The Reliance on Pharmaceuticals to Lose Weight

A Survey that Investigates Whether Individuals are Willing to Risk Drug Side Effects to Lose Weight

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**Summary:** For many, losing weight the old fashioned way, with proper diet and exercise, is insurmountable. The reliance on pharmaceuticals to lose weight has dramatically increased in popularity over the years as rates of obesity rise. When being overweight becomes a health risk, pharmaceuticals can be prescribed. The doctor decides whether the benefits to losing weight exceed the risks associated with taking the drug. We surveyed a small sample of Rutgers University students and staff on how much weight they would need to lose to risk experiencing the side effects of drugs intended for weight loss and those drugs that are prescribed for some other condition, but that have weight loss as a side effect. Most would not consider taking drugs unless they were looking to lose more than 51 pounds. However, some would consider taking Adderall, to lose smaller amounts of weight.

**Video Link:** https://youtu.be/H4T-uAbTqjI

**The Issue: The Reliance on Pharmaceuticals to Lose Weight**
With one out of three American adults being overweight or obese, weight loss is a great concern. It is most every American's New Year’s resolution to lose the weight that they packed on over the holidays (and pounds put on over the last few years). However, most hope to lose weight quickly with the least amount of effort possible. Instead of the traditional diet and exercise to lose weight, Americans are drawn to diet pills. It has high appeal because Americans think they can keep their relatively sedentary lifestyle while eating the foods they want, but still lose the weight. However, weight loss pharmaceuticals may not work for everyone and have hidden dangers- potential side effects and the dependence to keep taking them to keep the weight off. If individuals are made aware of the potential side effects, then it is up to them to determine whether they are willing to risk side effects to lose weight. We asked some Rutgers affiliates, most without weight problems, whether they would take pharmaceuticals to lose weight.

**An Overweight Nation**
Obesity is a growing epidemic in the US. According to the Center for Disease Control (CDC), approximately one third of Americans have a body mass index (BMI) of 30 or higher and are considered obese. Being obese puts individuals at greater risk for cardiovascular disease- the number one cause of death in this country, stroke, diabetes, and various types of cancers. The obesity epidemic is so prevalent, that it has become a growing problem amongst children. The CDC states that nearly 17% of children and adolescence between the ages of two to nineteen years old are classified as obese (1). With both obesity and childhood obesity being complex
burdens in this country, it is at the upmost importance that obese Americans take control of their weight to avoid health problems.

On an individual level, Americans are taking a less than responsible approach to mitigating this issue. With more fast food chains per city block, more drive-thrus, and online shopping and banking, on top of a sedentary lifestyle, Americans health is being put in jeopardy. New pharmaceuticals designed for weight loss are being used more often to shred the pounds off millions of Americans. However, there is no real assurance that the weight loss pharmaceutical will help the individual achieve their weight loss goal either in the short term or in the long term. Many tend to put the weight back on if they don’t learn to make necessary behavioral lifestyle changes (increasing their activity level and decreasing their calorie intake).

Diet and Losing Weight
A diet is simply defined as the foods that a person eats routinely. Eating nutritious foods is the most important factor in weight loss. No amount of exercise can compensate for consistently eating highly processed high calorie meals or junk foods. If Americans followed the current MyPlate guidelines or a relatively well-balanced diet, then there would be less of a reliance on market for weight loss drugs. According to the Mayo Clinic, the article states that, “clinically meaningful” weight loss stems more from a well-balanced diet complemented with daily exercise as opposed to just taking the drug. Clinically meaningful weight loss refers to “enough weight loss to begin lowering the risk of cardiovascular disease, diabetes, and other diseases.” This conveys that weight loss pills should be used in conjunction with diet and exercise to yield the best results. However, it is difficult to lose weight when an individual’s diet is not sufficient in key vitamins and nutrients. In 2011-2012, the CDC found that approximately 34% of children and adolescents eat fast food on any given day (2). Whether it’s a McDouble off the dollar menu at McDonalds or a Frosty at Wendy’s for an after school treat, both are certainly not treats for your waistline. The diet problem even grows worse around the holidays, where fast food places have seasonal items to celebrate the festivities. A shamrock shake at McDonalds in honor of St. Patrick’s Day has an astronomical 115g of sugar per serving. To put this in context, the American Heart Association recommends that men have no more than 35g of sugar a day while women should have fewer than 23g of sugar per day (3). No weight loss pill can disregard excess sugar that will otherwise end up being metabolized to pure fat. When over a third of American children and adolescents are consuming these high calorie and high sugary drinks per day, it is extremely difficult to fight the obesity epidemic. Weight loss is a gradual process. It is not a solution to pop a pill and have a false complex that an individual won’t gain weight. However, until we make fruits and vegetables, dairy, and poultry as tantalizing as a McDouble and low fat milk as popular as shamrock shakes, we will be fighting an uphill battle on the obesity epidemic.

Over The Counter (OTC) Dietary Supplements For Weight Loss
According to the National Institute of Health- Office of Dietary Supplements, Americans spend approximately two billion dollars on weight loss supplements per year (4). Most of these weight loss herbal concoctions are available over the counter making it an easy purchase for someone thinking that it would help them lose weight. Although some may truly believe that the OTC weight loss aid will magically burn off the pounds, many individuals still purchase these even though they know that the dietary supplements that claim to aid in weight loss may not work for
them. Additionally, there is evidence that weight loss supplements can pose a health risk for while not producing any intended benefit at all. Even though a prescription is not necessary to obtain these OTC supplements, the fact that they may have their own damaging effects and are known to interact with other pharmaceuticals, makes it important for people to tell their doctor that they are taking them.

