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NON-MEDICAL USE OF PRESCRIPTION STIMULANTS FOR WEIGHT LOSS:  
PREDICTORS, CONSEQUENCES, AND IMPLICATIONS FOR INTERVENTION IN A  
NATIONAL YOUNG ADULT SAMPLE

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of  
Philosophy at Virginia Commonwealth University

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## **Abstract**

### **NON-MEDICAL USE OF PRESCRIPTION STIMULANTS FOR WEIGHT LOSS: PREDICTORS, CONSEQUENCES, AND IMPLICATIONS FOR INTERVENTION IN A NATIONAL YOUNG ADULT SAMPLE**

By: Amy J. Jeffers, M.S.

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University.

Virginia Commonwealth University, 2016.

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The non-medical use of prescription drugs is an important public health concern. Non-medical use of prescription stimulants (NMUPS), specifically medications used to treat Attention Deficit Hyperactivity Disorder (ADHD), is particularly concerning. One timely concern regarding NMUPS, especially among young adults, is their role in appetite suppression/weight loss. Indeed, some individuals are motivated to misuse such drugs for the purpose of losing weight. Engaging in NMUPS for weight loss has been examined only minimally in the research literature. However, extant data demonstrate that this behavior is associated with other unhealthy behaviors and poor psychosocial health. Limitations of prior

research include the exclusive use of college student samples and little attention to relevant health behavior theory. The current study investigated NMUPS for weight loss in a national, young adult sample ( $n = 1526$ ), ages 18-25 years, utilizing Amazon's Mechanical Turk. Motivations and attitudes about NMUPS were evaluated, within the framework of the Theory of Planned Behavior (TPB). A structural equation model (SEM) was analyzed, which included attitudes; social norms; and perceived behavioral control (PBC) to lose weight without stimulants, as predictors of engaging in past year NMUPS for weight loss. Approximately 12.0% of participants reported lifetime NMUPS for weight loss, and of these, 48.4% reported past year use. Findings demonstrate that use is related to disordered eating and unhealthy weight loss behaviors, including vomiting; high rates of other substance use; and psychological concerns, including body dissatisfaction and depressive symptomatology. These results suggest that NMUPS for weight loss is associated with a variety of negative consequences and users are not well-informed regarding medication knowledge. The SEM provided adequate overall fit to the data; two of the four social norms and both PBC factors were significantly associated with NMUPS for weight loss. This study extends the literature on the utility of the TPB in examining NMUPS, and provides the first research on utilizing the TPB to examine NMUPS for weight loss. Methods aimed at increasing PBC regarding stimulant use and weight loss, and emphasizing healthful and sustaining weight loss strategies, improving mental health, and educating about polysubstance use are potential intervention targets.

Non-medical use of prescription stimulants for weight loss: Predictors, consequences, and implications for intervention in a national young adult sample

### **Non-medical Use of Prescription Drugs**

In recent years, there has been a dramatic increase in the non-medical use of prescription drugs (NMUPD), including the use of psychotropic or analgesic medications (e.g., pain relievers, tranquilizers, sedatives, stimulants) without a physician's prescription, as well as the intentional misuse of one's own medication among young adults. Consistent with the definition used in the Substance Abuse and Mental Health Services Administration's (SAMHSA) National Survey on Drug Use and Health, "NMUPD" will be used in this paper as the umbrella term to describe use without a prescription, as well as intentional misuse of one's own prescription (e.g., use too much, use to get high, or use to increase other drug or alcohol effects; SAMHSA, 2012). Thus, this commonly used definition includes both those who use prescription drugs without a doctor's prescription and those who intentionally misuse their own prescription drugs. However, when necessary, distinctions between non-medical use versus intentional misuse will be made clear.

Motives for NMUPD include: to get high, for experimentation, to enhance energy, relieve pain, and to lose weight (Jeffers & Benotsch, 2014; Jeffers, Benotsch, & Koester, 2013; McCabe & Cranford, 2012). In national studies, as many as 29.2% of young adults (18-25) report NMUPD in their lifetime (Institute for Behavior and Health, n.d), with almost 6% reporting NMUPD in the past month (SAMHSA, 2012). In 2012, a young adult in the United States (U.S.) was more likely to use a prescription drug non-medically than to use any illicit substance except marijuana (SAMHSA). NMUPD now accounts for more emergency room (ER) visits than use of all illicit substances combined (SAMHSA, 2012). Data from

other national samples have demonstrated that NMUPD is a risk factor for future drug dependence (Schepis & Krishnan-Sarin, 2008), binge drinking (McCauley et al., 2011), and substance use disorders (Schepis & Hakes, 2011). NMUPD has been associated with poor mental health, including depressive symptoms, suicidality, and anxiety (Dussault & Weyandt, 2013; Zullig & Divin, 2012). NMUPD has also been related to sexual risk behavior, including more sexual partners and unprotected sex (Benotsch, Koester, Luckman, Martin, & Cejka, 2011).

### **Non-medical Use of Prescription Stimulants**

One particularly concerning trend is the rise in the non-medical use of prescription stimulants (NMUPS; Arria & DuPont, 2010; Rabiner et al., 2009). Lifetime prevalence rates are estimated as high as 34% among college students (DeSantis, Webb, & Noar, 2008). Motivations for NMUPS include: to help with concentration, to increase alertness, to get high, and for the sake of experimenting (Teter, McCabe, LaGrange, Cranford, & Boyd, 2006). NMUPS is associated with adverse health effects including increases in heart rate, blood pressure, body temperature, and malnutrition due to a decrease in appetite (National Institute on Drug Abuse [NIDA], 2009). Chronic stimulant use can lead to paranoia and hostility and high doses can lead to cardiovascular consequences (NIDA, 2009). Mixing prescription stimulants with drugs or alcohol can exacerbate these side effects (Higher Education Center, 2012). NMUPS has been associated with other substance use including use of alcohol, tobacco, marijuana, cocaine, and ecstasy (Lanier & Farley, 2011). Indeed, NMUPS is associated with past year alcohol or drug use disorders in both males and females (Wu, Pilowsky, Schlenger, & Galvin, 2007). Further, between 2005 and 2010, the number of ER visits related to NMUPS increased dramatically from 5,212 to 15,585 (SAMHSA, 2013).

One timely concern regarding NMUPS, especially among young adults, is their role in appetite suppression.

**NMUPS for weight loss.** Prescription stimulant medications used to treat Attention Deficit Hyperactivity Disorder (ADHD), for example, Adderall and Ritalin, have shown promise for improving the main symptoms of ADHD and enhancing academic performance among those with ADHD (Zachor, Roberts, Hodgens, Isaacs, & Merrick, 2006). However, a common side effect of these medications is appetite suppression (Zachor et al., 2006) and subsequent weight loss (Kent, Blader, Koplewicz, Abikoff, & Foley, 1995). Because of this widely known side effect of ADHD medications, and given the increasing number of young adults who report a desire to lose weight (Neumark-Sztainer, Wall, Larson, Eisenberg, & Loth, 2011), some individuals are motivated to misuse such drugs for the purpose of weight loss (Jeffers & Benotsch, 2014; Jeffers et al., 2013). Further, there is a widespread misperception that prescription drugs are safe even when taken without a prescription (NIDA, 2013). This misperception, and the ease of obtaining these substances, contribute to their frequent non-medical use. Indeed, many individuals who share medications are unaware of their dangers and procure them for free from a friend or relative (NIDA, 2013). Thus, stimulant medication might seem like a cheap, easy way to lose weight. Engaging in the non-medical use of prescription ADHD medication for the purpose of weight loss has been discussed in the popular press, but has been examined only minimally in the research literature, has rarely been a focal point of research, and has been examined exclusively in college students (e.g., Jeffers & Benotsch, 2014; Jeffers et al., 2013; Rabiner et al., 2009; Teter et al., 2006).

In one study, the non-medical use of specific prescription stimulants was examined along with the motives for such use in a random sample of college students ( $n = 4580$ ; Teter et al., 2006). About 9.7% ( $n = 37$ ) of the lifetime users reported using stimulants not prescribed to them for the purpose of weight loss. However, this motivation was the sixth highest reason given after motives such as improving concentration, as a study aid, and increasing alertness. The use of prescription stimulants for weight loss was minimally examined in this study. Rabiner and colleagues (2009) examined the misuse of ADHD medication among individuals who reported having a current prescription for these medications ( $n = 115$ ), of which 27 reported misuse. Motivations for misusing prescription stimulants were discussed, including for the purpose of losing weight. However, this was not a focal point of the research as this behavior was minimally endorsed within the sample. Judson and Langdon (2009) found that 3.6% of individuals reported non-medically using ADHD medication to lose weight in a sample of 333 students (both prescription and non-prescription holders). DeSantis and colleagues (2008) examined non-medical use of prescription ADHD medications among college students and found that among the 585 participants that reported use without a prescription, 5% reported using for the purpose of suppressing appetite. This motive was also mentioned in qualitative interviews the researchers conducted. For some participants, appetite suppression was a beneficial side effect to use, and for some it was the primary motive. For example, one participant who reported studying as the main motive of NMUPS said, “It is kind of cool that you also don’t want to eat either” (DeSantis et al., 2008). Another participant reported, “The first time I used it was because one of my sorority sisters told me how great it was. She said you don’t want to eat, and it is safe and everything” (DeSantis et al., 2008).



***NMUPS for weight loss as a focal point.*** To the PI's knowledge, only two studies have focused strictly on NMUPS for the purpose of weight loss (Jeffers & Benotsch, 2014; Jeffers et al., 2013). In the first of these studies, 11.7% of young adults ( $n = 705$ ) surveyed reported having used a prescription stimulant for weight loss (Jeffers et al., 2013). Individuals who reported using prescription stimulants for weight loss were more likely to report dieting, had greater appearance-related motivations for weight loss, greater emotion and stress-related eating, a more compromised appraisal of their ability to cope, lower self-esteem, and were more likely to report engaging in other unhealthy weight loss and eating disordered behaviors such as vomiting, using laxatives, utilizing a fad diet, and skipping meals. Indeed, these individuals were eight times more likely to engage in these behaviors.

However, a limitation of the Jeffers et al. (2013) study included not clearly differentiating between those who misused their own ADHD medication from those who received medication from another source. Thus, the researchers were unable to differentiate between individuals who were misusing their own medication for the purpose of weight loss (i.e., for a purpose other than was intended) versus those who were receiving medication from others for the purpose of weight loss (i.e., non-medical use).

A follow-up investigation examined NMUPS for weight loss, recreational drug use, disordered eating, and body image (Jeffers & Benotsch, 2014). This study examined young adults' ( $n = 707$ ) NMUPS, in general and for weight loss, other recreational and illicit drug use, perceived effectiveness of NMUPS for weight loss, eating disordered behaviors and symptomatology, and body image. Current ADHD prescription holders were excluded from this study because these medications are sometimes prescribed off-label for weight loss (Bernstein, 2006; Johnson, 2006), and the researchers wanted to account for this possibility.

