis, 2010). Wages are commonly low on this site, with a median of under \$2 per hour, but money is usually not a primary motivation for workers completing the study (Paolacci et al., 2010). Because workers are independent contractors, they are not subject to minimum wage laws and determine their own hours and work volume (Mason & Suri, 2012). Furthermore, various psychology studies have been replicated on Mechanical Turk with results comparable to lab based studies.

There are also advantages of Mechanical Turk that make it preferable to other data collection methods for the present study. The subject pool is much more diverse than a traditional undergraduate population, and also stable over the course of the year, unlike a population of introductory psychology students (Mason & Suri, 2012). This diversity was important for my study, as most college students do not complete grocery shopping on a regular basis, and based on my experiences it seems they are more concerned about nutrition than the general population. Data collection on Mechanical Turk is also extremely fast, and it is not unheard of to recruit over 1000 participants in less than a month (Paolacci et al., 2010). In the present study, it took under 3 days to collect the 182 responses. Participants were paid \$0.80, and most completed the survey in less than 15 minutes. Participation was restricted to US residents

(as many of the food products presented are only available in America) and workers who had a greater than 95% approval rating from prior tasks.

Materials/Stimuli.

General. Each participant completed a questionnaire online consisting of the components outlined below. After signing up for the study on Mechanical Turk, participants were provided with a link to the Qualtrics website where the survey was located, and they could complete it on any computer or mobile device within the allotted time of 40 minutes.

Food choices. Participants were presented with a series of 35 food decisions. Each decision involved 8 products from a similar category (e.g., frozen dinners) or food group (e.g., meat) that can be found at a typical supermarket. A picture of each product, which contained no nutrition information unless it was part of the main packaging (e.g., 100 calorie snack packs or low-fat ice cream), was shown, but there was no additional description included. All pictures were presented against a white background, and they were approximately equal in size.

There were 3 types of food decisions that each participant made: completely healthy, completely unhealthy, and ‘both.’ There were 5 completely healthy decisions, which consisted only of product categories that are commonly thought of as nutritious (fruits (x2), vegetables (x2), and bottled water). Similarly, the 5 completely unhealthy decisions contained product categories considered indulgent or unhealthy (frozen pizza, snack cakes, chocolate, candy, and soda). The 25 ‘both’ decisions contained product categories that commonly include both healthy and unhealthy options (e.g., salty snacks and sandwich bread). Within each ‘both’ decision, there were 4 healthy and 4 unhealthy products that participants could choose from. Whenever possible, the products were “matched” such that there were similar healthy and unhealthy foods included (e.g., 4 low-fat ice cream flavors and the full-fat counterparts). Matching foods on variety and/or

flavor was an attempt to control for product preferences that are unrelated to nutritional value (e.g., mint chocolate chip ice cream may be more popular than vanilla, whether it is low- or full-fat).

Revised Restraint Scale. Restrained eating behavior was measured using the Revised Restraint Scale (RRS; Appendix A; Herman & Polivy, 1980). The questionnaire consists of 10 items rated on a 4- or 5-point scale, with higher values indicating greater restrained eating behavior. Previous studies have found that the RRS consists of 2 main factors: Concern for Dieting (e.g., “Do you give too much time and thought to food?”) and Weight Fluctuations (e.g., “How many pounds over your desired weight were you at your maximum weight?”; Heatherton, Herman, Polivy, King, & McGree, 1988). Therefore, the RRS measures a combination of disinhibition and restraint, which is common in most restrained eaters (Heatherton et al., 1988). In the present study, an aggregate restrained eating score was calculated for each participant by adding together their response to each of the 10 items. This procedure was employed because of the high internal consistency of the RRS ($\alpha = 0.75$).

Demographic information. Participants were asked to provide basic demographic information. Additionally, they were asked to specify their height and weight.

Procedure. Participants were told to imagine that they were actually grocery shopping when making each food decision, and to choose only a single product within each of the 35 decisions. Additionally, they were asked not to skip any of the food choices and to assume that every item within each decision was sold at a similar price and quantity.

Participants were randomly assigned to one of three potential shopping order conditions: completely healthy—‘both’—completely unhealthy (justification condition); completely unhealthy—‘both’—completely healthy (guilt condition); ‘both’—completely unhealthy—

completely healthy (control condition). Within the completely healthy and completely unhealthy choices, the order in which the 5 decisions were presented was fully randomized. Within the ‘both’ choices, there were 3 potential orders that the 25 decisions could be presented in, determined by a random number generator when designing the questionnaire. Each participant was randomly assigned to one of the three orders. Within each of the 35 total decisions, the order in which the 8 food products were presented was randomized. Each decision was presented on a separate page, and participants were required to make a single product choice before proceeding.

After finishing all 35 food decisions, participants completed the Revised Restraint Scale. There was also an attention check question included, which every participant except two answered correctly. However, no data was excluded from the final analyses, as there was no indication that the failed attention check was associated with more unanswered questions or noticeably faster response times than average. Lastly, participants answered the demographic questions and were ensured before being asked for their weight that all responses would be anonymous.

Results

The results from Study 1 are presented in two broad sections. The first concerns data collected from the Revised Restraint Scale (RRS), including an analysis of the Concern for Dieting and Weight Fluctuations subscales. The second discusses the influences of the licensing effect and self-control depletion on food choice, both overall and in conjunction with restrained eating behavior.

Restrained eating. When examined as a whole, the RRS exhibited good reliability ($\alpha = .75$). Participants were split into two groups based on a median cut-off score. Those having a combined ten question score greater than or equal to 24 were classified as *restrained* eaters ($n =$

94), whereas those scoring less than 24 were classified as *unrestrained* eaters ($n = 88$). This median score cut-off procedure has been used successfully in past studies to examine restrained eating behavior (e.g., Herman et al., 1987). Overall, in the 25 ‘both’ decisions, restrained eaters made significantly more healthy choices ($M = 11.15$, $SD = 5.68$) than unrestrained eaters ($M = 9.59$, $SD = 4.88$); $t(180) = 1.98$, $p = .049$.