**Over The Counter Supplements: Hydroxycut**

One of the grandiose weight loss aids that is available without prescription is Hydroxycut. Television and print media advertisements show the cliché adult man with a flabby tummy that transforms completely into a study younger man with washboard abdominals after using Hydroxycut. When these drugs are overly glorified in the media, it makes these dietary supplements look very appealing. Hydroxycut appears to be a more or less a fruity herbal supplement with the main ingredients being papaya, maqui, blackberry, amla and saffron extract. It is the Svetol in the green coffee bean extract that claims to be the weight loss agent along with the caffeine that would boost metabolism, energy and alertness throughout the day (5).

A Hydroxycut website cites a study on how Hydroxycut led to an average of 11 pounds lost for the fifty subjects that participated. Fifty subjects with BMI’s greater than 25 were randomly placed into two groups. The experimental group (n=30) was given Svetol pills while the control group (n=20) were given placebo pills. Each subject took two of their pills every day at their biggest meal for sixty days. The researchers analyzed BMI composition and muscle/fat mass ratios at the start and again when the study was completed. At the end of the study, the experimental group saw a significantly decrease in weight loss. The Svetol group lost 4.97 +/- 0.32kg, which was roughly 5.8% of body weight. The placebo group only lost on average 2.9% of body weight. Additionally, the experimental group saw an increase in their muscle mass/fat mass ratio. The 4.1 % increase in muscle mass was much higher than the placebo group that showed a 1.6 % increase (6). Although the study showed promise for Svetol to aid in weight loss, the sample size and selection of subjects needs to be expanded to determine whether Svetol has any weight loss effects. Also, the length of the study may not be long enough to show if there are any long-term effects of Hydroxycut. One would think that the manufacturer of the product would outsource a scientific study to be done to determine whether indeed hydroxycut does aid in weight loss. In order to eliminate conflict of interest and the potential biasing of results, the investigators conducting the scientific study should not be paid by the company to do the study.

**Garcinia Cambogia**

Garcinia Cambogia is an extract from the tropical fruit, Malabar tamarind, which gained national attention after its appearance on the Dr. Oz show. The supposed mechanism of action is that the main ingredient, hydroxycitric acid, prevents a fat producing enzyme called citrate lyase from forming. Without this enzyme, there would be a reduction of fat accumulation in the body. Additionally, hydroxycitric acid has been claimed to boost serotonin levels; which may curb hunger by suppressing appetite. This compound has been linked to possible liver damage and liver failure. In 2009, the Food and Drug Administration (FDA) sent out a disclaimer to withhold buying this product due to potential liver complications (7).

A study on Garcinia Cambogia showed lackluster results in supporting true weight loss. The study consisted of overweight men and women who had an average BMI of 32. Over the twelve
week study, subjects were randomized into two groups and were either given a pill that contained Garcinia Cambogia or a placebo. Both groups were given the same increased high fiber bulk modification to their diet. At the end of the 12 weeks, both groups did lose a significant amount of weight. However, the weight loss between groups was not significant at all. The group that had the hydroxycitric acid lost an average 4.1kg while the placebo group lost 3.2kg (8). Based on the results of this study, more long-term studies need to be performed to determine its effects.

**Prescription Drugs Developed to Aid Weight Loss**

**Orlistat**

One of the most popular weight loss drugs Orlistat (Xenical), was used in a 2002 McDuffie et. al., study that analyzed the effects of Orlistat on adolescents who were obese. Orlistat is an FDA approved weight loss drug that works by blocking fat absorption. It prevents fat from being broken down into triglycerides and free fatty acids. The body is unable to use fat unless it is broken down into its simpler forms. As a result, the patient takes in fewer fat calories; which hopefully leads to weight loss. The average BMI for these adolescents was a whopping 44. Twenty subjects took a 120 mg dosage of Orlistat three times a day along with a multivitamin once a day. They took these medications for three months while in conjunction with a lifestyle class that emphasized nutrition and exercise techniques. At the end of the three months, 85% of the subjects that finished the treatment showed a significant decrease in both weight loss and BMI. A reduction in fasting insulin, fasting glucose levels, and low density lipoprotein (LDL) levels was also observed, lowering their risks of developing type II diabetes, cardiovascular disease, and many forms of cancer later in life.

The majority of the subjects did experience mild side effects when taking Orlistat, the major ones being gastrointestinal (GI) discomfort and nausea. The pain and discomfort experienced from the side effects seems to be worth continuing the experiment because the subjects saw that there was an overwhelming benefit to losing the weight (9). This experiment concluded that Orlistat worked well in mitigating weight loss when it works synergistically with a nutrition and exercise educational regimen. A meta-analysis of Orlistat revealed two key results. Clinically meaningful weight loss was achieved for 35-73% of subjects taking Orlistat, 37-47% for subjects taking Lorcaserin, and 35-73% for taking the maximum dosage that FDA standards allow for phentermine. The wide range for Orlistat indicates that it works better in some individuals than in others. The other main conclusion drawn after analyzing the Orlistat meta-analysis was that none of the weight loss drugs were able to solely reduce the risk of cardiovascular diseases or morbidity (9). This conveys that the weight loss drugs should only be used as an aid, but never as the sole intervention. The main purpose of losing weight is to diminish the health hazards associated with being obese. If weight loss pharmaceuticals cannot solely decrease these risks, than physicians must strongly recommend nutrition and exercise counseling to patients taking pharmaceuticals to lose weight. The subjects that took the medication daily, along with enrolling in the nutrition and exercise class were the most successful in achieving clinically meaningful weight loss. In many of the studies that were examined in the meta-analysis, roughly 30-60% of the subjects did not achieve clinically meaningful weight loss in the trial period (10). These subjects mostly stopped taking the medications because the side effects outweighed the little to no benefit that they were receiving. Since the weight loss medication does not work for everybody, it is advantageous for subjects to adapt to a healthier lifestyle because the numerous
studies analyzed showed that healthy diet and exercise is more beneficial for health than just solely taking the weight loss pharmaceutical.