Moreover, they wanted to focus the investigation on users who did not actually have a prescription but were getting the medication from another source. Approximately 4.4% of the sample engaged in NMUPS for weight loss. Individuals who engaged in NMUPS for weight loss had problematic attitudes and feelings related to eating, including a high level of concern regarding dieting and weight. These individuals also engaged in problematic eating behaviors and had higher eating disorder symptomatology. Indeed, vomiting to control one's weight and shape, as well as laxative, diet pill, or diuretic use, were robustly associated with NMUPS for weight loss. There was also an association with binge eating, but this relation became nonsignificant when examined from a multivariate perspective. Individuals who engaged in NMUPS for weight loss had lower body appreciation and higher body image concerns, specifically related to the media. Individuals who used stimulants for weight loss were also more likely to use other recreational drugs, including marijuana, cocaine, methamphetamine, and hallucinogens.

### **Theory of Planned Behavior**

One limitation of these prior studies is that they were largely atheoretical. Applying a health behavior theory to a problematic behavior can provide a useful framework for better understanding the constructs related to that behavior, which can aid in developing interventions. The Theory of Planned Behavior (TPB; Ajzen, 1991; Ajzen, 2002) postulates that intention to engage in a particular behavior is a result of personal attitudes toward the behavior, social norms, and perceived behavioral control.

Within this model, attitudes refer to the degree to which a person has a positive or negative evaluation or appraisal regarding a certain behavior, and encompass beliefs about possible consequences or other attributes of the behavior. Social, or subjective norms, are

perceived social pressures to engage or not to engage in a particular behavior, and concern expectations of important others. Finally, perceived behavioral control refers to individuals' perceptions of their ability to perform a specific behavior. Perceived behavioral control is assumed to reflect both past experiences and future circumstances with respect to the behavior. Both self-efficacy (i.e., perceived ability to perform a behavior) and controllability (i.e., beliefs about whether performing the behavior is up to the individual) items should be incorporated when measuring perceived behavioral control, although control can be treated as a unitary factor depending on the purpose of the research (Ajzen, 2002). Taken together, these three constructs form a behavioral intention. Intentions are believed to encompass the motivational factors that influence a behavior, and, along with perceived behavioral control, account for a large proportion of variance in actual behavior (Ajzen, 1991).

**The TPB and examinations of health behaviors.** The TPB has been shown to predict various health-related behaviors, including exercise (Nguyen, Potvin, & Otis, 1997), diet (Conner, Kirk, Cade, & Barrett, 2003), as well as addictive behaviors including binge drinking (Collins & Carey, 2007), smoking (Van De Ven, Engels, Otten, & Van Den Eijnden, 2007), and illicit drug use (Morrison et al., 2010). For example, Collins and Carey (2007) examined the TPB in relation to binge drinking in college students and found that drinking refusal self-efficacy and attitudes predicted intention. Further, intention predicted Time 2 binge drinking. Van De Ven et al. (2007) found that smoking-related cognitions predicted the onset of smoking via intention among adolescents with and without asthma. The TPB has also been used to predict marijuana use among unmarried pregnant adolescents (Morrison et al., 2010).

**TPB and NMUPD.** The TPB has also been used to predict NMUPD, and NMUPS, in particular. Judson and Langdon (2009) used the TPB to examine NMUPS in college students ( $n = 333$ ) with and without ADHD prescriptions. Participants were recruited from two New England colleges and the sample was predominantly White (89%). Prescription holders and non-prescription holders were compared on a variety of domains, including motives for use, knowledge of medication side effects, and TPB constructs. NMUPS for non-prescription holders was defined as using stimulant medication without a prescription. NMUPS for prescription holders included using stimulant medications in excess or for purposes other than intended (i.e., treating ADHD). Results were consistent with the TPB, particularly for non-prescription holders, such that they had fewer concerns regarding adverse health effects and ethics of use, higher perceived positive social norms, and lower perceived behavioral control (i.e., felt more dependent on stimulant medications). Judson and Langdon (2009) did not directly measure intention to use, but the relation between these beliefs and attitudes were directly related to NMUPS. As previously mentioned, 3.6% of participants reported weight loss as a motive for NMUPS. However, it is unclear whether this motive was endorsed by prescription holders, non-prescription holders, or both. Moreover, the investigators did not focus on this motivation in their study.

In a dissertation study, Gallucci (2011) created a survey instrument using TPB constructs (including modified items from Judson and Langdon's [2009] work) to examine NMUPS and diversion behavior (e.g., selling medications, sharing among friends) among undergraduates aged 18-24 ( $n = 1026$ ). Gallucci did not directly measure intention to use, but attitudes and perceived behavioral control were related to lifetime NMUPS, with the latter being the strongest predictor of lifetime NMUPS; social norms, however, were not related.

Gallucci mentioned that the social norm variables (e.g., beliefs held by relevant others) were associated with higher numbers of participants who had incomplete data. He posited that participants' unwillingness to answer these questions might be attributable to the survey administration (e.g., close proximity to friends in the classroom during survey completion). Only perceived behavioral control was related to recent non-medical use (i.e., past 30 days; Gallucci, Martin, Beaujean, & Usdan, 2015). Findings indicate that some elements of the TPB are related to lifetime NMUPS, and that the TPB has limited utility in predicting recent NMUPS, at least for the past 30 days, in undergraduates ages 18-24.

In a master's thesis, Srigley (2013) examined behavioral intentions to use prescription stimulants, depressants, and opioids non-medically within the next year in a sample of 131 college students. Both attitude toward use and perceived behavioral control emerged as strong predictors of intention to engage in NMUPD.

Finally, Ponnet and colleagues (Ponnet, Wouters, Walrave, Heirman, & Van Hal, 2015) examined Flemish college students' ( $n = 3,589$ ) intention to engage in NMUPS for the purpose of enhancing academic performance. They used an extended model of the TPB and found that subjective norms, followed by attitudes and perceived behavioral control predicted intention to use, among other variables (e.g., substance abuse, procrastinating tendencies).

Overall, few studies have examined the TPB as it applies to NMUPS. The four aforementioned studies have resulted in inconsistent results and warrant further research to determine the ability of the TPB to predict NMUPS (e.g., Gallucci, 2011). Moreover, two of the four studies involved small samples (e.g., 131 and 333) with the exclusive use of undergraduate students.

### **NMUPS in College Students and Non-College Students**

The majority of studies examining NMUPS among young adults have focused on college students, as prevalence rates of NMUPS are typically higher in this population compared with their non-college peers (Herman-Stahl, Krebs, Kroutil, & Heller, 2007). This is not surprising given the commonly reported motives for NMUPS related to improving academic performance (Herman-Stahl et al., 2007). College students may also have greater exposure to individuals using prescription medications (both for medical and non-medical purposes; Herman-Stahl et al., 2007). However, NMUPS prevalence rates vary and range from 3-36% (McCabe, Teter, & Boyd, 2006) in college student samples depending on geographic location and school admission standards (Gallucci, 2011).

Relatively few studies have examined NMUPS in non-college populations (e.g., Herman-Stahl et al., 2007; Wu et al., 2007). Although there is evidence to support higher prevalence rates in college populations, non-college young adults are also at risk for engaging in this behavior. Kelly and colleagues (2013) found that in a sample of socially active young adults who participate in urban nightlife ( $n = 1207$ ), 44.1% reported lifetime NMUPD, with NMUPS as the most prevalent in the past 6 months (16.7%). Although the authors did not report on college attendance rates, it is highly probable that this community sample consisted of both students and non-students. As the authors concluded, a contribution of this study included moving beyond college student samples to lend insight into non-medical use across a spectrum of young adults (Kelly et al., 2013). Additionally, results from the 2013 Monitoring the Future (MTF) survey demonstrated that annual prevalence rates of Adderall misuse were somewhat higher for college students (9.0%), but 6.7% of their non-college peers also endorsed the behavior (Johnston, O'Malley, Bachman, & Schulenberg,

2013). Further, prevalence rates of Ritalin misuse are much lower than rates of Adderall but rates were not different for college students (1.8%) and non-college students (2.6%).

Clearly, NMUPS is not limited to undergraduate students. Further, although most research suggests higher rates of this behavior in college student populations, prevalence rates are also concerning in their non-college counterparts (e.g., 6.7%; Johnston et al., 2013). Moreover, academic-related motives for NMUPS (e.g., improve academic performance) are undoubtedly more salient among college students, but it is likely that non-academic related motives (e.g., appetite suppression) are just as prevalent among non-college populations. Research is warranted to examine NMUPS in a national sample of young adults to gain a more comprehensive picture of the behavior, specifically as it relates to weight loss.

### **Gaps in the Research**

Although promising, limitations of the existing research concerning NMUPS for weight loss include the exclusive use of college student samples and relatively little attention to relevant health behavior theory. Because NMUPS for weight loss is associated with poor psychosocial health and health-jeopardizing behaviors, further research is warranted to examine factors such as motivations and attitudes that are amenable to change. The paucity of literature also warrants further investigation of individuals' knowledge of risks of the medication, negative consequences associated with NMUPS, age of onset, and how they decided to try this behavior. The current study has attempted to address these gaps in the literature.

### **The Current Study**

This innovative study investigated NMUPS for weight loss in a national, young adult sample, and assessed its relation with other problematic cognitions and health behaviors,

including disordered eating. In addition, motivations and attitudes about NMUPS were evaluated, as these constructs might be most amenable to change in a future intervention. Moreover, this investigation focused on users who did not actually have a prescription but received medication from another source (i.e., non-medical use), as these individuals are typically at greater risk for adverse effects (e.g., cardiac effects; Benson, Flory, Humphreys, & Lee, 2015). Accordingly, this project's specific aims and relevant corresponding hypotheses were:

**Aim 1:** To examine the prevalence of NMUPS for weight loss in a broader, national sample of young adults. Young adults, ages 18-25, were recruited because they are the group most likely to engage in NMUPS (SAMHSA, 2012) and are also at high risk for disordered eating behaviors (Neumark-Sztainer et al., 2011).

**Aim 2:** To investigate correlates of NMUPS for weight loss, including negative consequences associated with this misuse (e.g., medical, psychological), age of onset, factors influencing participants' decision to use prescription stimulants for weight loss, knowledge about these medications (e.g., adverse effects, contraindications), medication source, and perceived effectiveness of NMUPS for weight loss.

**Aim 3:** To evaluate the utility of the TPB model to predict membership in one of three groups: individuals who have engaged in NMUPS for weight loss in the past year; individuals who have tried to lose weight via other methods in the past year; and those who have not tried to lose weight in the past year.