Because past research has indicated that the RRS can be split into two distinct subscales, Concern for Dieting (CD) and Weight Fluctuations (WF; Heatherton et al., 1988; see Appendix A), it was important to explore this possibility in the present study. The six questions in the CD subscale and the four questions in the WF subscale exhibited strong reliability ($\alpha = .72$ and $.71$ respectively). When using the median cut-off score for the CD subscale, there were 90 unrestrained and 92 restrained eaters. In the 25 ‘both’ decisions, restrained eaters made significantly more healthy choices ($M = 12.03$, $SD = 5.68$) than unrestrained eaters ($M = 8.72$, $SD = 4.43$); $t(180) = 4.39$, $p < .001$. However, when using the median cut-off score for the WF scale, the 98 restrained eaters did not differ significantly in the number of healthy food items chosen within the 25 ‘both’ decisions ($M = 10.42$, $SD = 5.41$) when compared to the 84 unrestrained eaters ($M = 10.37$, $SD = 5.32$; $t(180) = 0.06$, $p = .95$). These findings indicate that the relationship between healthy food choices and restrained eating behavior is different when examining only the WF subscale rather than the CD subscale or the complete RRS.

Licensing effect and self-control depletion. In order to examine the influence of the licensing effect and self-control depletion on food choice, a 3 (food choice order, between subjects) x 5 (decision grouping, within subjects) x 2 (high and low restrained eating behavior, between subjects) mixed factorial ANOVA was conducted, with the total number of healthy ‘both’ choices as the dependent variable. To examine the effect of shopping trip length (as a

measure of self-control depletion), the 25 'both' food decisions were split into five equal groups (i.e., choices 1-5, choices 6-10, etc.), and the total number of healthy products chosen within each group was summed for each participant. This data analysis method allowed the decisions made at different points in the shopping trip (e.g., beginning vs. the end) to be conceptualized as a within subjects variable. The three food choice order groups were completely healthy—'both'—completely unhealthy (justification condition); completely unhealthy—'both'—completely healthy (guilt condition); 'both'—completely unhealthy—completely healthy (control condition). The two restrained eating groups (restrained or unrestrained eaters) were determined based on the median cut-off score of the complete RRS. Although it would be possible to define the two groups based on only the CD or WF subscale, I chose to use the complete RRS for the initial analysis based on the procedures utilized in previous studies.

I first examined the licensing effect, specifically the hypothesis that participants in the justification condition would make fewer healthy choices overall than those in the guilt and control conditions. There was no main effect of shopping order, $F(2, 176) = 0.84$; $p = .43$, indicating that there was no significant difference in the total number of healthy choices made in the justification, guilt, and control conditions. Additionally, there was no significant interaction effect between shopping order and restrained eating behavior; $F(2, 176) = 0.02$, $p = .98$. This finding implies that the hypotheses that restrained eaters would be more susceptible to the licensing effect (i.e., make fewer healthy choices in the justification condition than unrestrained eaters), and that restrained eaters would make more unhealthy choices in the guilt condition (due to the *what the hell effect*) whereas unrestrained eaters would make more unhealthy choices in the control condition, were both not supported (see Table 1 for descriptive statistics relating to shopping order).

The effects of self-control depletion on product choice were investigated next by testing the hypothesis that the proportion of unhealthy choices would increase as the shopping trip progressed. However, there was no main effect of decision grouping, $F(4, 704) = 1.75; p = .14$, indicating that the number of healthy choices did not significantly differ between the five decision groups and disconfirming the hypothesis. Additionally, there was no interaction effect between restrained eating behavior and decision grouping, $F(4, 704) = 1.60; p = .17$, indicating that the hypothesis that restrained eaters would be more susceptible to self-control depletion than unrestrained eaters (i.e., begin to make more unhealthy choices earlier in the shopping trip) was not supported (see Table 2 for descriptive statistics relating to decision grouping).

It should also be noted that there was a marginally significant main effect of restrained eating behavior, $F(1, 176) = 3.87; p = .051$, which is indicative of the finding that restrained eaters make more healthy choices overall than unrestrained eaters. Additionally, there was no significant three-way interaction between shopping order, decision grouping, and restrained eating behavior, $F(8, 704) = 1.40; p = .20$, indicating no evidence for any relationship between self-control depletion, the licensing effect, and restrained eating in Study 1.

Because of the significant difference in food choice observed between restrained and unrestrained eaters defined by the CD, but not WF, subscale, a 2 (high and low restrained eating behavior defined by only the CD subscale) x 3 (food choice order) x 5 (decision grouping) mixed factorial ANOVA follow-up analysis was conducted. The expected main effect of restrained eating behavior was observed, $F(1, 176) = 18.52; p < 0.001$, but there was no significant interaction between restrained eating behavior and shopping order, $F(2, 176) = 0.81; p = .45$, or between restrained eating behavior and decision grouping, $F(4, 176) = 0.43; p = .79$. Additionally, there was no significant three-way interaction between restrained eating behavior,

decision grouping, and shopping order; $F(8, 176) = 1.65, p = .11$. These findings indicate that there was no relationship between restrained eating behavior and decision grouping or shopping order when making the restrained vs. unrestrained eater distinction based on the CD subscale.

Discussion

The results of this study can be divided in two general categories. First, the RRS exhibited strong reliability when analyzed as a whole and as two distinct subscales. Restrained eaters made healthier choices than unrestrained eaters overall when the groups were defined using the median cut-off score from the complete RRS or the Concern for Dieting subscale. However, when classifying restrained and unrestrained eaters using the median cut-off score from the Weight Fluctuations subscale, there were no differences in the nutrition content of product choices between the two groups. Second, contrary to hypothesis, there were no main effects of shopping order or decision grouping, indicating that the licensing effect and self-control depletion did not significantly affect product choice in this study. Furthermore, there were no interaction effects between restrained eating behavior and shopping order or decision grouping, signifying that restrained and unrestrained eaters were not differentially affected by the licensing effect or self-control depletion. Both categories of results will be discussed and analyzed below.