**Phentermine**
Phentermine (Adipex-P) is another weight loss pharmaceutical available with prescription. This drug has been around for nearly 65 years and is one of the more well known weight loss pharmaceuticals on the market. Phentermine causes the body to release more catecholamines which affect the sympathetic nervous system by suppressing appetite and increasing energy expenditure during the “flight or fight” response. By not eating as often, and moving more frequently, more calories are burned. Since this drug affects neurotransmitters, there are many physiological health risks with this drug that have resulted in death (11). Although there are hazardous side effects, this drug was cited in many studies for its benefits on how it combats obesity better than dieting alone.

A 1968 study reported in the British Medical Journal compared 3 groups of women to how they responded to phentermine over the course of 6 months. One group was given 15 mg of the drug every day, while another group had the same dosage, but they only took phentermine every other month. The control group was given a placebo for the entire duration of the study. The two groups were put on a restrictive 1,000 calories per day diet. At the end of the study, the women that took phentermine everyday lost approximately 27lb while the women that took the drug every other month lost 1.7lb more. Further analyzing revealed that the most weight loss occurred in the first couple months of the study and then decreased over time (12). It’s plausible that the body adapts to the new physiological networking of neurotransmitters so the body doesn’t exert as much energy while being induced with catecholamines. Constant exposure to this increase in sympathetic nervous system stimulation is why individuals with heart conditions should not take this medication as it may increase blood pressure. Arrhythmias, tachycardia, and increased blood pressure are all potentially lethal side effects of taking phentermine regularly. A lethal comorbid interaction was also observed in depressed patients on a monoamine oxidase inhibitor (MAOI) drug while taking phentermine (11). Becoming dependent on this pharmaceutical is potentially dangerous due to the various cardiovascular problems affiliated with it.

Table 1. Pharmaceuticals Developed for Weight loss and their Side Effects
Victoza

Victoza (liraglutide) is a prescription pharmaceutical to control blood-glucose levels in patients with Type 2 diabetes. Its mode of action is that the beta-cells in the islets of Langerhans in the pancreas are stimulated to secrete insulin to counteract the surplus of glucose in circulation (13). Although a diabetes medication, patients who have Type 2 diabetes often share a comorbidity with obesity. This drug serves as a double whammy for showing clinical results with both lowering glucose levels and facilitating weight loss. Individuals averaging 233lbs that took Liraglutide over a 56 week period lost weight. A randomized and double blind experiment split participants into three group. One group received Liraglutide at a dosage of 3mg/day. The second group received Liraglutide at a dosage of 1.5mg/day. The third and final group received a placebo treatment. Each group was also instructed to constrict their original diet by 500 calories and increase their weekly exercise regimen by an additional three hours. The group that took the highest dosage of Liraglutide lost the most amount of weight (6% kg of their body weight while taking the 3mg/day dosage) while the group that took half of that dosage lost 4.7% kg of body weight. The placebo group only lost approximately 2% kg of their body weight. Clinically meaningful weight loss occurred in 25.2% of subjects in the 3mg/day group and 16.2% of the 1.5mg/day group (14). Achieving clinically meaningful weight loss gives the individual benefits in cardiovascular protective properties. This is critical for patients that are fighting both obesity and Type 2 diabetes.

One disappointing result of the above study is that it might not be practical for many Americans. The 3 mg Liraglutide is not covered by many insurance company plans and costs roughly $1,000 a month. Additionally, patients will respond to weight loss pharmaceuticals in a variety of ways. A very costly medication could be futile for some that don’t achieve clinically meaningful weight loss. Additionally, there is a slight increased risk of developing pancreatitis while taking Victoza. Since increasing beta cell secretion is over stimulating the pancreas, more pressure and thus, inflammation can result from taking the drug (13). This deadly side effect along with weight loss pharmaceuticals not working effectively for everyone shows that more long-term studies are needed to prove efficacy and efficiency of Victoza.
**Prescription Drugs that have Weight Loss as a Side Effect: Adderall**

Adderall is one of the most popular medications to treat Attention Deficit Hyperactivity Disorder (ADHD), and many users report weight loss as a side effect. Taking Adderall increases the neurotransmitter dopamine in the brain which increases feelings of relaxation and contentment. Appetite is suppressed and thus, the user takes in fewer calories throughout the course of the day. Additionally, Adderall increases energy and metabolism and users become more focused while taking the drug. This quality is why Adderall is so popular because it allows individuals to better focus on tasks. Being a methamphetamine, Adderall can increase metabolism. The influx of dopamine to the brain causes the subject to have a flight or fight response that decreases appetite and allows more additional energy stores to be used up (15). This mode of action may prove successful if the mechanism can boost metabolism long term.