**Hypothesis for Aim 3:** Individuals who have engaged in NMUPS for weight loss will have more favorable attitudes toward the behavior (e.g., view the behavior as ethical), view the behavior as common, and have lower perceived behavioral control to lose weight without



the help of stimulants, as well as higher perceived behavioral control to obtain stimulant medication compared to the other two groups.

**Aim 4:** To compare the three groups on additional relevant behaviors and constructs: disordered eating behaviors, body image, other substance use, and depressive symptomatology.

**Hypothesis for Aim 4:** The three groups will differ on various constructs, such that individuals who engage in NMUPS for weight loss will have poorer body image, higher rates of disordered eating, higher rates of other substance use, and greater depressive symptomatology compared to the other two groups.

## Method

### Research Design

**Amazon's Mechanical Turk.** The current study utilized a survey aimed at assessing NMUPS for weight loss in a national sample of young adults recruited from Amazon's Mechanical Turk (MTurk), an increasingly popular online method for recruiting large samples at relatively low cost. Online data collection, particularly regarding surveys, is popular and increasingly trusted in the scientific community (e.g., Casler, Bickel, & Hackett, 2013). This data collection poses no greater concern to data integrity and quality compared with more traditional data collection methods (e.g., Casler et al., 2013). In particular, recent research has demonstrated that MTurk samples are diverse, data can be collected efficiently and inexpensively, data quality are high, and there is incentive to take the time to complete tasks satisfactorily. Further, recent literature, such as a paper by Mason and Suri (2012) has included steps and "how to" information for researchers that might be interested in utilizing

MTurk (Casler et al., 2013). MTurk has been successfully used to recruit participants for survey, longitudinal, and experimental research (Shapiro, Chandler, & Mueller, 2013).

**Brief overview.** MTurk started out in 2005 as a platform for humans to complete tasks that are extremely difficult or impossible for computers (e.g., audio transcription), and has since also become a place for scientists to conduct behavioral research (Mason & Suri, 2012). In MTurk language, this online labor market allows for employers (called requesters; e.g., researchers) to post a task, or HIT (Human Intelligence Task; e.g., online survey) for prospective employees (called workers; participants) to complete in exchange for a wage (called reward; incentive; Paolacci, Chandler, & Ipeirotis, 2010). MTurk is a crowdsourcing site with one of the largest participant pools, thus data can be obtained quickly. There is typically a stable pool of potential participants from which to recruit inexpensively (Ipeirotis, 2010; Mason & Suri, 2012). Prior research demonstrates rapid data collection rates (Mason & Suri, 2012; Shapiro et al., 2013). For example, Shapiro and colleagues (2013) recruited participants to complete a study on well-being and mental health, which included items assessing depression, anxiety, satisfaction with life, and personality. The survey took approximately 20 minutes to complete and participants were given \$0.75 as an incentive. The authors collected data from 530 participants in two days. Additionally, Ipeirotis (2010) had participants complete a survey assessing demographics and information regarding MTurk participation that took approximately 3 minutes to complete. Participants were given \$0.10 for participation. The survey was conducted over a three week period, and they collected data from 1000 MTurk participants.

**Low cost.** One main advantage of MTurk is the low cost of conducting studies (with built-in payment mechanism; Mason & Suri, 2012; Paolacci et al., 2010). Incentives can be

as low as \$0.01 and rarely exceed \$1.00 (Paolacci et al., 2010). In terms of an hourly wage, the average MTurk participant is willing to work for \$1.40 an hour (Paolacci et al., 2010). A concern often posed is that lower pay equals lower quality work, however, as will be discussed subsequently, this is typically not the case and there seems to be little to no influence of incentive on the quality of work (Mason & Suri, 2012). For example, Mason and Watts (2009) found that the number of tasks participants completed increased with greater incentive (from \$0.01 to \$0.10) but that the data quality were the same. Moreover, 69.6% of U.S. MTurk workers reported that “MTurk is a fruitful way to spend free time and get some cash (e.g., instead of watching TV)” (Ipeirotis, 2010; Mason & Suri, 2012; Paolacci et al., 2010). Many people find MTurk money as a nice way to pay for “extras” (Mason & Suri, 2012). Non-monetary motivations include: for entertainment purposes and “killing time.” Thus, most people are not trying to make a living using MTurk (less than 8% reported earning greater than \$50/week), and many are willing to participate for lower pay than they might otherwise (Mason & Suri, 2012).

***Diverse participant pool.*** Another major benefit of using MTurk is the recruitment of diverse participants. Research has shown that MTurk samples are more diverse than college student samples and that recruiting very large samples is feasible (Mason & Suri, 2012; Shapiro et al., 2013). Demographic surveys show that MTurk participants from the United States are similar to the national population, and that they are much more representative than participants from traditional university subject pools, though they are typically younger than the general population (Paolacci et al., 2010). Participants come from widespread geographic locations, are more ethnically diverse, and economically varied compared to typical academic samples (Casler et al., 2013). Moreover, MTurk samples are also more diverse in

terms of ethnicity and economic status compared with samples recruited via social media (e.g., Facebook, Twitter; Casler et al., 2013). MTurk samples are comparable in demographic characteristics to community-based samples and the relations between key demographic characteristics (e.g., age, gender) and health behaviors are similar for MTurk and community samples (Shapiro et al., 2013). In addition, the estimated prevalence of mental health problems (depression, social anxiety, substance use) found in MTurk samples closely matches those of the U.S. population (Shapiro et al., 2013).

***Good data quality.*** Prior research suggests the data quality from MTurk are high (Mason & Suri, 2012; Paolacci et al., 2010; Shapiro et al., 2013). For example, Buhrmester and colleagues (Buhrmester, Kwang, & Gosling, 2011) compared personality data collected from MTurk with data collected using the same measures in traditional settings and found concordance in findings. There was no evidence of random or otherwise problematic responding in the data collected on MTurk and the psychometric properties (e.g., test-retest correlations, coefficients alpha) of surveys using the two formats were nearly identical. Shapiro et al. (2013) also found satisfactory internal and test-retest reliability for mental health measures on MTurk. Moreover, they demonstrated criterion validity by replicating established associations between psychopathology and demographic predictors (e.g., unemployment).

Casler and colleagues (2013) took a behavioral, traditionally in-person task and converted it to an online format. Participants were shown four pairs of simple tools: one familiar object demonstrated performing its typical function and one highly similar (in appearance) novel object. In one condition, the “teaching” trials, the novel tool was named and shown performing its action. In the “non-teaching” trials, the tool was named but only

described in terms of non-functional features (e.g., color). In the in-person condition, participants were allowed to hold the tools, and in the online format, participants viewed videos with close-up shots of the objects three times. Participants were then introduced to a different, unrelated task and were asked to choose which tool they needed to complete the task. The authors then compared responses of participants recruited from MTurk, participants recruited from social media postings, and a traditional sample of college students who completed the task at a lab in-person. The expected behavioral outcome (i.e., choosing the novel tool in non-teaching trials and no preference for novel tool in teaching trials) was evident in all three recruitment conditions; thus, there was no difference in the response pattern among the groups. The authors concluded that online recruitment and testing, and MTurk in particular, can be a valid, and sometimes, even superior method than in-person data collection. Additionally, Gardner and colleagues (Gardner, Brown, & Boice, 2012) used MTurk to investigate body size estimation and dissatisfaction, and compared the results of this study to those of three prior studies. All four of these studies used the same assessment scale (i.e., Body Image Assessment Scale; Gardner, Jappe, & Gardner, 2009), but employed different methodologies (group data collected in a classroom, individually in a lab, and online via a university student web portal). Despite the different methodologies and sample characteristics, comparable values were obtained in all four studies. The authors agreed with Buhrmester et al. (2011) that quality data can be obtained inexpensively on MTurk, and that MTurk is a viable method for collecting data related to body image and other areas of psychology.

Moreover, MTurk has an approval rating system based on prior performance on other MTurk “tasks” (e.g., surveys). Poor performance can lead to “rejection” of participants’ work,

thus reducing participants' approval ratings, which can subsequently impact their participation in additional work including research studies. Further, researchers can require participants to have an approval rating above a certain threshold. This rating system serves as an incentive for participants to take tasks seriously (Casler et al., 2013). Gardner et al. (2012) also noted that some participants are interested and motivated by the tasks.

***Participant anonymity.*** An additional benefit is the anonymous nature of MTurk, where participant identities are masked from researchers thus increasing response rates (Shapiro et al., 2013). Prior work indicates that stigmatized health behaviors are more likely to be fully reported as anonymity increases and that computer assessments can be an important tool for data collection in this regard (Des Jarlais et al., 1999; Gosling, Vazire, Srivastava, & John, 2004). Studies assessing sensitive information such as substance use and eating disordered behaviors may well obtain more accurate data using web-based technologies than traditional methods.

***Creating a survey on MTurk.*** There are two ways to create HITs, or surveys, on MTurk: internal or external HITs (Mason & Suri, 2012). An internal HIT consists of using templates offered by Amazon. The development and all of the data collection are completed on Amazon's servers. These HITs can be created quickly and with little HTML programming knowledge. However, a disadvantage is that they are limited to only single-page surveys. In an external HIT, the survey and data are stored on the researcher's server. Advantages include increased control over the content and presentation of the survey (allowing multiple pages in a survey), and that the data are secure because they are not stored on Amazon's servers as in an internal HIT. (Although Amazon says they will not touch the data, this is still a privacy concern, especially for behavioral researchers examining sensitive issues.)

## **Procedure**

The current study utilized an online survey placed on Amazon's Mechanical Turk website via an external HIT. Participants were able to view the title of the survey, description, number of timeslots available, and incentive amount. Additionally, the purpose of the study, risks/benefits of participating in the research, and contact information for the Principal Investigator (PI) and the university's Institutional Review Board were provided in case the participant experienced distress as a result of the research. Participants provided informed consent by reading over the informed consent document and clicking on an "Agree" button (or "Cancel" if they did not want to participate), and then continued onto the survey. The PI frequently checked how many participants completed the survey, and subsequently approved participants' work, which enabled them to be paid.

**Security.** Data were never stored on Amazon's servers, but went directly from the participant to an external server managed by the PI. As an added security measure, the https protocol was used so that participants' responses were encrypted during the data transfer process (Mason & Suri, 2012; Schmidt, 2007).

**Quality assurance.** Although rare, some workers simply care about the money they earn and not the quality of their work (typically referred to as spammers; Mason & Suri, 2012). Additionally, there have been reports of programs (i.e., bots) that are designed to automatically complete HITs (Mason & Suri, 2012), which can negatively impact data quality. However, one safeguard from these occurrences is the inclusion of a question created to discourage spammers and bots; this type of question must require human knowledge and equal effort as additional questions in the survey, but have a verifiable answer (Mason & Suri, 2012). This/these question(s) can be used to evaluate the work. Choosing questions with

topics that are not in line with the remainder of the study, should be clear to participants (workers) that they have been included to verify the legitimacy of the other survey responses. Five such questions were included in the current study. (It was made clear in the description of the study that participants who did not answer these questions correctly, would not be paid; Mason & Suri, 2012). To ensure both maximum data retention and fairness to participants, the PI paid participants who correctly answered four out of the five quality assurance questions (e.g., paid them and kept their data even if they skipped the "What do you think the purpose of this study was?" question).