Restrained eating behavior. When using the median cut-off score of the complete RRS to classify participants as restrained or unrestrained eaters, there was a main effect of eating behavior such that restrained eaters made significantly more healthy choices than unrestrained eaters in the 'both' choices. This finding makes sense when viewed independently from the justification and self-control depletion manipulations. Restrained eaters are generally more cognizant of their food choices, and therefore more likely than unrestrained eaters to consider the

nutritional consequences of supermarket purchases. Restrained eaters also rely more on external, rather than internal, cues to indicate what they should eat (e.g., Herman & Mack, 1975). Because there were no overt product descriptions included in the study, differentiating between healthy and unhealthy foods required attention to detail (e.g., noticing the word “light” on an ice cream container or “baked” on a bag of chips). Restrained eaters, because of their reliance on external cues, are used to this type of detective work when choosing products during a typical shopping trip, whereas unrestrained eaters likely rely more on internal cues such as what they feel tastes best.

When examining the two distinct subscales of the RRS, the finding that restrained eaters made healthier choices than unrestrained eaters only held when splitting the participants using Concern for Dieting subscale scores. Dividing the group based on the Weight Fluctuations subscale scores did not yield any noticeable differences in food choice. This finding may be explained by the different natures of the two subscales. The CD subscale contains questions (e.g., “Do you give too much time and thought to food?” and “How conscious of you of what you’re eating?”) designed to explicitly measure how much thought and effort individuals put into food intake and restriction. Scoring high on this subscale would seem to be associated with spending a large amount of effort making healthy supermarket decisions. Conversely, the WF subscale contains direct questions (e.g., “What is the maximum amount of weight you have ever lost in one month?” and “How many pounds over your desired weight were you at your maximum weight?”) meant to roughly estimate how an individual’s weight has changed recently, and whether he is currently overweight. The rationale behind this subscale is that higher scores indicate periods of restriction (dieting) followed by disinhibition, which is characteristic of restrained eaters. However, it is also possible to score high on the WF subscale simply by

currently being overweight and/or recently dieting. These two factors alone do not constitute a restrained eater (i.e., overweight individuals may not actively be trying to restrict intake, or dieters may be simply trying to lose weight, but struggling). In fact, there has been some research suggesting that unrestrained, but overweight, individuals score erroneously high on the RRS due to the WF subscale alone (Heatherton et al., 1988). Therefore, many of the individuals classified as restrained eaters when using only the WF may not actively practice restraint of food intake or consideration of product nutrition content, leading to the lack of a difference in food choices seen in the study.

Although I chose to use the median cut-off score to differentiate between restrained and unrestrained eaters, I don't believe the results would have been altered if a different procedure (e.g., absolute cut-off score) were used. The median cut-off procedure has been utilized with success in past studies examining restrained eating behavior (e.g., Herman et al., 1987). Additionally, there is no reported score on the RRS that officially designates a restrained eater, so it would be difficult to choose one without sufficient knowledge of a wider variety of studies. The distinction between restrained and unrestrained eaters is almost always made dichotomously (e.g., Fedoroff et al., 2003; Herman & Mack, 1975) but it would be interesting to examine more groups (e.g., designating the upper quartile of scores as "high" restrained eaters, etc.) in order to get a more complete picture of differences in product choice. This analysis would require a larger sample size, however.

Licensing effect. Contrary to hypothesis, there was no main effect of shopping order on the number of healthy products chosen in the 'both' decisions. More specific to the licensing effect, it appears that being forced to make five completely healthy choices did not act as a justification for individuals to subsequently choose more unhealthy products. Because the study

was conducted online, individuals may not have felt they were engaged in an actual shopping trip. Therefore, the licensing effect that may occur when walking through the produce section or health food aisle, seeing all of the healthy products, and making “feel good” purchases may not occur when looking at pictures of fruits, vegetables, and water for less than a minute. Although past studies have demonstrated that many different tasks can act as potential justifications (e.g., choosing a healthy snack or passing on an unhealthy dessert), including some with intangible justifications (e.g., imagining completing community service), all of these studies were conducted in a lab setting where participants were fully engaged in the task. The average completion time in this study was 11.2 minutes (and some participants took under five minutes), much shorter than a normal experience at a supermarket, indicating that individuals may not have even been fully aware of the justification task they completed. This fact is especially important considering past research indicating that justifications need to be salient in order to be effective (Mukhopadhyay & Johar, 2009). Even restrained eaters—who I expected to be most susceptible to the licensing effect, a prediction based on the results of previous studies (e.g., De Witt Huberts et al., 2012)—did not exhibit any changes in purchasing behavior while in the justification condition. In order to ensure that individuals in the justification condition recognize and appreciate their early healthy choices (as they likely would during an actual shopping experience) while still using a paradigm completed online, it may be necessary to include other stimuli (e.g., follow-up questions or more health buzz words on packaging) in conjunction with the five healthy choices.

Despite the prediction that unrestrained eaters would make more healthy choices than restrained eaters in the guilt condition, there was no interaction effect observed between restrained eating behavior and shopping order. I expected that being forced to make five

unhealthy choices at the beginning of the shopping trip would induce guilt in the unrestrained eaters, and they would therefore try to balance their purchases by choosing more healthy products subsequently. Conversely, I expected that restrained eaters would experience the *what the hell effect* in the guilt condition, feeling that their self-imposed diet boundaries had been breached by the initial unhealthy products and thus not practicing restraint anymore. However, as was the case with the predicted licensing effect, the five initial unhealthy choices were likely not impactful enough to induce either guilt or a “what the hell” feeling in any of the participants. Because the study was conducted online, there were no real consequences or benefits to buying any of the products. Although past research has indicated that guilt can lead to the balancing of hypothetical menu decisions (Dhar & Simonson, 1999), it is likely that in the present study there would have been more guilt induced among unrestrained eaters, and feelings of “what the hell” among restrained eaters, if they were asked to actually lift unhealthy products off the shelf, place them in a cart, and consider eating them. Furthermore, in a supermarket setting, unrestrained eaters would be able to see the tangible benefits of balancing their carts with healthy products as they progressed through the aisles. In my online study, individuals were not reminded of prior choices, possibly permitting them to forget about any guilt they may have felt initially. For restrained eaters, who rely on external cues to drive food intake, not being able to see previously purchased food in the cart may have caused them to forget the fact that they had exceeded a diet boundary, therefore reducing the potential impact of the *what the hell effect*.