Using Adderall as a weight loss drug is not recommended because it can be potentially dangerous. Since Adderall is not designed to be weight loss drug, its other effects could cause cardiovascular difficulties. A recent study showed that one in eight college students take Adderall to prepare for exams. Not having ADHD while taking Adderall can cause hypertension, tachycardia, and even anorexia. Many individuals become depleted of many nutrients and minerals because they are ingesting fewer amount of food (16). Since eating becomes a secondary concern while on Adderall, individuals that don’t need to lose weight, will and this may lead to an eating disorder.

Another huge problem with Adderall is the dependence factor. Adderall used in succession tends to work better because the body gets filled increasing amount of dopamine. The dopamine stores will eventually become depleted when taking the drug to the point where a higher dosage is needed or the subject would have to stay off the drug until homeostatic dopamine levels were in effect (15). Some individuals may become addicted if they like the short-term results gotten from taking the drug. Taking more than one pill or a higher dosage than normal are both ways in which tolerance can be breached. This is a indication that an addiction is occurring. If an individual’s performance boost is a direct result of the Adderall, then that person is at risk for becoming completely dependent on it (16). Based on the risks of the side effects and indications of when to use Adderall, it is neither safe nor smart to use Adderall for a weight loss drug when it is designed to treat ADHD.

**Wellbutrin**

Wellbutrin (Bupropion) is a common antidepressant that acts as a norepinephrine-dopamine reuptake inhibitor (NDRI) to combat depression. Additionally, the increase of dopamine reuptake from Wellbutrin causes the relaxed feelings that occur while taking Adderall. The user subsequently has a suppressed appetite and increase in energy. The drug has also shown benefits for depressed people who were also obese. Obese patients found that Wellbutrin sped up metabolism, which aids weight loss. Like other weight loss pharmaceuticals, Wellbutrin has many side effects that can cause significant health problems. Wellbutrin was noted to cause a high incidence of seizures in many patients (17). With antidepressants being the number one drug class being prescribed, it is alarming how the side effects of the drug could unearth new health problems for the user.
Exercise
Besides diet, exercise is the other essential component to consistently key weight loss. Whether it is lifting free weights or running on a treadmill, elevating the heart rate for 30-60 minutes a day will help shed the pounds. However, there is consistent research showing that exercise may even be a bigger mental challenge to overcome than physical. Dr. Sherry Pagoto from the Division of Behavioral Medicine at the University of Massachusetts Medical School cites many reasons as to why individuals must overcome the mentality of excuses before they start losing weight. Dr. Pagoto mentions that exercise discomforts people and elaborates that a person’s comfortable lifestyle might cause them to exaggerate that exercise is too uncomfortable. The beauty of the pharmaceutical is that an individual can take the pill and believe they will lose weight without physically exerting too much energy (18).

Community Action: Survey to Investigates Whether Individuals are Willing to Risk Drug Side Effects to Lose Weight
An IRB approved survey will be administered to mainly Rutgers students and faculty at Rutgers gyms and Rutgers food courts. Approximately fifty surveys were distributed randomly to individuals over the age of eighteen. The call to action on the survey is to analyze if participants are willing to take a weight-loss pharmaceutical for their specific weight loss goals. In essence, what is the willingness to take prescription drugs in order to lose weight? The anonymous survey also investigates the diet and exercise regime that participants partake in on a daily basis. Individuals that don’t exercise often and consume diets high in sugar, salt, and bad fats regularly are more likely to be overweight. These individuals will most likely be good candidates to see which drugs they would hypothetically take over others to achieve weight loss. The survey lists various drugs, along with the side effects, to have participants think if they would be willing to take that drug in order to achieve their desired weight loss. The results of the survey were analyzed and configured to double bar graphs to convey how the subjects’ value weight loss pharmaceuticals when trying to lose weight. Each double bar graph was based on a pharmaceutical that depicts how much weight each gender would want to lose in order to consider taking the medication.

Survey Results
The 50 Rutgers University affiliate respondents, 21 male and 29 female averaging 22 years old, were a pretty healthy bunch. Approximately 90% of the males and 76% of females surveyed said that they currently do not take any pharmaceuticals or supplements that cause weight gain or weight loss. When asked “How much weight would you like to lose”, 23% of men and 28% of women wanted to lose 1-10 lbs with only 14% men and 7% of women wanting to lose more than 11 lbs. Most of the respondents (62% of the men and 65% of women) had no desire to lose weight.

52% of men said that they were generally careful about the foods they ate in terms of sugar, carbohydrates, fat and calories. 45% of women noted that they were extremely cognizant about the foods they ate and tried to limit sugar, salt, and high caloric foods. 17% of the women noted that they were vegetarian. Only 10% of women reported that they consume sugary drinks and highly processed meals as part of their regular diet. Given the above, these respondents were probably not candidates for and would not consider taking a weight loss drug.
One of the first questions that was asked in the survey was how often the subjects consume fast food per week? Figure 1 below illustrates how often the subjects reportedly consumed fast food. Overall, women proportionately ate less fast food compared to the men. 62% of women reported that they do not consume fast food regularly at all compared to merely 23% of men. None of the fifty subjects consumed any fast food more than five times per week. It’s logical that the more fast food consumed per week leads to unwanted weight gain. Individuals that regularly consume fast food are more likely to be candidates for trying a weight loss pharmaceutical because they have weight that they’d like to lose.

Figure 1. How often do you consume fast food?