### **Participants**

**Power analysis.** As the goal of Aim 4 was to compare/contrast those who engaged in NMUPS for weight loss, those trying to lose weight via other methods, and those not trying to lose weight, power to detect various effect sizes was explored using G\*Power software. The power analysis was based on the multivariate analysis of covariance (MANCOVA; see analyses below), and the sample size required to detect a small effect size (Cohen, 1988) with a power level of .80 and alpha set at .05 to detect differences between groups for a MANCOVA was  $n = 64$  for each group. In prior work, the prevalence of NMUPS for weight loss has ranged from 4.4% to 11.7% (Jeffers & Benotsch, 2014; Jeffers et al., 2013). Taking the conservative estimate into account (especially given that NMUPS is typically higher in college/university samples), the PI planned to recruit at least 1455 ( $64/.044$ ) participants to obtain power  $\geq .80$ . Moreover, the PI aimed to recruit at least 45 additional participants (for a total  $n = 1500$ ) to account for response error, poor quality responses, and missing data. The power analysis thus facilitates detection of differences (i.e., small effect sizes) among the three groups on multiple constructs (e.g., body dissatisfaction, depressive symptomatology)



as a MANCOVA tests for multiple differences between groups. A sample size of 1500 was also sufficiently large to estimate the prevalence of NMUPS for weight loss (Aim 1). The power analysis for the MANCOVA was based on  $n = 192$  ( $n = 64 \times 3$  groups). For the structural equation model (SEM), almost the entire sample was included ( $n = 1429$ ), which is approximately seven times larger than the sample size on which the power analysis is based. The sample size for the SEM was based on the groups for the dependent variable; please see results section below. Therefore, the analyses were sufficiently powered (power  $> 0.80$ ) to detect a significant effect ( $p < 0.05$ ) for parameters with low to moderate effect sizes in all statistical models.

**Eligibility criteria and incentive.** Participants ( $n = 1526$ ; see Descriptive Results below), ages 18-25, were recruited from MTurk because they are the group most likely to engage in NMUPS (SAMHSA, 2012) and are also at high risk for disordered eating behaviors (Neumark-Sztainer et al., 2011). Participants were required to speak English and reside in the United States. Additionally, only participants who had an approval rate of 90% or greater (i.e., their work has been accepted by the requester or researcher at least 90% of the time) were allowed to participate, which is a common qualification on MTurk (Mason & Suri, 2012). They received \$0.50 for their participation as low incentive rates are common in MTurk and rarely exceed \$1.00 (Paolacci et al., 2010).

### **Measures**

The online survey allowed for branching of questions so that participants skipped questions that did not pertain to them. For example, a participant who never endorsed NMUPS was not subsequently asked about motivations for NMUPS. See Appendix A for the entire list of measures.

**Demographics.** Participants were asked their age, race/ethnicity, gender, educational status, income, height, weight, whether they had ever been prescribed a prescription stimulant medication by a doctor to treat ADHD (e.g., Adderall, Ritalin), whether they were currently being prescribed a prescription stimulant medication by a doctor to treat ADHD (e.g., Adderall, Ritalin), whether they had a current prescription for any medication for the purpose of weight loss, whether they had ever tried to lose weight, whether they were currently trying to lose weight, how often they had tried to lose weight during the last year, place of residence (state), and whether they lived in a rural versus urban area. Body mass index (BMI) was calculated based on self-reported height and weight.

**Quality assurance questions.** To discourage spammers and bots, as well as to ensure good quality data, five verifiable questions were included: “Who is the president of the United States?,” “What would you want your last meal to be?,” “Please check the number four below: 1, 2, 3, 4, 5, 6,” “While watching the television, how often have you ever had a fatal heart attack?” (Response choices were: *Never, Rarely, Sometimes, On a regular basis.*), and “What do you think the purpose of this study was? (Please make your best guess).” (Mason & Suri, 2012).

**NMUPS frequency.** NMUPS was assessed with the following question: “On how many occasions (if any) in (a) your lifetime or (b) the past 12 months have you used a prescription stimulant normally used to treat ADHD (e.g., Adderall, Ritalin, Concerta, Vyvanse), not prescribed to you?” The response scale ranged from 1 (*No occasion*) to 7 (*40 or more occasions*). This question was modeled off of other commonly used questions to assess NMUPS (Johnston, O’Malley, Bachman, & Schulenberg, 2005; McCabe & Teter, 2007; McCabe et al., 2011).

**NMUPS motivations.** Participants who had ever engaged in NMUPS answered questions concerning motivations for non-medical use including “weight loss/appetite suppression,” “to get high,” “increased energy,” and “to increase concentration.” Motivations were assessed for lifetime and past year use. Similar items have been used in prior work (Jeffers & Benotsch, 2014).

**Age of onset.** Participants who had ever engaged in NMUPS reported at what age they began using stimulants non-medically. One question also specifically asked about age of onset for those who used non-medically for weight loss.

**How they decided to try this as a weight loss strategy.** One question addressed how an individual who engaged in NMUPS for weight loss decided to try this as a weight loss strategy: a) You knew someone else who was doing it, b) You heard about the idea from the media (e.g., TV, radio, Internet), c) Someone else gave you their ADHD medication specifically for that purpose, d) Other \_\_\_\_\_.

**Medication source.** Those who had engaged in NMUPS reported on the source of the medication: a) Friends, b) Family, c) Internet, d) Stranger, e) Other. This item has been used in prior work (Jeffers & Benotsch, 2014).

**Perceived effectiveness of NMUPS for weight loss.** Participants reported on the perceived effectiveness of NMUPS for weight loss from 1 (*Not at all effective*) to 4 (*Very effective*) as done in prior work (Jeffers & Benotsch, 2014).

**Negative consequences associated with NMUPS.** Participants who had engaged in NMUPS reported on negative consequences experienced as a result. Items were adapted from a Drug Use Consequences Scale developed by Palmer et al. (Palmer, McMahon, Moreggi, Rounsaville, & Ball, 2012) and the Shortened Inventory of Problems—Alcohol and Drugs by

Blanchard and colleagues (Blanchard, Morgenstern, Morgan, Lobouvie, & Bux, 2003), which was modified from its parent scale, the Inventory of Drug Use Consequences by Miller et al. (Miller, Tonigan, & Longabaugh, 1995). Examples include: “lost a close relationship” and “continued to use despite psychological or physical consequence.” The response scale ranged from 0 (*Never*) to 7 (*40+ times in past year*).

**Medication knowledge.** This section assessed participants’ knowledge of stimulant medication including side effects and adverse consequences, contraindications, as well as sources of exposure regarding this information, modeled after Judson and Langdon (2009). Items were also developed based off of the Physicians’ Desk Reference (“Adderall XR,” 2014; “Ritalin LA,” 2014; and “Vyvanse,” 2014).

**Attitudes.** Attitudes were assessed with questions regarding beliefs about adverse health effects and ethical considerations, modeled after a sample TPB questionnaire (Ajzen, n.d.-a) and Judson and Langdon (2009). Sample items include: “I believe it is safe for people to use stimulant medication in *excess or for purposes other* than prescribed by a physician” and “It is ethical for people without diagnosed ADHD to use stimulant medication for any reason.” The response scale ranged from 1 (*Strongly Disagree*) to 7 (*Strongly Agree*).

**Subjective norms.** Subjective norms were assessed with questions regarding social acceptability of use and perceptions of close others’ beliefs regarding NMUPS. Items were modeled after a sample TPB questionnaire (Ajzen, n.d.-a) and Judson and Langdon (2009). Sample items include: “I know at least one person (e.g., family member/friend/significant other) who misuses his/her own stimulant medication for the purpose of weight loss/appetite suppression” and “I believe the use of stimulant medication by people without diagnosed

ADHD, is common.” The response scale ranged from 1 (*Strongly Disagree*) to 7 (*Strongly Agree*).

**Perceived behavioral control.** Perceived behavioral control assessed participants’ perceptions of their ability to lose weight without the use of stimulants. Items were modeled after a sample TPB questionnaire (Ajzen, n.d.-a) and Judson and Langdon (2009). Sample items include: “I feel I do not need stimulant medication *to help me lose weight/control my appetite*” and “I am confident that I could get a stimulant medication from someone if I wanted to.” The response scale ranged from 1 (*Strongly Disagree*) to 7 (*Strongly Agree*).

**Disordered eating behaviors.** The Eating Disorder Examination-Self-report Questionnaire (EDE-Q; Fairburn & Beglin, 1994), which has demonstrated validity in both men and women (Lavender, De Young, & Anderson, 2010; Rose, Vaewsorn, Rosselli-Navarra, Wilson, & Weissman, 2013), was used to measure disordered eating behavior and attitudes. It assesses engagement in binge episodes and a range of compensatory behaviors, including self-induced vomiting, laxative use, excessive exercise, and dietary restraint within the past 28 days. A sample item includes: “On how many of the past 28 days, have you had a definite fear that you might gain weight?” The response scale for this particular item ranged from 0 (*No days*) to 6 (*Every day*).

**Healthy and unhealthy weight loss behaviors.** Items from Neumark-Sztainer et al.’s (2011) Project EAT-III Survey, were used to assess both healthy (e.g., exercise, ate less sweets) and unhealthy weight loss behaviors (e.g., fasted, used diuretics) participants had engaged in over the past 12 months. An energy drink item was also added as an unhealthy weight loss behavior (Jeffers, Vatalaro-Hill, & Benotsch, 2014). The response scale ranged from 1 (*Never*) to 4 (*On a regular basis*).

**Body dissatisfaction.** The Appearance Evaluation subscale of the Multidimensional Body Self-Relations Questionnaire (MBSRQ; Brown, Cash, & Mikulka, 1990) was used to assess body dissatisfaction. The MBSRQ is a 69-item questionnaire that assesses attitudes toward the body and body image, and has demonstrated validity in both men and women samples (Cash, Morrow, Hrabosky, & Perry, 2004). The Appearance Evaluation subscale (7 items) assesses how satisfied one is with the appearance of one's body. Sample items include: "I like my looks just the way they are" and "I am physically unattractive." The response scale ranged from 1 (*Definitely disagree*) to 5 (*Definitely agree*).