Self-control depletion. Contrary to hypothesis, there was no main effect of decision grouping on product choice, indicating that the number of healthy choices made by participants did not change as the shopping trip progressed. There was also no interaction between decision grouping and restrained eating behavior, suggesting that restrained eaters were not differentially

affected by self-control depletion. Because the average time to complete the study was much less than a typical trip to the supermarket, self-control depletion may not have been a significant factor. However, past studies (Bruyneel et al., 2006; Vohs et al., 2008) have found that the total number of decisions—rather than shopping time—influences cognitive depletion, which can normally be induced when participants make as few as five or ten decisions. Therefore, the more likely explanation for the lack of a cognitive depletion effect seen in the current study is that the decisions made did not require a sufficient amount of self-control. In other words, because clicking on pictures of food products has no real-world health or economic impact on the individual, it does not require a great deal of self-control to choose which loaf of bread to buy or to resist a full-fat ice cream. This phenomenon is analogous to the finding that completing math problems does not deplete self-control resources in the same way that a thought suppression exercise does (Muraven et al., 1998). If self-control, a limited cognitive resource, was not used up when making successive decisions in the current study, it is likely that products chosen later in the shopping trip would be no more or less healthy than earlier ones. In previous studies examining cognitive depletion, participants were asked to come into a lab to make product choices or resist temptation (therefore inducing a sense of investment in the tasks and requiring self-control) or asked about their recent shopping experiences (which required personal time and resources, and therefore depleted cognitive resources). It appears that it is not possible to replicate these paradigms using an online format in which participants have no stake in, and feel no consequences or benefits from, the choices they make.

Study 2

After analyzing the data collected in Study 1, I conducted a follow up study with students at Hamilton College. In Study 1, there was no evidence of the expected effects of cognitive

depletion or justification, although restrained eaters chose significantly more healthy foods overall than unrestrained eaters. However, because the study was conducted as an online survey, rather than requiring participants to choose actual foods to eat, there are some potential limitations that negated the expected impact of the licensing effect and self-control depletion. The study, on average, was completed in a much shorter period of time (11.2 minutes) than a typical trip to the grocery store, indicating that participants may not have been fully engaged in the choices they were making. Additionally, because they were merely clicking on pictures of food rather than being forced to buy and eat the products, there were fewer consequences to their decisions. Thus, Study 2 was conducted in person, rather than online, and required participants to make choices between actual foods, rather than pictures of it. Due to practical constraints of the study set-up, and because they tie most closely into my ultimate interest in healthy vs. unhealthy food decisions, only restrained eating behavior and the justification effect (and not cognitive depletion) were examined.

Participants in Study 2 were required to choose food from a buffet line and then complete the RRS. In order to examine the justification effect, I altered the order in which the food was presented for each of the three conditions (justification, guilt, and control). As in Study 1, I expected participants in the justification condition to make the most unhealthy choices overall (as measured by the proportion of cookies on their plates), and restrained eaters to make more unhealthy choices than unrestrained eaters in this condition. Additionally, I anticipated that in the guilt condition, restrained eaters would have a greater proportion of cookies on their plates than unrestrained eaters, due to the *what the hell effect*. Based on the results of Study 1, I also examined the effects of restrained eating behavior on food choice, independent of the justification manipulation. Specifically, I explored whether restrained eaters made healthier

choices overall than unrestrained eaters, and whether this effect held when examining the CD subscale of the RRS separately.

Methods

Participants. One-hundred twenty-four Hamilton College students completed the study, but the responses from 3 participants had to be excluded (2 for not completing the entire questionnaire, 1 for choosing the food only after finishing the RRS). The 121 participants (84 female, 36 male, 1 transgender) included in the final analysis ranged in age from 18 to 22 ($M = 19.7$, $SD = 1.23$). A majority identified as White (81 %), 9.9 % as Asian/Pacific Islander, 4.1 % as Black, 2.5 % as Hispanic, and 2.5 % as other.

Materials/Stimuli.

General. Each participant chose food from a buffet line and completed a questionnaire with the components outlined below. Students were informed of the study through all-campus e-mails and advertising from researchers when walking by the study set-up.

Food. In each condition, participants chose from 3 distinct food categories: vegetables, cookies, and candy. The vegetables included baby carrots and celery sticks; the cookies consisted of Oreo chocolate sandwich cookies and Keebler original chocolate chip cookies; and the candy was an assortment of bite-sized chocolate bars (e.g., Snickers) and fruity confections (e.g., Starbursts). In each condition, an attempt was made to include a similar amount and type of food in each category (e.g., the same proportion of carrots to celery or Oreo to Keebler cookies).

Procedure. Participants were informed that they would be completing a psychology study relating to decision-making in return for free food. They were not initially told the true nature of the study so their food choices and/or responses to the RRS were not biased. The study was conducted on 3 separate nights in the Science Center atrium, beginning around 7:15 p.m.,

and data collection continued until data were collected from ~40 individuals each night. Keeping the starting time of the study constant was an attempt to control for the hunger levels of participants (many students told us that they had just come from dinner). After completing a consent form distributed by a research assistant at the beginning of a long (~7 foot) table, participants were given a small paper plate and told to take as much food as they wanted. A separate condition was conducted each night, and the order of food was varied accordingly: 1st night: justification condition (vegetables—cookies—candy); 2nd night: guilt condition (candy—cookies—vegetables); 3rd night: control condition (cookies—candy—vegetables). The cookies were presented on plates, while the vegetables and candy were placed in bowls. Each category of food was spaced evenly apart, and the serving vessels were refilled throughout the night in an attempt to keep the amount of food present relatively constant. After choosing food, participants were handed a questionnaire consisting of the RRS and demographic questions, as detailed in Study 1. Following the RRS, they were asked to self-report how many vegetables, cookies, and candy pieces they had taken. Participants were then debriefed about the true nature of the study and allowed to ask any additional questions. There was no indication from any participants that they had guessed the research question or otherwise biased their food choices in any way.

By placing the consent form and paper plates at one end of the table and the questionnaire at the opposite end, we hoped that participants would see and choose the food in the specified order. Although it is possible that some individuals viewed the food out of the intended order (e.g., they saw the plate of cookies before the bowl of vegetables in the justification condition) researchers ensured that each person chose food to put on their plates in a linear manner. Although they were allowed to reach backwards in the line for more of a particular item, once

they began the RRS they were no longer allowed to take any food. Also, the debriefing was conducted away from the food table so as to not bias any of the other participants.