![Fast Food Consumption](image1)

Figure 2. How often do you exercise daily?

![Exercise Frequency](image2)
Many health organizations push for at least 30-60 minutes of exercise a day. Figure 2 shows that nearly 50% of the men exercise for an hour at the minimum every day while only 14% of the women reported that they work out for an hour at the minimum. Nearly 19% of the men and 28% of the women said that they either don’t have any exercise regimen or they don’t exercise at all.

Two different classes of drugs were analyzed in this survey. The first drug class was pharmaceuticals that specifically were designed for the patient to lose weight. The second class were drugs that served a different purpose, but weight loss was a side effect. When asked how much weight the subject would want to lose before resorting to taking a weight loss pharmaceutical; the majority 48% of women and 43% of men said that they would never take a drug intended for weight loss. On the other end of the spectrum, 24% of women and 21% of men would take the drug only if they wanted to lose more than 51lbs.

Figure 3. How much weight do you have to lose to take a drug for weight loss?

Subjects were then asked if they would take a prescription drug for a different medical condition that had weight loss as a side effect as opposed to its main effect. This question yielded a high percentage of both men and women saying that they would not take a drug like this. Compared to the prescription drug intended for weight loss, these negative approval ratings are higher. As shown in Figure 4, 55% of women and 57% of men disapprove taking a drug that has weight loss as a side effect. The distribution trend of this graph is similar to the graph about intended weight loss. The highest reporting numbers were at the tail ends; 51+ lb. and never taking the drug. Both graphs show that the majority of subjects would rather not take the drug at all or take the drug if they need to lose more than 51lb.
Figure 4. How much weight would you have to lose to take a drug that has weight loss as a side effect?

Side effects may deter subjects from taking any type of pharmaceutical. Subjects were shown common side effects of many weight loss pharmaceuticals and were asked how much weight would they need to lose in order to consider taking that medication. The common side effects were: insomnia, loss of appetite, headaches and/or migraines, hypertension, constipation, diarrhea, increased heart rate, dizziness, and flatulence. Nearly 67% of all men and 62% of women said that they would never take a drug that had any of the above conditions listed as side effects. Approximately 14% of men and 7% of women said they were willing to endure the side effects if they had to lose up to ten pounds only. Only one of the men said they would need to lose more than 51 pounds to put up with the side effects. The women responded fairly similarly as the men did, but one of the major contrasts with the women compared to the men is that there were a higher proportion of women reporting they need more than 51 pounds to endure these side effects. 24% of these women said they would put up with the side effects to lose the excess 51 pounds.

Figure 5. How much weight would you have to lose to consider taking Phentermine?

Phentermine is a prescribed weight loss pharmaceutical that works by suppressing appetite. Figure 5 shows that Phentermine was not popular amongst subjects. 88% of all participants said they would not take this particular drug to lose any amount of weight. Only 6% of the people surveyed said they would want to lose more than fifty-one pounds to take Phentermine. The side effects of Phentermine seemed to outweigh the potential benefits that Phentermine may have to offer.
Orlistat facilitates weight loss by blocking the absorption of fat while being digested. Similar to Phentermine, 88% of individuals surveyed would not take Orlistat to lose any weight. The slight difference is that 14% of women noted that they would try orlistat to drop over fifty-one pounds of weight. Based on the results for both Phentermine and Orlistat, the small amount of individuals that are willing to try a weight loss pharmaceutical to lose weight will do so only to lose more than fifty-one pounds.
Compared to the other weight loss pharmaceuticals, Adderall had the most varied response over both genders. The subjects were more receptive to taking Adderall to lose weight compared to the other pharmaceuticals. Although these percentages were lower compared to the previous drugs, 58% of women and 52% of men indicated that taking Adderall was not an option for them to lose weight. However, nearly 10% of women and 29% of men would consider taking Adderall to lose up to ten pounds. This deviates from the trend that the two most popular options for both parties tend to be at the tail ends of the graph. In contrast, 17% of women and only mere 5% of men said they would take the weight loss pharmaceutical to lose more than fifty-one pounds of weight; the second most popular option for women.

Figure 8. How much weight would you have to lose to take Victoza?
This diabetes medication Victoza did not seem to be a suitable medication to take for weight loss for the majority of the subjects. 83% of women and 90% of men stated that they would not take Victoza to lose any amount of weight. A miniscule 10% of women and 5% of men would take Victoza to solely lose more than fifty-one pounds of weight.

**Discussion**

One of the big takeaways from this study was that the majority of college-aged individuals would not take a weight loss pharmaceutical to lose weight. In general, the subjects’ disfavored drugs that have weight loss as a side effect more than pharmaceuticals that were developed as a weight loss drug. Interestingly, subjects were more willing to take Adderall to lose weight compared to the other pharmaceuticals. Given that the majority of subjects were college students, it is highly likely that they may have either taken or know of someone that has taken Adderall to help them concentrate while studying and were therefore more familiar with Adderall and its potential side effects.

Both Orlistat and Phentermine received fairly similar results when the survey was concluded. Both pharmaceuticals had a very high proportion of subjects report that they would “never” take either drug if they wanted to lose weight. It is possible that members who belong to a gym wouldn’t want to take a drugs that blocks fat absorption because they know fat is needed in the body to absorb nutrients- inhibiting their workout in some way. Additionally, the side effects of Phentermine may have deterred many gym goers from wanting to take the drug. Phentermine raises heart rate and blood pressure; both of which are already elevated while doing hearty exercise. Subjects viewed that a well-balanced diet and daily exercise would be more feasible to achieving clinically meaningful weight loss.