**Media influence on body image.** The Sociocultural Attitudes Towards Appearance Questionnaire-3 (SATAQ-3; Thompson, van den Berg, Roehrig, Guarda, & Heinberg, 2004) is a widely used, self-report questionnaire that assesses various sociocultural influences on body image and eating disturbances, and has demonstrated both reliability and validity in studies with women and men (Karazsia & Crowther, 2008). This measure has four subscales: the internalization of media, both generally and related to athleticism; pressures; and information. However, only the pressures subscale was used in the current study as it has previously been shown to account for significantly more variance in body dissatisfaction than the other three subscales (Thompson et al., 2004). The pressures subscale assesses perceived pressures from the media to achieve the sociocultural appearance ideal. A sample item includes: "I've felt pressure from TV or magazines to have a perfect body." The response scale ranged from 1 (*Definitely disagree*) to 5 (*Definitely agree*).

**Depressive symptomatology.** The Center for Epidemiologic Studies Depression Scale-Revised (CESD-R; Eaton, Muntaner, Smith, Tien, & Ybarra, 2004) was used to assess depressive symptomatology. This is a valid and reliable instrument that has wide

applicability in the general population (Van Dam & Earleywine, 2011). A sample item includes: “Nothing made me happy.” The response scale ranged from 0 (*Not at all or less than 1 day*) to 4 (*Nearly every day for 2 weeks*).

**Other substance use.** Participants reported on other recreational drugs and substances used within the past year. Similar items have shown utility in prior work (Benotsch, Perschbacher Lance, Nettles, & Koester, 2012).

### **Data Analysis**

All data were analyzed using SPSS 22, except for the SEM analysis, which was conducted using Mplus version 7.31.

**First aim.** The first aim of this study was to examine the prevalence of NMUPS for weight loss in a broader, national sample of young adults. Frequency rates were calculated to assess the number and percentage of participants who had ever engaged in NMUPS for weight loss (i.e., lifetime users). Additionally, lifetime frequency rates were calculated to assess the percentage of participants who had engaged in NMUPS for other motivations. The same frequency statistics were conducted to assess past year use.

**Second aim.** The second aim of this study was to investigate correlates of NMUPS for weight loss, including negative consequences associated with this misuse, age of onset, factors influencing participants’ decision to use prescription stimulants for weight loss, knowledge about these medications, medication source, and perceived effectiveness of NMUPS for weight loss. Frequency statistics were used to calculate the types of negative consequences experienced, how individuals decided to try NMUPS for weight loss, amount of knowledge concerning the medication, medication source, and perceived effectiveness. Descriptive statistics (mean, range) were used to describe the age of onset for the behavior.

**Third aim.** The third aim of this study was to evaluate the utility of the TPB model to predict membership in one of three groups: individuals who have engaged in NMUPS for weight loss in the past year; individuals who have tried to lose weight via other methods in the past year; and those who have not tried to lose weight in the past year. However, given that the outcome was multinomial (i.e., three weight loss groups), Mplus would not provide the desired fit statistics. Thus, to obtain fit statistics, participants who had not tried to lose weight in the past year were removed from the analysis as they had not endorsed one of the main variables of interest, and as such, are a less interesting group. A SEM with weighted least squares means and variance adjusted (WLSMV) estimation was conducted to examine the overall fit of attitudes toward NMUPS for weight loss; social norms regarding NMUPS for weight loss; and perceived behavioral control to lose weight without stimulants, as well as to obtain stimulant medication, as predictors of engaging in past year NMUPS for weight loss.

SEM allows for the estimation of latent variables (e.g., attitudes) compared to observed variables only, thus eliminating random error (Hays, Revicki, & Coyne, 2005). SEM also allows comparisons between an observed variance/covariance matrix (i.e., the current data) and a hypothesized or implied variance/covariance matrix (i.e., TPB), to determine how well the theoretical model fits the given data. The chi-square test and the root mean square error of approximation (RMSEA) were used to assess the model fit. A  $p > .05$  for the chi-square test and a  $RMSEA \leq .06$  were used to indicate a good model (Hu & Bentler, 1999; Tucker & Lewis, 1973).

Questionnaire items related to the TPB were used as indicators to examine the latent constructs in the SEM. Because some of these items were developed for the current study (a



standard practice for TPB measures; Ajzen, n.d.-b), factor analysis was performed to test that items adequately fit their respective constructs and to remove any poorly fitting items prior to fitting the SEM. Further, examining the amount of predictive variance of each latent construct in the model allows for testing of the hypothesis for aim 3: Individuals who have engaged in NMUPS for weight loss will have more favorable attitudes toward the behavior (e.g., view the behavior as ethical), view the behavior as common, and have lower perceived behavioral control to lose weight without the help of stimulants, as well as higher perceived behavioral control to obtain stimulant medication compared to the other group.

**Fourth aim.** The fourth aim of this study was to compare the three groups on additional relevant behaviors and constructs: disordered eating behaviors, body image, other substance use, and depressive symptomatology. A MANCOVA was conducted to compare the three groups on the following continuous dependent variables: body dissatisfaction, media influence on body image, eating attitudes, and depressive symptomatology. The following covariates were included: gender, age, race/ethnicity, educational status, and BMI. Although results have been inconsistent, NMUPS for weight loss has been associated with being White and having a lower BMI (Jeffers & Benotsch, 2014; Jeffers et al., 2013). Chi-square analyses were also performed to compare the two weight loss groups on the following dichotomous outcomes: disordered eating behaviors and engagement in healthy and unhealthy weight loss behaviors. A chi-square analysis was also performed to compare the three groups on other substance use. Bonferroni post-hoc tests were conducted if significant differences were found between groups. Conducting the MANCOVA and chi-square analyses allowed for the testing of significant differences between group means, thus allowing for the testing of the hypothesis for aim 4: The three groups will differ on various

constructs, such that individuals who engage in NMUPS for weight loss will have poorer body image, higher rates of disordered eating, higher rates of other substance use, and greater depressive symptomatology compared to the other two groups.

## Results

### Descriptive Results

Data were collected from September 2014 thru February 2015. A total of 1856 surveys were submitted on MTurk. Three-hundred and thirty entries were removed from analyses due to one of five reasons: the participant 1) was outside of the 18-25 year age range (or missing age; age range from 18-70 years), 2) voluntarily completed the survey twice, 3) incorrectly answered two or more of the quality assurance questions, 4) encountered a technical error where the same survey was submitted more than once, or 5) resided outside of the United States. See Table 1. (Participants who were outside of the age range or resided outside of the United States were allowed to complete the survey due to some errors with initial implementation of the MTurk survey.)

Table 1.

*Reasons entries were deleted from MTurk.*

Reason Deleted	<i>n</i>	%
Outside of Age Range (or Missing Age)	177	9.5
Voluntarily Completed Survey Twice	109	5.9
Quality Assurance Questions	37	2.0
Duplicate Survey (Due to Technical Error)	4	0.22
Location	3	0.16

$n = 1856$ .

The total usable  $n = 1526$ . The mean age of the participants was 22.32 years ( $SD = 2.05$ ) and the sample consisted of 955 females (62.6%), 538 males (35.2%), and 33 transgender (2.2%) individuals. The majority of the sample was White (74.4%), followed by African-American (8.5%), Hispanic/Latino (6.9%), Asian-American (6.7%), other race/ethnicity (2.6%), and Native American participants (0.9%). Participants' BMI ranged from 12.75 to 68.52 ( $M = 26.07$ ,  $SD = 7.24$ ), indicating a slightly overweight sample. Approximately 17.0% of individuals reported having a high school diploma/GED or less than a high school education. The remaining 83.0% had completed at least one year of college/university or higher (e.g., had a four-year college degree). A plurality of participants reported a total household income of \$0-25,999 (37.6%) for the previous year, followed by \$26,000-51,999 (30.6%), more than \$75,000 (12.9%), \$52,000-74,999 (12.4%), and 6.5% reported that they "didn't know/declined to say." Approximately 15.0% of participants reported ever being prescribed a prescription stimulant medication by a doctor to treat ADHD. Based on data from the 2010 census (U.S. Census Bureau, 2014a), participants' state residencies were highly representative of the U.S. population ( $r = .97$ ,  $p < .001$ ). To calculate this statistic, states were listed by population rank and then participant frequencies from the current dataset were entered to correspond with the state rankings. Next, a correlation was run between participant home states and the 2010 census data on state populations for the U.S. The state represented the most was California ( $n = 154$ ) and the least represented state was Wyoming ( $n = 1$ ). The majority of participants were from urban (72.5%) versus rural (27.5%) areas.

### **First Aim**

Approximately one-third (33.1%) of participants reported that they had ever engaged in NMUPS ( $n = 507$ ), with 51.0% of these individuals reporting past year use ( $n = 258$ ). Of those reporting lifetime NMUPS, 36.2% of participants reported engaging in NMUPS for weight loss ( $n = 184$ ), or 12.1% of the total sample. Of those reporting NMUPS for weight loss, 48.4% reported past year use ( $n = 89$ ). The top five reported motivations for engaging in NMUPS in one's lifetime were: to increase concentration (77.4%), to increase energy (77.0%), as a study aid (72.3%), to increase alertness (67.5%), and to get high (57.0%). Weight loss was the twelfth most commonly-reported lifetime motivation. See Table 2. The top five reported motivations for past year NMUPS were: to increase concentration (73.7%), to increase energy (72.8%), to increase alertness (68.0%), as a study aid (66.0%), and to get high (53.1%). Weight loss was the eleventh most commonly-reported past year motivation. See Table 3.

Table 2.

*Frequencies of NMUPS motivations—lifetime.*

<b>NMUPS Motivation— Lifetime</b>	<b><i>n</i></b>	<b>Percentage of Those Reporting NMUPS</b>	<b>Percentage of Total <i>n</i></b>
To increase concentration	393	77.4	25.8
Increased energy	389	77.0	25.5
Study aid	365	72.3	23.9
Because it helps increase my alertness	340	67.5	22.3
To get high	289	57.0	18.9
Because of experimentation	286	56.9	18.7
To try something new	274	54.0	18.0
To reduce anxiety	262	52.1	17.2
Pain relief	218	43.1	14.3
Coping with a difficult problem	203	40.2	13.3

<b>NMUPS Motivation— Lifetime</b>	<b><i>n</i></b>	<b>Percentage of Those Reporting NMUPS</b>	<b>Percentage of Total <i>n</i></b>
To forget my worries	197	39.4	12.9
Weight loss/appetite suppression	184	36.2	12.1
To feel more self- confident	177	35.0	11.6
To fit in and not be excluded	104	20.8	6.8
Because it's safer than street drugs	93	18.4	6.1
Sexual stimulant	92	18.2	6.0
Because it counteracts the effects of other drugs	90	17.8	5.9
Because I'm addicted	44	8.8	2.9

*Note.* *n* ranges from 500-508.

Table 3.