Results

The results of Study 2 are presented in two broad sections. The first discusses the responses to the RRS and whether restrained and unrestrained eaters differed in their food choices. The second concerns the influence of the licensing effect on food choice, both alone and in conjunction with restrained eating behavior.

Restrained eating. The Revised Restraint Scale exhibited good reliability both as a whole ($\alpha = .74$) and when considering the CD subscale independently ($\alpha = 0.75$). When splitting participants into restrained ($n = 65$) and unrestrained ($n = 56$) eaters based on the complete RRS, the median cut-off score was 21. The median cut-off score to split them into two groups based on the CD subscale alone was 13 (restrained: $n = 63$; unrestrained: $n = 58$). Restrained ($M = 0.255$, $SD = 0.31$) and unrestrained ($M = 0.249$, $SD = 0.33$) eaters defined by the complete RRS did not differ in the proportion of cookies they choose to put on their plates; $t(119) = 0.10$, $p = .92$. Similarly, restrained ($M = 0.25$, $SD = 0.32$) and unrestrained ($M = 0.26$, $SD = 0.32$) eaters defined by only the CD subscale did not differ in the proportion of cookies on their plates; $t(119) = 0.16$, $p = .87$. The only difference between restrained and unrestrained eaters' (defined by either the complete RRS or only the CD subscale) food choices was that, when defined by the CD subscale, restrained eaters ($M = 0.38$, $SD = 0.41$) had a significantly greater proportion of vegetables on their plates than unrestrained eaters ($M = 0.25$, $SD = 0.31$; $t(115) = 2.05$, $p = .043$).

Licensing effect. In order to examine the effect of justification—both alone and in conjunction with restrained eating behavior—on food choices, a 2 (high and low restrained eating behavior as defined by the complete RRS) x 3 (food order) mixed factorial ANOVA was

conducted, with the proportion of cookies on the plate as the dependent variable. Contrary to hypothesis, there was no main effect of food order, $F(2, 121) = 1.89, p = .15$, indicating that there was no significant difference in the proportion of cookies chosen by participants in each of the three conditions (justification, guilt, and control). Additionally, there was no interaction effect between restrained eating behavior and food order; $F(1,121) = 0.01, p = .99$. This finding refutes my hypotheses that restrained eaters would be more susceptible than unrestrained eaters to (i.e., choose more cookies in) the justification condition, and that restrained eaters would also choose more cookies in the guilt condition due to the *what the hell effect*. It should also be noted that the 2 x 3 mixed factorial analysis was subsequently conducted with the restrained eater distinction made by only the CD subscale, and there was no significant main effect or interaction effect observed (see Table 3 for full descriptive statistics relating to the licensing effect in Study 2).

Discussion

The results of Study 2 can be divided into two general sections. The first concerns the data collected from the RRS, both as a whole and when considering the CD subscale independently. Although the scale exhibited good reliability, there were no differences in the proportion of cookies chosen by restrained and unrestrained eaters, neither when defined using the complete RRS nor only the CD subscale. The only notable difference in food choice behavior observed in the study was that restrained eaters (defined using the CD subscale) took a greater proportion of vegetables than unrestrained eaters. The second section of results concerns the effect of justification and guilt on food choices, both alone and in conjunction with restrained eating behavior. Contrary to hypothesis, there was no main effect of food order, indicating that the licensing effect did not impact participants' food choices. Additionally, there was no

interaction effect between restrained eating behavior and food order. This finding refuted my hypothesis that restrained eaters would be more susceptible than unrestrained eaters to the licensing effect and the *what the hell effect*. Each of these findings will be discussed in turn below.

Restrained eating behavior. Unlike in Study 1, restrained and unrestrained eaters did not differ in the nutritional content of their food choices (as measured by the proportion of cookies that they chose) in Study 2. The only noticeable difference in food choice was observed when comparing the proportion of vegetables chosen by restrained and unrestrained eaters defined by the CD subscale alone. Although the finding that restrained eaters chose a greater proportion of vegetables than unrestrained eaters overall would fit with the results of Study 1, it is the only food choice difference that was found even when running multiple analyses with different dependent variables (e.g., cookie proportion, total cookies, total vegetables, etc.). Furthermore, the difference only held when the restrained eater distinction was made using the CD subscale alone. However, both the RRS and CD subscale exhibited good reliability in Study 2, comparable to what was observed in Study 1, so it appears to have been effective at differentiating between restrained and unrestrained eaters. Therefore, the lack of an effect of restrained eating behavior on food choice was likely due to a feature of the Study 2 design. Participants were asked to choose a small amount of food in a short period of time. Most of the participants chose less than five items overall, and the average amount of cookies chosen was less than one. Restrained eaters may not have viewed a single cookie as a violation of their diet boundaries, especially when they were also able to choose vegetables to balance the plate. Even if the restrained eaters were concerned about the nutritional impact of choosing a cookie, they could have used various explanations (e.g., they had just come from dinner or would begin

studying soon) to justify their decision. Restrained eaters may have also based some of their food decisions on what they saw other (possibly unrestrained eater) participants choose in front of them, especially since restrained eaters tend to rely on external cues to drive food choices (e.g., Herman & Mack, 1975). Based on all of these factors, it is understandable that there were few significant differences in the food choices of restrained and unrestrained eaters in Study 2.

Licensing effect. There was no difference in the proportion of cookies chosen in the justification, guilt, and control conditions, indicating that the expected licensing and *what the hell effects* were not observed. Similarly to Study 1, this finding may be explained by a lack of effective manipulations. Simply seeing a bowl of vegetables at the beginning of a buffet line may not have been enough to induce justification, just as seeing a bowl of candy may not have been tempting enough to induce a feeling of guilt or remove dietary restriction in normally restrained eaters (i.e., cause them to say “what the hell” and choose more cookies). The food order manipulation was likely weakened further by the fact that participants could see all three food items being offered when they walked up to the table. In other words, it is difficult to induce guilt with the initial bowl of candy when individuals can see that they will soon have access to a selection of vegetables, and justification is likely not fully felt when participants can plan the different types of food they will select before being exposed to healthy vegetables.