Victoza received the strongest disapproval rating out of all the pharmaceuticals listed on the survey. Nearly 87% of all subjects said they would not take Victoza as a weight loss pharmaceutical to lose any amount of weight. This is most likely due to Victoza being prescribed to treat Type 2 diabetes and acts to promote insulin secretion to lower blood glucose levels. This pathway could cause weight loss by reducing the amount of free glucose circulating that will be stored as fats. This pharmaceutical would be preferred in individuals with diabetes that share a comorbid condition with obesity and not at all appropriate for a non-diabetic person.

It is highly likely that the results of this study would be very different if we surveyed the general population. Roughly half of our subjects were going to a gym for exercise and most all subjects were college aged and not overweight. These subjects are more likely to want to rely on diet and exercise to manage their weight. In contrast, the average adult American, many of which struggle with weight gain and are overweight or obese and are probably taking numerous pharmaceuticals for a variety of disorders, has probably at least contemplated taking an OTC supplement or a prescribed drug to help them lose weight. It is hypothesized that there is a greater proportion of overweight and obese people that are willing to risk taking a pharmaceutical to lose weight. A future study that included subjects that range in age from 18-65 would yield more informative results on the risks that people will take to lose weight.
References


6. Svetol®, green coffee extract, induces weight loss and increases the lean to fat mass ratio in volunteers with overweight problem. Dellalibera et.al.,


for Weight loss Among Patients with Type 2 Diabetes.

15. Adderall and Weight Loss: What you need to know. Kimberly Holland

http://mentalhealthdaily.com/2015/02/04/using-adderall-for-weight-loss-an-insidious-strategy/

17. Antidepressants that cause Weight Loss: Wellbutrin is the Best. Mental Health Blog.

18. The Real Reason We Don’t Exercise… and why you get your body out of its comfort zone.
https://www.psychologytoday.com/blog/shrink/201411/the-real-reason-we-dont-exercise

Appendix 1. IRB Protocol

I. Willingness to Take Prescription Drugs to Lose Weight

II. The purpose of this study is to see whether individuals would take a prescription drug to lose weight and at what amount of weight loss would individuals consider taking a prescription drug that may have side effects

III. With both childhood obesity and adult obesity on the rise, it is critical that individuals who are overweight to take control of their own health. However, many individuals resort to using over the counter weight loss supplements to shed excess pounds instead of using die-hard diet and exercise regimens. According to the National Institute of Health- Office of Dietary Supplements, Americans spend approximately $2 billion dollars on weight loss supplements a year. The U.S. Government Accountability office has stated that many weight loss supplements are ineffective- and many pose harm physically. With growing popularity, it is important to understand why diet supplements are a fad, when statistics continue to show that they aren’t effective and may even pose health risks.

Many weight loss pharmaceuticals are now available either prescription or over the counter. This makes weight loss plausibly easier, yet more potentially dangerous at the same time. Consumers may just buy the drug to lose weight without even considering any side effect is that harmful if it can be sold over the counter. According to a WEBMD article, they cite that “clinically meaningful” weight loss stems more from a well-balanced diet complemented with daily exercise as opposed to just taking the drug. WEBMD denotes that this is: “enough weight loss to begin lowering the risk of cardiovascular disease, diabetes, and other diseases-.” This synergistic relationship between a healthy lifestyle in conjunction with exercise was examined in a National Library of Medicine meta-analysis by Yanovski et. al.,. The study cited that 36% of adults in the USA are classified as obese. This grossly large number is why healthy weight loss is so imperative for this country. The results after analyzing the twenty-one studies showed that
subjects that took a weight loss drug while eating a healthier diet and exercising more often than before led to clinically meaningful weight loss. Approximately 37-47% of subjects that took Lorcaserin, which suppresses the appetite, achieved clinically meaningful weight loss in a one-year time frame. Subjects on the drug Orlistat had a slightly higher range of 35-73% clinically meaningful weight loss. It’s essential to note that there is a wide range for both drugs. Weight loss pharmaceuticals do not work for everybody, nor do they replace a well balanced diet with heart-healthy exercise. Similar to the previous study, this research drew the conclusion that these drugs, when used with healthy diet and exercise, led to a larger average weight loss than the placebo group. This study also acknowledges that the subjects that did not lose weight while taking the pharmaceuticals should discontinue the drug to reduce their risk of experiencing undesirable side effects.

In the USA, Orlistat (Xenical) is the only weight loss drug that is FDA approved to be administered to adolescents. In a 2002 study by McDuffie et. al., twenty adolescents were given orlistat three times a day combined with them taking a diet and exercise wellness course over a twelve week period. The results showed that 85% of the subjects had a significant reduction in weight and body mass index. Additionally; low density lipoprotein (LDL) cholesterol, fasting glucose levels, and fasting insulin all significantly improved. The study also showed that the subjects tended to show the same mild adverse side effects that their adult counterparts had while on Orlistat. The side effects were more contained to gastrointestinal (GI) discomfort and majority of the subjects reported that the side effects subsided over time. The study concluded that orlistat works well synergistically with the lifestyle class based on how the adolescents’ health problems had decreased over the three month trial. It is still unclear, if the adolescent participants lost the weight due to the orlistat, or, due to the lifestyle changes the adolescents made as a result of attending the behavioral lifestyle class. It also poses the question of whether these subjects will become reliant on weight loss drugs in the future to lose weight instead of managing their diet and exercise lifestyles. There are conflicting studies that show subjects taking weight loss pharmaceuticals do not result in a significant amount of weight loss.