*Frequencies of NMUPS motivations—past year.*

<b>NMUPS Motivation— Past Year</b>	<b><i>n</i></b>	<b>Percentage of Those Reporting Past Year NMUPS</b>	<b>Percentage of Total <i>n</i></b>
To increase concentration	188	73.7	12.3
Increased energy	185	72.8	12.1
Because it helps increase my alertness	172	68.0	11.3
Study aid	167	66.0	10.9
To get high	136	53.1	8.9
To reduce anxiety	125	49.2	8.2
To try something new	95	37.5	6.2
Because of experimentation	93	36.9	6.1
Coping with a difficult problem	93	36.8	6.1
To feel more self- confident	92	36.5	6.0
To forget my worries	91	35.8	6.0

NMUPS Motivation— Past Year	<i>n</i>	Percentage of Those Reporting Past Year NMUPS	Percentage of Total <i>n</i>
Weight loss/appetite suppression	89	35.2	5.8
Pain relief	87	34.7	5.7
Because it counteracts the effects of other drugs	54	21.2	3.5
Because it's safer than street drugs	51	20.1	3.3
Sexual stimulant	47	18.6	3.1
To fit in and not be excluded	44	17.3	2.9
Because I'm addicted	29	11.4	1.9

Note. *n* ranges from 251-256.

### Second Aim

Female (13.6%) and transgender participants (24.2%) were more likely than males (8.6%) to report engaging in NMUPS for weight loss,  $\chi^2(2) = 13.04, p = .001$ . White and non-White participants reported similar rates of the behavior with 12.6% of Whites reporting use and 10.5% of non-Whites reporting use,  $\chi^2(1) = 1.23, p = .268$ . Interestingly, there were significant differences in education, with 15.8% of participants with a high school diploma/GED or less than a high school education reporting use and 11.3% of participants who had completed at least one year of college/university or higher reporting use,  $\chi^2(1) = 4.07, p = .044$ . Additionally, there were significant differences in age between participants reporting NMUPS for weight loss ( $M = 22.67, SD = 1.96$ ) and those who did not ( $M = 22.28, SD = 2.06$ ),  $t(1524) = -2.44, p = .015$ . There were also significant differences in BMI between participants reporting NMUPS for weight loss ( $M_{Rank} = 832.79; M = 26.78, SD = 6.61$ ) and those who did not ( $M_{Rank} = 749.97; M = 25.97, SD = 7.32$ ),  $z = -2.40, p = .016$ .

Additionally, there were slight regional differences among individuals reporting this

behavior: South—32.6%, Northeast—26.6%, West—21.7%, and Midwest—19.0%, with slightly higher rates in the South and Northeast regions. However, there was only a significant difference in reporting for the Northeast region, with 15.6% of individuals living in the Northeast region reporting use, compared with 11.1% of individuals living in other U.S. regions reporting use,  $\chi^2(1) = 4.69, p = .030$ . NMUPS for weight loss did not differ between participants residing in rural (11.0%) versus urban (12.5%) areas,  $\chi^2(1) = 0.68, p = .411$ .

Participants reported that they started engaging in NMUPS for weight loss ranging from 12 to 24 years ( $M = 18.16, SD = 2.71$ ). Around 8.5% of participants reported starting between the ages of 12-14 (approximate age during middle school), 33.4% reported starting between the ages of 15-17 (approximate age during high school), and 58.2% reported starting at age 18 and over. Participants also reported that they decided to try a prescription stimulant without a doctor's orders specifically for the purpose of weight loss/appetite suppressive effects due to: knowing someone else who was doing it (48.9%), someone else giving his/her ADHD medication specifically for that purpose (23.4%), hearing about the idea from the media (e.g., TV, radio, Internet; 19.7%), and for other reasons not listed (8.0%). A vast majority of participants reported receiving their stimulant medications from friends (82.1%), followed by family (10.9%), the Internet (3.3%), a stranger (2.2%), and other sources (1.6%). Interestingly, one participant reported getting the medication from a "teenager whose house I was watching while they were away." In terms of effectiveness, many participants reported that engaging in NMUPS for weight loss was "mildly effective" (43.1%), followed by "very effective" (21.3%), "somewhat effective" (18.1%), and "not at all effective" (17.6%).

Individuals also reported a number of consequences associated with NMUPS for weight loss. The top five commonly-reported past year consequences were: enjoyed using

stimulants (54.3%), lost weight or not eaten properly (52.0%), felt bad physically (46.6%), felt guilty or ashamed (38.8%), and done impulsive things you later regretted (38.3%). See Table 4. The top five commonly-reported consequences experienced in one's lifetime, but not in the past year, were: lost weight or not eaten properly (33.9%), enjoyed using stimulants (33.0%), taken drugs in larger amounts or over a longer period of time than planned (27.2%), felt bad physically (27.1%), and done impulsive things you later regretted (26.9%). See Table 5.

Table 4.

*Frequencies of negative consequences associated with NMUPS for weight loss—past year consequences.*

<b>Negative Consequences—Past Year</b>	<b><i>n</i></b>	<b>Percentage of Those Reporting NMUPS for Weight Loss</b>
Enjoyed using drugs	99	54.3
Lost weight or not eaten properly because of my stimulant use	95	52.0
Felt bad physically	84	46.6
Felt guilty or ashamed	71	38.8
Done impulsive things you later regretted	70	38.3
Spent too much money or lost a lot of money	68	37.2
Spent a significant amount of time thinking about, looking for, or using	67	36.6
Taken drugs in larger amounts or over longer period of time than you planned	67	36.3
Need more drugs to get the same effect or don't get the same effect with the usual amount	66	36.1
Wanted or tried to limit, cut down, or stop	62	33.7



<b>Negative Consequences—Past Year</b>	<b><i>n</i></b>	<b>Percentage of Those Reporting NMUPS for Weight Loss</b>
Failed to do what was expected of you	61	33.5
Been unhappy because of my stimulant use	59	32.8
Lost interest in activities or hobbies	59	32.0
Missed school, work, or activities with friends	56	30.6
Said or done something embarrassing	53	29.0
Continued to use despite psychological or physical consequence	50	27.4
Performed poorly at school or work	46	25.0
While using stimulants I said harsh or cruel things to someone	45	24.9
Take more to avoid or reduce withdrawal	41	22.2
My personality has changed for the worse	32	17.4
Needed medical treatment	23	12.5
Gotten into a physical fight	22	11.9
Lost a close relationship	22	11.9
Gotten into legal trouble or arrested	21	11.7
Had to go to the Emergency Room (ER)	18	9.7
Been suspended, expelled from school, or fired from work	14	7.5

*Note.* *n* ranges from 181-184.

Table 5.

*Frequencies of negative consequences associated with NMUPS for weight loss—lifetime but not past year consequences.*

<b>Negative Consequences— Lifetime But Not Past Year</b>	<b><i>n</i></b>	<b>Percentage of Those Reporting NMUPS for Weight Loss</b>
Lost weight or not eaten properly because of my stimulant use	62	33.9
Enjoyed using drugs	60	33.0
Taken drugs in larger amounts or over longer period of time than you planned	50	27.2
Felt bad physically	49	27.1
Done impulsive things you later regretted	49	26.9
Said or done something embarrassing	49	26.8
Felt guilty or ashamed	48	26.4
Been unhappy because of my stimulant use	46	25.6
Need more drugs to get the same effect or don't get the same effect with the usual amount	45	24.6
Lost a close relationship	44	24.2
My personality has changed for the worse	44	23.9
Continued to use despite psychological or physical consequence	43	23.5
Spent a significant amount of time thinking about, looking for, or using	42	23.0
Wanted or tried to limit, cut down, or stop	42	22.8
Failed to do what was expected of you	41	22.5
Spent too much money or lost a lot of money	39	21.4
While using stimulants I said harsh or cruel things to someone	38	21.0
Missed school, work, or activities with friends	36	19.7

<b>Negative Consequences— Lifetime But Not Past Year</b>	<b><i>n</i></b>	<b>Percentage of Those Reporting NMUPS for Weight Loss</b>
Lost interest in activities or hobbies	35	19.0
Performed poorly at school or work	32	17.5
Take more to avoid or reduce withdrawal	32	17.4
Gotten into a physical fight	27	14.7
Been suspended, expelled from school, or fired from work	24	13.2
Had to go to the Emergency Room (ER)	20	10.9
Gotten into legal trouble or arrested	19	10.5
Needed medical treatment	15	8.2

*Note.* *n* ranges from 181-184.

Individuals also answered questions concerning their knowledge of stimulant medications. On a scale from “Strongly Disagree” to “Strongly Agree,” 76.5% of participants reported that they agreed or strongly agreed with the statement: “I consider myself to be knowledgeable about the side effects associated with the use of stimulant medication normally used to treat ADHD (e.g., Adderall, Ritalin, Vyvanse).” See Table 6. The greatest sources of exposure to information about side effects associated with the use of ADHD medication include: the Internet (73.9%), other students/friends (46.7%), and in class (33.7%). See Table 7. When presented with symptoms that either were or were not side effects, the top five items that were answered correctly were: nighttime wakefulness (insomnia) and reductions in appetite with 90.7% of individuals answering both correctly, increase in heart rate (85.8%), dry mouth (73.9%), headache and anxiety with 72.3% of participants answering both correctly, and tachycardia (excessively rapid heartbeat; 70.1%).

The total mean score of side effects that were answered correctly was  $M = 60.33\%$ . There was a moderate correlation between participants' confidence in their knowledge about side effects and their actual knowledge ( $r = .28, p < .001$ ). See Table 8. When presented with both true and false contraindications, the top five items that were answered correctly were: history of drug abuse (82.1%), serious cardiac (heart) problems (76.4%), during or within 14 days following MAOI (antidepressant medication) use (49.5%), hyperthyroidism (43.5%), and influenza (35.0%). The total mean score of contraindications that were answered correctly was  $M = 42.88\%$ . See Table 9.

Table 6.

*Extent to which individuals consider themselves knowledgeable about side effects of stimulant medications (of those reporting NMUPS for weight loss).*

<b>Knowledgeable of Side Effects</b>	<b><i>n</i></b>	<b>Percentage</b>
Strongly Disagree	7	3.8
Disagree	21	11.4
Neither	15	18.2
Agree	90	49.2
Strongly Agree	50	27.3

$n = 183$ .

Table 7.

*Frequencies— sources of exposure to information about side effects associated with use of ADHD medication (of those reporting NMUPS for weight loss).*

Source	<i>n</i>	Percentage
Internet	136	73.9
Other students/friends	86	46.7
In class	62	33.7
Healthcare facility pamphlet	45	24.5
Television	40	21.7
Books	24	13.0
None	21	11.4
Parents	20	10.9
Magazine	18	9.8
Other	15	8.2
Information session	11	6.0

*n* = 184.

Table 8.