Even if participants did not know what food was coming next when they began choosing items from the buffet line, selecting one food type may not be enough to induce a feeling of guilt or justification, especially if (as discussed above) participants did not choose many items overall. As was the case in Study 1, it is not clear how invested participants were in their food selections. Many participants came with friends and were conversing while choosing foods. They may have been picking items with less consideration of nutritional goals than they would have had if they

were alone and allowed more time to contemplate their choices. Additionally, participants could reach backwards in line to choose more of a previous food item, obscuring any initial impact of justification or guilt that may have been present.

There are two additional considerations that should also be taken into account when examining the results of Study 2. First, the design of the study was such that participants were subjected to a buffet line, rather than a typical supermarket set-up. Although the justification effect has never been directly tested using this type of paradigm, researchers have examined how the order of food in a buffet line affects the nutritional content of food choices. Wansink and Hanks (2013) found that diners in a breakfast buffet line were significantly more likely to choose healthy food (fruit) when it was presented first rather than last. Diners were also more likely to choose unhealthy food (cheesy eggs) when it was presented first rather than last. Overall, the first three foods that individuals encountered (out of seven total) comprised two-thirds of their total food selection, and 75 % of diners took the first food in line, no matter what it was. These findings led researchers to suggest a “first foods most” mechanism for buffet line selections, proposing that merely seeing a food first in a line of choices can lead individuals to (unknowingly perhaps) choose more of it. These results indicate that the influences of justification and guilt may not have been present in my study, as participants could have taken more of whatever food was first in line and less of subsequent foods, regardless of how they felt after choosing the items. Although there was no significant effect of food order, there was a trend (see Table 4) indicating that participants chose a greater proportion of cookies in the control condition (compared to the guilt and justification conditions). This trend supports the “first foods first” explanation of eating behavior and suggests that a buffet line may not be an optimal design to study the licensing effect.

The second consideration that needs to be taken into account is the potential social effect of a buffet line. Unlike Study 1, in which individuals made food choices without seeing others' decisions, participants in Study 2 could often view the selections of others in front of them in line. This fact may have prompted individuals to choose more or less of a particular item than they usually would (e.g., a restrained eater who normally would choose only carrots may take a cookie or two if she sees a peer in front of her doing the same). Some participants may have also felt they were "being watched" by researchers handing out questionnaires and consent forms, therefore altering their food choices. Although there is a social component to a grocery store experience as well, the shopper is often not directly exposed to others' choices in the same way as an individual in a buffet line. Additionally, the social impact may be amplified in this study because all participants were students at Hamilton College, and many took the study at the same time as friends. Although it is not clear exactly how restrained and unrestrained eaters would have responded to choosing foods around others, it is reasonable to assume that restrained eaters would have been more affected, as they tend to rely on external cues to drive food selection (e.g., Herman & Mack, 1975). It has also been shown that the amount of food people take from a serving dish can be influenced by the amount of food taken by, and body type of, individuals choosing before them (McFerran, Dahl, Fitzsimons, & Morales, 2010). Therefore, the social component of a buffet line is another factor that makes it a less than ideal design to study the impact of the licensing effect and restrained eating behavior on food choices.

General Discussion

Although neither Study 1 nor Study 2 produced the expected effects of justification and self-control depletion on food choices, there are valuable lessons to be learned from both studies. There are also directions for future research, important study design considerations, and real-world implications.

Measurement of Restrained Eating Behavior

The RRS appears to be valid in both a population of college students (Study 2) and a more diverse sample ranging in ages from 18 to 76 (Study 1). The two distinct subscales of the RRS (Concern for Dieting and Weight Fluctuations) were also reliable in both populations. These findings indicate that the ten-question survey designed by Herman & Polivy (1980) is still widely applicable, and its brevity makes it desirable to use in studies of restrained eating. Using the median cut-off score of the RRS yielded significant differences in food choices between restrained and unrestrained eaters in Study 1, supporting results of previous studies that examined eating behavior independent of the effects of justification and cognitive depletion (e.g., Herman & Mack, 1975). However, the results of Study 1 indicate that the CD subscale may be the most important component of the RRS when examining restrained eating behavior, as it directly measures dietary restriction (and instances when that restriction is disregarded) and ignores weight fluctuations that may be the consequence of factors (e.g., obesity or a new diet) other than restrained eating. Although Study 2 did not yield many overall differences in food choices between restrained and unrestrained eaters, the one statistically significant result (restrained eaters taking a greater proportion of vegetables than unrestrained eaters) was obtained when making the restrained eater distinction using only the CD subscale. Future studies of restrained eating behavior in any context should consider utilizing only the CD subscale to

distinguish restrained and unrestrained eaters, as it appears to provide the best estimation of true restrained eating behavior.

Inducing Feelings of Justification and Guilt

The licensing effect is a robust phenomenon that has been demonstrated in a wide variety of studies and shown to greatly impact food choice behavior (e.g., Mukhopadhyay & Johar, 2009). Similarly, guilt has been shown to influence food choices by encouraging individuals to balance their consumption patterns (Dhar & Simonson, 1999). Feelings of justification and guilt can be induced in a wide variety of circumstances (e.g., completing a strenuous task, passing on an indulgent snack, being forced to make a hedonic purchase), often without conscious awareness. Therefore, the lack of an effect of justification manipulations observed in both studies is likely due to the ineffective induction of these feelings. Because Study 1 was conducted online, completed in less than 12 minutes on average, and involved choosing between pictures of food products with no real economic or nutritional impact, participants likely did not care enough about, or completely internalize, the initial justification or guilt manipulations. Similarly, in Study 2, a variety of limitations (e.g., seeing the bowls out of the intended order, “first foods most” buffet line effects) may have negated the expected justification and guilt effects of placing the vegetable or candy bowl first.

In order to properly induce feelings of justification or guilt, participants must care about and have consequences stemming from their food choices. It’s easy for a shopper to say she is going to buy whole grain bread and low-fat ice cream, even after choosing vegetables initially, when all she is doing is clicking on pictures of food, but it’s much more difficult to choose healthy products consistently when engaging in an actual supermarket trip and knowing that she will have to pay for and eat everything she buys. A student choosing from a buffet line will

likely not feel guilty after choosing a piece of candy if he has already seen the bowl of carrots that he can choose from next, even if he is considering the nutritional content of his food choices while he converses with a friend behind him. Restrained eaters are normally more susceptible to the licensing effect than unrestrained eaters (Wallis & Hetherington, 2004). However, restrained eaters also consider the nutritional impact of their food choices on a regular basis, so if the justification manipulations are not effective, they will simply choose more healthy products overall (as exhibited in Study 1). Therefore, it appears that both studies suffered from ineffective designs.