Pharmaceuticals are costly, a drain on the health care system, potentially come with side effects that could prove to be hazardous to one’s health, and should not be considered as a substitute for maintaining a proper diet and exercise regimen. Promoting healthy exercise and proper nutrition is more advantageous for the general public than advertising the grandeur of a weight loss drug. However, popping a pill is a lot easier than being on an exercise bike for 30 min a day or restraining oneself to not eat what they shouldn’t. Some may believe that the pharmaceuticals prescribed by their doctor are safe and won’t affect them negatively or they are willing to experience some negative side effects depending on how desperate they are to lose x number of pounds. We hope to shed some light on identifying the “price point” (how many pounds are required for them to lose) needed to gamble with the potential of experiencing negative side effects.

IV.
A. A survey has been designed to analyze whether subjects are willing to take pharmaceuticals to lose weight given specific side effects.

B. We will sample members of the Sonny Werblin Gym at Rutgers University in New Brunswick, New Jersey. This gym is the largest at Rutgers University and is used by every age
category over eighteen. We will exclude anybody under eighteen from the survey. We will also sample individuals purchasing fast food in the food court of Rutgers student centers. We hope to administer 100-200 surveys.

C. The variable of interest is the subject’s desired weight loss versus their judgement to take the prescription drug. The study focuses on how much weight it would take for someone to take a prescription drug for weight loss.

D. The student investigator will request individuals that are entering or exiting the Sonny Werblin Recreation Gym at Rutgers University in New Brunswick, New Jersey to complete the survey. The student investigator will also request individuals complete the survey following their purchase of fast food in the student center food court. The survey will be administered right outside the gym entrance or in the seating area of the student center Food court. The subject will remain anonymous and the person’s name will not be collected or written on the survey.

E. The subject’s survey will be placed in a sealed envelope and will not be shared with anybody. The only person viewing the survey will be Daniel Auferio, the student investigator or Dr. Julie Fagan, the student’s professor. Once the surveys have been collected and analyzed, they will later be disposed of. There are no risks to taking the survey.

F. Each subject will be informed that the study is voluntary and anonymous. They will be provided the “Informational Sheet” and after explanation of the survey, asked if they have any questions prior to taking the survey and giving verbal agreement to participate. The subjects will be given the survey on paper and provided a pen to fill it out while the student investigator stands by. When the respondent has completed the survey, the student investigator will collect it.

G. None

H. Bar graphs will be used to display the data obtained from questions 6 and 7. Z-scores and t-tests are not necessary. It is sufficient to count the number of subjects that would take a certain drug to lose weight and plot that on a graph.

References


Informational Sheet

Title: Willingness to Take Prescription Drugs to Lose Weight
Authors: Julie M. Fagan, Ph.D. with student Daniel Auferio

INTRODUCTION: You are invited to voluntarily participate in a research study that will measure the willingness to take prescription drugs to lose weight.

BENEFITS: You will not receive any direct benefit for participating in this research. However, it is expected that the research will provide scientists with a better understanding of the reliance on pharmaceuticals to achieve weight loss goals.

RISKS: This study consists of only a survey and there are no risks involved.

CONFIDENTIALITY: This research is completely anonymous. No information will be recorded that could identify you.

COMPENSATION: You will receive no monetary compensation for participating in this study.

RESEARCH QUESTIONS: If you have any questions regarding the study, you may contact Dr. Julie Fagan at Fagan@rutgers.edu

SUBJECT RIGHTS: If you have any questions about your rights as a research subject, you may contact the IRB Administrator at Rutgers University at: Institutional Review Board, Rutgers University, the State University of New Jersey, Liberty Plaza / Suite 3200, 335 George Street, 3rd Floor, New Brunswick, NJ 08901

The Survey: Willingness to Take Prescription Drugs to Lose Weight

More than 2 in 3 adults and 1 in 3 children and adolescents ages 6 to 19 are considered to be overweight or obese. More than 1 in 3 adults and 1 in 6 children and adolescents ages 6 to 19 are considered to be obese. More than 1 in 20 adults are considered to have extreme obesity*.

1) Please fill in the following information.
   A. Your Age ___________
   B. Gender ________
   C. How much weight would you like to lose (if any)?
      _____ 51+ lb
      _____ 26-50lb
      _____ 11-25lb
      _____ 1-10lb
      _____ None

2) What pharmaceutical, exercise, and diet regimens have impacted your achieving your body weight goals? Check all that apply

   A. Pharmaceutical - What pharmaceuticals are you currently taking that may result in body weight gain or loss?
      _____ None
      _____ Over the Counter herbals that claim to aid in weight loss
Steroids (known to increase appetite)
Prescription drugs to aid in weight loss
Thyroid medications (resulting in your gaining weight)
Thyroid medications (resulting in your losing weight)
Psychotropic drugs that may have as a side effect, weight gain
Psychotropic drugs that may have as a side effect, weight loss
Amphetamines (known to result in weight loss)
Diabetes medications to help control glucose metabolism that may have weight loss as a side effect
Other medications