*Frequencies—knowledge about medication: Side effects (of those reporting NMUPS for weight loss).*

Side Effect	Correct ( <i>n</i> ; percentage)	Incorrect ( <i>n</i> ; percentage)	Don't Know ( <i>n</i> ; percentage)
<i>Nighttime wakefulness (insomnia)</i>	166 (90.7)	12 (6.6)	5 (2.7)
<i>Reductions in appetite</i>	166 (90.7)	10 (5.5)	7 (3.8)
<i>Increase in heart rate</i>	157 (85.8)	15 (8.2)	11 (6.0)

<b>Side Effect</b>	<b>Correct (n; percentage)</b>	<b>Incorrect (n; percentage)</b>	<b>Don't Know (n; percentage)</b>
<i>Dry mouth</i>	136 (73.9)	22 (12.0)	26 (14.1)
<i>Headache</i>	133 (72.3)	28 (15.2)	23 (12.5)
<i>Anxiety</i>	133 (72.3)	31 (16.8)	20 (10.9)
<i>Tachycardia (excessively rapid heartbeat)</i>	129 (70.1)	38 (20.7)	17 (9.2)
<i>Agitation</i>	124 (67.4)	39 (21.2)	21 (11.4)
<i>Increase in blood pressure</i>	123 (67.2)	29 (15.8)	31 (16.9)
<i>Dizziness</i>	111 (60.7)	46 (25.1)	26 (14.2)
<i>Adverse psychiatric problems</i>	107 (58.2)	41 (22.3)	36 (19.6)
<i>Cardiovascular adverse reactions</i>	99 (54.1)	47 (25.7)	37 (20.2)
Sore throat	93 (50.5)	33 (17.9)	58 (31.5)
Vomiting	78 (42.6)	62 (33.9)	43 (23.5)
<i>Abdominal pain</i>	78 (42.4)	63 (34.2)	43 (23.4)
<i>Diarrhea</i>	58 (31.5)	72 (39.1)	54 (29.3)
<i>Sudden death</i>	52 (28.4)	84 (45.9)	47 (25.7)
Nausea	51 (27.9)	102 (55.7)	30 (16.4)

Note. n ranges from 183-184. Items listed in italics are possible side effects.

Table 9.

Frequencies—knowledge about medication: Contraindications (of those reporting NMUPS for weight loss).

<b>Contraindication</b>	<b>Correct (n; percentage)</b>	<b>Incorrect (n; percentage)</b>	<b>Don't Know (n; percentage)</b>
<i>History of drug abuse</i>	151 (82.1)	16 (8.7)	17 (19.2)
<i>Serious cardiac (heart) problems</i>	139 (76.4)	22 (12.1)	21 (11.5)
<i>During or within 14 days following MAOI (antidepressant medication) use</i>	91 (49.5)	24 (13.0)	69 (37.5)

<b>Contraindication</b>	<b>Correct (<i>n</i>; percentage)</b>	<b>Incorrect (<i>n</i>; percentage)</b>	<b>Don't Know (<i>n</i>; percentage)</b>
<i>Hyperthyroidism</i>	80 (43.5)	31 (16.8)	73 (39.7)
Influenza	64 (35.0)	26 (14.2)	93 (50.8)
Crohn's disease	39 (21.3)	35 (19.1)	109 (59.6)
Migraines	36 (19.7)	68 (37.2)	79 (43.2)
<i>Glaucoma</i>	33 (18.1)	53 (29.1)	96 (52.7)

*Note.* *n* ranges from 182-184. Items listed in italics are possible contraindications.

### **Third Aim**

Factor analysis was performed to test that questionnaire items related to the TPB adequately fit their respective constructs and to remove any poorly fitting items. The extraction technique performed in this study was principal axis factoring, and promax rotation was utilized as the rotation technique given that factors were expected to correlate. To determine the number of factors to be retained, the Guttman-Kaiser rule (i.e., retain factors with an eigenvalue larger than 1), scree plots, percentage of variance accounted for by the factors, and congruency of items with the theory were considered.

The attitudes construct loaded onto three separate factors with an eigenvalue  $\geq 1$ . The first factor included five indicators of attitudes [eigenvalue = 4.33,  $R^2 = .48$ ;  $\alpha = .88$ ]. The second factor included two indicators of attitudes [eigenvalue = 1.37,  $R^2 = .15$ ;  $\alpha = .86$ ]. Finally, the third factor included two indicators of attitudes [eigenvalue = 1.28,  $R^2 = .14$ ;  $\alpha = .84$ ]. See Table 10 for the factor loadings of these items.

Table 10.

*Factor loadings for the attitudes items.*

<b>Attitude Items</b>	<b>Factor Loading (Factor 1)</b>	<b>Factor Loading (Factor 2)</b>	<b>Factor Loading (Factor 3)</b>	<b>Mean (SD)</b>

Attitude Items	Factor Loading (Factor 1)	Factor Loading (Factor 2)	Factor Loading (Factor 3)	Mean (SD)
1. It is ethical for people without diagnosed ADHD to use stimulant medication for any reason.	.739	-.051	.002	2.91 (1.68)
2. It is ethical for people diagnosed with ADHD to use stimulant medication in excess or for purposes other than prescribed by a physician.	.764	.068	.014	2.65 (1.596)
3. It is ethical for people with diagnosed ADHD to use stimulant medication to lose weight/control appetite.	.892	-.043	-.058	2.84 (1.64)
4. It is ethical for people without diagnosed ADHD to use stimulant medication to lose weight/control appetite.	.886	-.045	-.021	2.67 (1.67)
5. I believe it is safe for people to use stimulant medication in excess or for purposes other than prescribed by a physician.	.523	.188	.148	2.17 (1.48)
6. I am concerned that taking stimulant medication in excess or for purposes other than prescribed by a physician will adversely affect a person's health.	-.063	1.022	-.011	5.46 (1.46)



Attitude Items	Factor Loading (Factor 1)	Factor Loading (Factor 2)	Factor Loading (Factor 3)	Mean (SD)
7. I am concerned that taking stimulant medication to lose weight/control appetite will adversely affect a person's health.	.060	.746	-.022	5.38 (1.47)
8. I feel that the benefits of using a prescription stimulant medication without a doctor's orders for any reason outweigh the potential risks.	-.020	-.017	.878	3.10 (1.86)
9. I feel that the benefits of someone misusing their own prescription stimulant medication for any reason outweigh the potential risks.	.013	-.016	.846	3.02 (1.84)

$n = 1422$ .

Similarly, a factor analysis was performed on the subjective norms items, and four separate factors emerged with an eigenvalue  $\geq 1$ . The first factor included four indicators of subjective norms [eigenvalue = 3.18,  $R^2 = .32$ ;  $\alpha = .83$ ]. The second factor included two indicators of subjective norms [eigenvalue = 2.02,  $R^2 = .20$ ;  $\alpha = .95$ ]. The third factor included two indicators of subjective norms [eigenvalue = 1.47,  $R^2 = .15$ ;  $\alpha = .85$ ]. Finally, the fourth factor also included two indicators of subjective norms [eigenvalue = 1.396,  $R^2 = .14$ ;  $\alpha = .80$ ]. See Table 11 for the factor loadings of these items.

Table 11.

*Factor loadings for the subjective norms items.*

Subjective Norms Items	Factor Loading (Factor 1)	Factor Loading (Factor 2)	Factor Loading (Factor 3)	Factor Loading (Factor 4)	Mean (SD)
1. It is socially acceptable for people without diagnosed ADHD to use stimulant medication for any reason.	.790	.079	-.130	.123	3.50 (1.78)
2. It is socially acceptable for people diagnosed with ADHD to use stimulant medication in excess or for purposes other than prescribed by a physician.	.789	.066	-.094	.081	3.37 (1.74)
3. My friends/family/significant other believe that it is ok for people <i>without</i> diagnosed ADHD to use stimulant medication for any reason.	.711	-.071	.122	-.083	2.98 (1.74)
4. My friends/family/significant other believe that it is ok for people diagnosed with ADHD to use medication in excess or for purposes other than prescribed.	.688	-.093	.156	-.139	2.88 (1.67)
5. I know at least one person (e.g., family member/friend/significant other) who uses stimulant medications for the purpose of weight loss/appetite suppression without a doctor's prescription.	-.026	.033	.851	.057	3.28 (2.21)

Subjective Norms Items	Factor Loading (Factor 1)	Factor Loading (Factor 2)	Factor Loading (Factor 3)	Factor Loading (Factor 4)	Mean (SD)
6. I know at least one person (e.g., family member/friend/significant other) who misuses his/her own stimulant medication for the purpose of weight loss/appetite suppression.	.029	.017	.834	.014	3.09 (2.11)
7. I value my friends'/ family's/significant other's opinion on whether or not it is ok for people with a prescription to use the stimulant medication in excess or for purposes other than prescribed.	.014	.947	.024	-.021	4.53 (1.69)
8. I value my friends'/ family's/significant other's opinion on whether or not it is ok for people without a prescription to use the stimulant medication for any reason.	-.012	.954	.020	-.018	4.499 (1.695)
9. I believe the use of stimulant medication by people without diagnosed ADHD, is common.	.014	-.024	-.016	.841	5.33 (1.46)
10. I believe the use of stimulant medication by people diagnosed with ADHD in excess or for purposes other than prescribed, is common.	-.011	-.021	.092	.768	5.01 (1.46)

$n = 1411$ .

Finally, a factor analysis was performed on the perceived behavioral control items, and two separate factors emerged with an eigenvalue  $\geq 1$ . The first factor included two indicators of perceived behavioral control [eigenvalue = 1.87,  $R^2 = .47$ ;  $\alpha = .90$ ]. The second factor also included two indicators of perceived behavioral control [eigenvalue = 1.62,  $R^2 = .41$ ;  $\alpha = .80$ ]. See Table 12 for the factor loadings of these items. See Table 13 for means and standard deviations of each latent construct.

Table 12.

*Factor loadings for the perceived behavioral control items.*

Perceived Behavioral Control Items	Factor Loading (Factor 1)	Factor Loading (Factor 2)	Mean (SD)
1. I feel I do not need stimulant medication to help me lose weight/control my appetite.	-.033	-.819	5.70 (1.71)
2. I am confident that I could get a stimulant medication from someone if I wanted to.	-.905	.019	4.89 (1.93)
3. I feel I could lose weight successfully without the help of a stimulant medication.	.034	-.812	5.74 (1.60)
4. I know people that would give/sell me a prescription stimulant medication if I wanted it.	-.913	-.018	4.71 (2.09)

$n = 1504$ .

Table 13.

*Means and standard deviations of the separate factors of the latent constructs.*

Construct	Factor	Mean (SD)
Attitudes	1	13.25 (6.66)

Construct	Factor	Mean (SD)
	2	5.16 (2.76)
	3	6.16 (3.45)
Subjective Norms	1	12.70 (5.63)
	2	8.99 (3.31)
	3	6.38 (4.03)
	4	10.31 (2.70)
Perceived Behavioral Control	1	9.56 (3.85)
	2	4.55 (3.02)

*Note.* *n* ranges from 1458-1519.