Designing a Study to Accurately Measure Supermarket Behavior

I chose to conduct Study 2 at Hamilton in order to allow participants to actually see, touch, and eat the foods they were choosing, a methodology that could have been better suited to my research questions than an online “supermarket trip” generally lasting under twelve minutes. However, there were also flaws in the design of Study 2 related to inducing feelings of justification or guilt in participants. Because of the methodological problems encountered in both studies, future studies interested in examining the effects of justification and self-control depletion on supermarket shopping behavior should involve individuals completing an actual grocery shopping trip. In this paradigm, the shoppers are fully invested in their food choices, as they will actually be buying them with their own money and taking them home to eat. Additionally, the justification and guilt manipulations are built into the store layout (i.e., shoppers in a store with the produce section first are automatically in a justification condition, whereas those in a store with the alcohol aisle first are in a guilt condition), which allows for a more realistic representation of how shoppers feel during a typical supermarket experience. In terms of self-control depletion, a grocery shopping trip likely lasts at least 30 minutes and

involves hundreds of decisions (both about which foods to buy and which to pass over). It would be nearly impossible to include this many decisions in so many different food categories on an online survey, let alone in a buffet line. Furthermore, the act of being in the grocery store and feeling obligated to complete a “chore” is likely enough to induce cognitive depletion in many individuals.

Although conducting a study in the supermarket introduces many challenges, past research has indicated that it is possible. Gilbride et al. (2013) handed shoppers barcode scanners as they entered the grocery store and asked them to scan each item before placing it in their cart. This procedure allowed researchers to examine the number and type of products that each individual purchased and the order in which they were chosen, essential elements needed to observe the effects of justification and self-control depletion simultaneously. Importantly, Gilbride et al.’s study design should not affect the order in which participants normally shop or what products they buy, as they are recruited upon entering the store. Also, it allows additional factors of a grocery shopping experience (e.g., presence of other shoppers, advertising signs) to be accounted for that could not be included in an online survey. Although most shoppers will purchase items in a specified order depending on the grocery store layout, by recruiting individuals from multiple stores with dissimilar designs it would be possible to examine the effects of justification and guilt. It would be naïve to assume that these phenomena are not influential during a trip to the supermarket—especially considering the breadth of past research indicating otherwise—after only an online survey and buffet line study.

I originally decided against a supermarket field study due to practical considerations (e.g., coordinating with management, finding multiple stores with different layouts) associated with conducting a yearlong undergraduate senior thesis. Although I now believe that the field

study would ideally be the best design to fully examine my research questions, there are some limitations that should be taken into consideration. Shoppers may alter their normal purchasing behavior because of the scanner. Additionally, individuals may have done something before shopping (e.g., gone to the gym or eaten a healthy meal) that would lead to an unaccounted for justification effect. The social aspects of a supermarket trip may also impact how justification and cognitive depletion are felt. If a shopper goes to the store with his young child or significant other, he may rely on their recommendations—which are not necessarily impacted by the store layout or self-control depletion, as they are not the “main” shopper and have a different agenda for what to buy—for some purchases. Another consideration that needs to be taken into account is how pre-planned each shopper’s decisions are. Some individuals enter the grocery store with a well laid out list and stick to it meticulously, whereas others only have a vague idea of what they are going to purchase. Because the licensing effect and self-control depletion often lead to unplanned “impulse” purchases, if a shopper already knows exactly what she is going to buy her choices may not be impacted by the grocery store layout or number of shopping decisions. Nevertheless, even shoppers who have (or claim to have) extensive lists often make purchases on a whim, especially if they can come up with a reasonable justification (e.g., “I just purchased all of that organic produce that I didn’t expect to be in season yet. I deserve an extra pint of ice cream this week.”). Even with these potential limitations, I still anticipate that a field study is the best methodology to fully analyze the nuanced impact of the justification effect and self-control depletion. Design limitations are present in any experiment, but with a large enough sample size (which is especially important in this case because of the numerous variables that need to be taken into account) and strict control over factors that can be directly managed (e.g., store layout, time of day, shopper socioeconomic status), a successful study is certainly attainable.

Potential Implications of Justification and Cognitive Depletion

Although my two studies did not yield an effect of justification or self-control depletion, I am confident that both phenomena play a significant role in food choices during a trip to the supermarket. There are wide ranging implications of these effects, especially in terms of health and nutrition. Whenever a shopper visits the grocery store, he is immediately subjected to the potential impact of justification because of the store's layout. If the produce section is placed first (as is often the case), the simple act of buying fruits and vegetables can lead him to purchase unhealthy snack foods in future aisles. He may (consciously or unconsciously) justify these decisions by referencing all of the fresh produce in his cart, but he may not have ever bought those snacks if he had simply turned the other way when entering the store and began in the frozen foods aisle instead. Although a few unhealthy snack purchases may not seem all that damaging to good nutrition, consider how often a typical consumer visits the supermarket. The average American shops for food 1.5 times per week (Food Marketing Institute, 2015), so buying one bag of potato chips and one pint of ice cream (certainly reasonable purchases if the justification effect is involved) during each trip yields almost 80 bags of chips and pints of ice cream per year. One-time indulgent purchases are to be expected from any shopper, but if a consistent pattern develops there is the potential for severe health consequences. There are approximately 1200 calories in a pint of Ben and Jerry's ice cream and 1200 calories in an 8 oz. bag of Lay's potato chips, adding up to 192,000 calories over the course of the year. If all of the treats are shared by a family of four (not an unreasonable expectation if the purchases have become an expected addition to the weekly shopping trip), the purchases can lead to an extra 14 pounds that each individual gains annually!