B. Diet - Check all that apply:
I’m a “vegetarian”
I’m on a “Paleo” diet
I’m on a “Mediterranean” diet
In general, I am “careful” what I eat and limit my consumption of sugar carbohydrate, fat and calories
I’ve had bariatric surgery so I am limited to how much I can eat
I’m diabetic, so I am careful what I eat
I regularly consume sugary drinks and snacks that may be high in salt, sugar, carbohydrate, fat and calories
I consume many “processed” foods that may be high in salt, sugar, carbohydrate, fat and calories

On average, how often do you consume fast food per week?
5 or more times
3-4 times
1-2 times
0. I avoid fast food

On average, how often do you go out to eat or purchase ready to eat meals per week (excluding “fast food”)?
5 or more times
3-4 times
1-2 times
0. I prepare most of my meals at home

C. Exercise- On average, how long do you typically exercise for?
60 min or more per day per week
30-60 min per day per week
5-30 min on a given day, not necessarily every day
No specific exercise regimen but I get some daily exercise
No specific exercise regimen. I get little exercise

3. How confident are you, that you could make lifestyle changes (diet and exercise) necessary to achieve your weight loss goal?
Please answer the following questions independent of your weight loss goals

4. At what amount of weight loss would you consider taking a prescription drug intended for weight loss? Check all that apply.
   - 51+ lb
   - 26-50lb
   - 11-25lb
   - 1-10lb
   - Never

5. At what amount of weight loss would you consider taking a prescription drug that has weight loss as a side effect?
   - 51+ lb
   - 26-50lb
   - 11-25lb
   - 1-10lb
   - Never

6. Prescription drugs may have side effects. At what amount of weight loss would you consider taking a prescription drug with the following side effects:
   a. Insomnia
      - 51+ lb
      - 26-50lb
      - 11-25lb
      - 1-10lb
      - Never
   b. Loss of Appetite
      - 51+ lb
      - 26-50lb
      - 11-25lb
      - 1-10lb
      - Never
   c. Headaches / Migraines
      - 51+ lb
      - 26-50lb
      - 11-25lb
      - 1-10lb
      - Never
   d. Hypertension (high blood pressure)
e. Constipation
   - 51+ lb
   - 26-50lb
   - 11-25lb
   - 1-10lb
   - Never

f. Diarrhea
   - 51+ lb
   - 26-50lb
   - 11-25lb
   - 1-10lb
   - Never

g. Increased heart rate
   - 51+ lb
   - 26-50lb
   - 11-25lb
   - 1-10lb
   - Never

h. Dizziness
   - 51+ lb
   - 26-50lb
   - 11-25lb
   - 1-10lb
   - Never

i. Flatulence
   - 51+ lb
   - 26-50lb
   - 11-25lb
   - 1-10lb
   - Never

7. At what amount of weight loss would you consider taking the following prescription drugs given their mode of action and side effects.

<table>
<thead>
<tr>
<th>Name of Drug</th>
<th>Mode of Action</th>
<th>Side Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Phendimetrazine</td>
<td>Decreases appetite</td>
<td>Increased blood pressure and pulse, increases satiety, nervousness, insomnia, constipation</td>
</tr>
</tbody>
</table>
b. Phentermine  Decreases appetite  Headache, increased blood pressure and pulse,  Increases satiety  nervousness, dry mouth, constipation

c. Orlistat  Blocks absorption  Intestinal cramps, diarrhea, fecal urgency and incontinence

d. Victoza  Stimulates insulin secretion  Increased risk pancreatitis, swelling, shakiness, and hunger

Adderall  Treat ADHD and narcolepsy  Loss of appetite, dry mouth, anxiety nervousness

THANK YOU FOR PARTICIPATING!
CONSENT FORM
FOR ANONYMOUS DATA COLLECTION

You are invited to participate in a research study that is being conducted by Dr. Julie Fagan who is an Associate Professor at Rutgers University. The purpose of this research is to determine participant’s willingness to take prescription drugs to lose weight.

This research is anonymous. Anonymous means that I will record no information about you that could identify you. There will be no linkage between your identity and your response in the research. This means that I will not record your name, address, phone number, date of birth, etc. If you agree to take part in the study, you will be assigned a random code number that will be used on each test and the questionnaire. Your name will appear only on a list of subjects, and will not be linked to the code number that is assigned to you. There will be no way to link your responses back to you. Therefore, data collection is anonymous.

The research team and the Institutional Review Board at Rutgers University are the only parties (please modify if others will have access to the data) that will be allowed to see the data, except as may be required by law. If a report of this study is published, or the results are presented at a professional conference, only group results will be stated. All study data will be kept for three years.

There are no foreseeable risks to participation in this study. In addition, you may receive no direct benefit from taking part in this study. Participation in this study is voluntary. You may choose not to participate, and you may withdraw at any time during the study procedures without any penalty to you. In addition, you may choose not to answer any questions with which you are not comfortable.

If you have any questions about the study or study procedures, you may contact myself, Daniel Auferio or my faculty advisor Julie M. Fagan, Ph.D. at 84 Lipman Dr., New Brunswick, NJ 08903.

If you have any questions about your rights as a research subject, please contact an IRB Administrator at the Rutgers University, Arts and Sciences IRB:
Institutional Review Board
Rutgers University, The State University of New Jersey
Liberty Plaza / Suite 3200, 335 George Street, 3rd Floor, New Brunswick, NJ 08901

Please retain a copy of this form for your records. By participating in the above stated procedures, then you agree to participation in this study.

If you are 18 years of age or older, understand the statements above, and will consent to participate in the study, click on the "I Agree" button to begin the survey/experiment. If not, please click on the “I Do Not Agree” button which you will exit this program.