I recognize there are many factors that influence weight gain other than food choices. However, making small changes in shopping habits can have huge benefits over the course of a month, year, or lifetime. It is not possible to completely deny shoppers of guilty pleasures, and supermarkets are managed to make money, not contribute to healthier eating habits. Nevertheless, stores are doing a disservice to individuals' health and putting them at a disadvantage immediately upon entering the doors. By reorganizing supermarkets to place the produce sections and health food aisles last—while also eliminating the candy bars and other junk food available at the checkout counter—the impact of the licensing effect will be greatly lessened. Furthermore, this layout will improve the overall nutritional content of shoppers' food choices when considering cognitive depletion. At the end of a shopping trip, consumers have limited stores of self-control remaining, so placing only healthy options in the last aisles and eliminating temptations at the checkout counter should lessen impulse purchases among depleted individuals. Stores would understandably be skeptical of these changes, as fewer impulse purchases equates to less revenue. I am not trying to suggest that the nutritional impact of store layout should trump supermarkets' economic considerations, nor I am saying that it would be possible for stores to routinely choose ethics over money in a capitalistic society. However, nutritious food is often more expensive than junk food, in part because many people feel that it is worth more and are willing to pay more for it. Therefore, I do not think that a store promoting nutritious choices with its layout and seeking the highest possible profits are mutually exclusive concepts. At the very least, supermarkets should be open to the possibility of change.

Many people will be skeptical that simply reorganizing a supermarket can lead to healthier food choices among consumers, but it could easily be an empirical investigation. If supermarket chains agree to reorganize a portion of their stores in various parts of the country on

a trial basis, it will be possible to compare consumers' shopping trends before and after the design changes. For example, if shoppers in a newly organized store that places the snack food aisle first and the produce section last buy fewer ice cream and junk food products over a 6 month period than their counterparts at a traditionally organized store, it will provide evidence that reorganizing supermarkets to limit the negative impacts of justification and self-control depletion can be effective. This trial period would also allow stores to see if there is any economic impact of the store layout alteration. It is clear that eliminating the purchase of just one bag of chips or pint of ice cream per week can make a huge difference in long-term health. Even if supermarket chains are unwilling to alter their layouts (or if the profit margins turn out to not be in their best interests), simply educating consumers about the potential impact of justification and self-control depletion on their food choices may convince some to "shop backwards" during their next trip to the grocery store, or at least be more cognizant of their choices when reaching middle aisles. Consumer education may be especially important for restrained eaters, who are likely to be the most susceptible to external cues like justification and cognitive depletion. No matter what the exact mechanism of change is, there is a great deal of opportunity to examine how the reorganization of a supermarket or the alteration of consumers' shopping patterns can positively impact the nutritional content of food choices. After all, what other venue is there that nearly every American must visit at least periodically in order to feed themselves and their families?

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Table 1

Means (SE) of the Number of Healthy Products Chosen in the 25 'Both' Decisions for the Three Different Shopping Order Conditions in Study 1

	Overall	Restrained Eaters	Unrestrained Eaters
Justification Condition	2.22 (0.14)	2.38 (0.20)	2.05 (0.20)
	<i>n</i> = 60	<i>n</i> = 30	<i>n</i> = 30
Guilt Condition	2.03 (0.14)	2.19 (0.18)	1.86 (0.21)
	<i>n</i> = 60	<i>n</i> = 35	<i>n</i> = 25
Control Condition	1.98 (0.14)	2.12 (0.20)	1.84 (0.19)
	<i>n</i> = 62	<i>n</i> = 29	<i>n</i> = 33

Table 2

Means (SD) of the Number of Healthy Products Chosen in Each of the 5 Groupings of 'Both' Choices in Study 1, Combined Across All Three Shopping Order Conditions

	Overall (<i>N</i> = 182)	Restrained Eaters (<i>n</i> = 94)	Unrestrained Eaters (<i>n</i> = 88)
Decisions 1-5	2.04 (1.31)	2.28 (1.20)	1.80 (1.37)
Decisions 6-10	2.12 (1.39)	2.14 (1.42)	2.10 (1.36)
Decisions 11-15	1.97 (1.47)	2.13 (1.57)	1.80 (1.34)
Decisions 16-20	2.22 (1.42)	2.32 (1.50)	2.11 (1.33)
Decisions 21-25	2.04 (1.33)	2.29 (1.41)	1.78 (1.19)

Table 3

Means (SD) of the Proportion of Cookies Chosen in Each of the Three Food Order Conditions in Study 2

	Overall	Restrained Eaters	Unrestrained Eaters
Justification Condition	0.18 (0.32) <i>n</i> = 42	0.19 (0.25) <i>n</i> = 24	0.17 (0.27) <i>n</i> = 18
Guilt Condition	0.26 (0.32) <i>n</i> = 42	0.26 (0.32) <i>n</i> = 23	0.26 (0.37) <i>n</i> = 19
Control Condition	0.32 (0.32) <i>n</i> = 37	0.33 (0.36) <i>n</i> = 18	0.31 (0.36) <i>n</i> = 19

Appendix

Complete Revised Restraint Scale (RRS; Herman & Polivy, 1980) that was utilized in both Study 1 and Study 2. The subscale that each question relates to—Concern for Dieting (CD) or Weight Fluctuations (WF)—is also included.

1. (CD) How often are you dieting?
Never, Rarely, Sometimes, Often, Always
2. (WF) What is the maximum amount of weight (in pounds) that you have ever lost within one month?
0-4, 5-9, 10-14, 15-19, 20+
3. (WF) What is your maximum weight gain (in pounds) within a week?
0-1, 1.1-2, 2.1-3, 3.1-5, 5.1+
4. (WF) In a typical week, how much does your weight (in pounds) fluctuate
0-1, 1.1-2, 2.1-3, 3.1-5, 5.1+
5. (CD) Would a weight fluctuation of 5 pounds affect the way you live your life?
Not at all, Slightly, Moderately, Very much
6. (CD) Do you eat sensibly in front of others and splurge alone?
Never, Rarely, Often, Always
7. (CD) Do you give too much time and thought to food?
Never, Rarely, Often, Always
8. (CD) Do you ever have feelings of guilt after overeating?
Never, Rarely, Often, Always
9. (CD) How conscious are you of what you are eating?
Not at all, Slightly, Moderately, Extremely
10. (WF) How many pounds over your desired weight were you at your maximum weight?
0-1, 1-5, 6-10, 11-20, 20+