**Structural equation modeling.** The third aim of this study was to examine NMUPS for weight loss and how this behavior relates to TPB constructs (latent variables), as well as to use this model to predict membership in one of two groups: individuals who have engaged in NMUPS for weight loss in the past year and individuals who have tried to lose weight via other methods in the past year. Thus, the dependent variable for the SEM consisted of two groups: 1) those reporting past year NMUPS for weight loss (and possibly other weight loss behaviors;  $n = 89$ ), and 2) those reporting trying to lose weight via other methods (and not endorsing NMUPS for weight loss;  $n = 1340$ ) in the past year. See Table 14 for frequencies of four possible weight loss groups.

Table 14.

*Original frequencies of weight loss behavior groups (past year).*

<b>Weight Loss Behavior Group</b>	<b><i>n</i></b>	<b>%</b>
No Weight Loss Behaviors	97	6.4
Other Weight Loss Behaviors, But No NMUPS	1340	87.8
No Other Weight Loss Behaviors, NMUPS Only	1	0.1
Other Weight Loss Behaviors and NMUPS	88	5.8

$n = 1526$ .

A SEM with WLSMV estimation was conducted to examine the overall fit of attitudes toward NMUPS for weight loss; social norms regarding NMUPS for weight loss; and perceived behavioral control to lose weight without stimulants, as well as to obtain stimulant medication, as predictors of engaging in past year NMUPS for weight loss.

Separate latent constructs were estimated for each of the TPB constructs, and were correlated with each other in the final model. The model provided adequate overall fit to the data ( $\chi^2 = 1273.88$ ,  $df = 208$ ,  $p < .001$ ,  $RMSEA = .058$  [90% CI = .055, .061]). Indeed, two of the four subjective norms factors were significantly associated with NMUPS for weight loss, indicating that those with greater subjective norms regarding knowing at least one person who uses stimulant medication for the purpose of weight loss/appetite suppression ( $\beta = .272$ ,  $p < .001$ ), in addition to believing that NMUPS is common ( $\beta = .196$ ,  $p < .05$ ) were more likely to report NMUPS for weight loss. Further, both perceived behavioral control factors were significantly associated with NMUPS for weight loss, indicating that those with lower perceived behavioral control such that they were less likely to feel that they could lose weight without the help of a stimulant medication ( $\beta = -.322$ ,  $p < .001$ ), as well as feeling confident that they could obtain a stimulant medication from someone if they wanted to ( $\beta$

= .172,  $p < .05$ ) were more likely to report NMUPS for weight loss. Results from the SEM are presented in Figure 1. Additionally, the model indicated many significant correlations among the separate factors of the three latent predictors of NMUPS. See Table 15 for correlations.

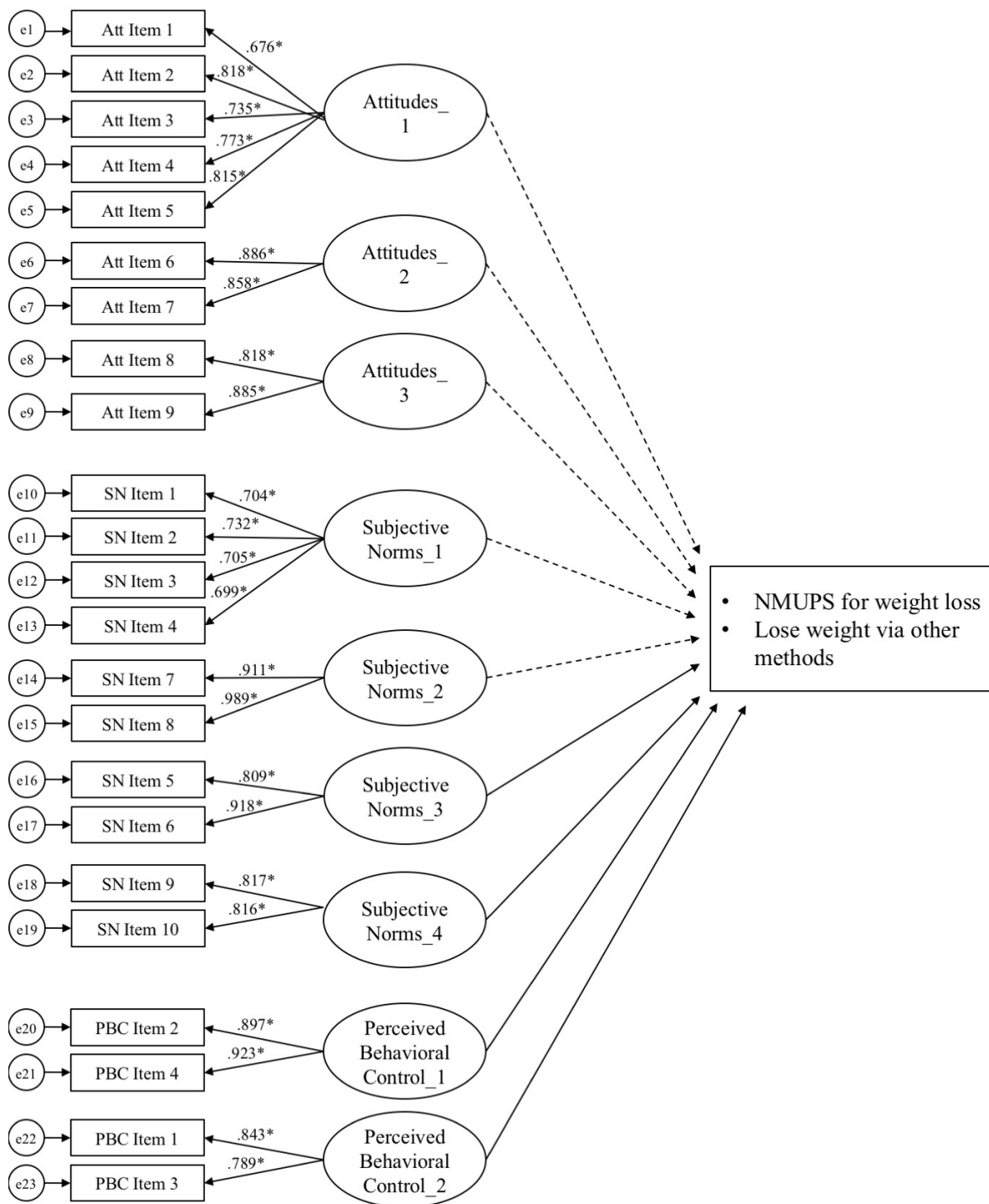


Figure 1. Results for the structural equation model.  $\chi^2(208) = 1273.88, p < .001$ . Root Mean Square Error of Approximation = .058. Note. All coefficients are standardized. Also, \* $p$ -value < .001. Dotted line = not significant. Att = Attitudes. SN = Subjective Norms. PBC =



Perceived Behavioral Control. The construct followed by an underscore and number represents the factor number for that construct.

Table 15.

*Correlations among the separate factors of the latent constructs.*

Latent Construct	Att_1	Att_2	Att_3	Norms_1	Norms_2	Norms_3	Norms_4	PBC_1	PBC_2
Att_1	1								
Att_2	-.39**	1							
Att_3	.41**	-.22**	1						
Norms_1	.49**	-.21**	.28**	1					
Norms_2	-.02	.13**	-.01	-.03	1				
Norms_3	.23**	-.14**	.16**	.31**	.02	1			
Norms_4	.00	.33**	.04	.21**	.09**	.15**	1		
PBC_1	.13**	.01	.13**	.32**	.02	.32**	.36**	1	
PBC_2	-.28**	.38**	-.19**	-.16**	.12**	-.24**	.14**	.05*	1

*Note.*  $n$  ranges from 1411-1519. \*\*  $p < .001$ . \*  $p < .05$ . Att = Attitudes. PBC = Perceived Behavioral Control. The construct followed by an underscore and number represents the factor number for that construct.

There were significant correlations among the three attitude factors, indicating that those who were more likely to feel that engaging in NMUPS is ethical and safe were less likely to be concerned that NMUPS would adversely affect a person's health ( $r = -.39, p < .001$ ), in addition to feeling the benefits of NMUPS outweigh the potential risk ( $r = .41, p < .001$ ). Further, those who were less likely to be concerned that NMUPS would adversely affect a person's health were more likely to feel the benefits of NMUPS outweigh the potential risk ( $r = -.22, p < .001$ ).

There were also many significant correlations among the four subjective norms factors, indicating that those who perceived greater social acceptability toward NMUPS were

more likely to know at least one person who engages in NMUPS for the purpose of weight loss/appetite suppression ( $r = .31, p < .001$ ), in addition to believing NMUPS is common ( $r = .21, p < .001$ ). Those who were more likely to know at least one person who engages in NMUPS for the purpose of weight loss/appetite suppression were also more likely to believe NMUPS is common ( $r = .15, p < .001$ ). Finally, those who were more likely to value their friends'/ family's / significant other's opinion on whether or not it is okay for people to engage in NMUPS were more likely to believe NMUPS is common ( $r = .09, p < .001$ ).

There was also a significant correlation between the two PBC factors, indicating that those who were more likely to feel that they could lose weight without the help of a stimulant medication were also more likely to feel that they could obtain a stimulant medication if they wanted to ( $r = .05, p < .05$ ).

Further, there were many significant correlations among the separate factors of the latent constructs. Those who were more likely to feel that engaging in NMUPS is ethical and safe were also more likely to perceive greater social acceptability toward NMUPS ( $r = .49, p < .001$ ), in addition to knowing at least one person who engages in NMUPS for the purpose of weight loss/appetite suppression ( $r = .23, p < .001$ ). Those who were more likely to feel that engaging in NMUPS is ethical and safe were less likely to feel that they could lose weight without the help of a stimulant medication ( $r = -.28, p < .001$ ), in addition to feeling that they could obtain a stimulant medication if they wanted to ( $r = .13, p < .001$ ).

Those who were less likely to be concerned that NMUPS would adversely affect a person's health were more likely to perceive greater social acceptability toward NMUPS ( $r = -.21, p < .001$ ), in addition to knowing at least one person who engages in NMUPS for the purpose of weight loss/appetite suppression ( $r = -.14, p < .001$ ). Further, those who were

more likely to be concerned that NMUPS would adversely affect a person's health were more likely to value their friends'/ family's / significant other's opinion on whether or not it is okay for people to engage in NMUPS ( $r = .13, p < .001$ ), in addition to believing NMUPS is common ( $r = .33, p < .001$ ). Finally, those who were more likely to be concerned that NMUPS would adversely affect a person's health were more likely to feel that they could lose weight successfully without the help of a stimulant medication ( $r = .38, p < .001$ ).

Those who were more likely to feel the benefits of NMUPS outweigh the potential risks were also more likely to perceive greater social acceptability toward NMUPS ( $r = .28, p < .001$ ), in addition to knowing at least one person who engages in NMUPS for the purpose of weight loss/appetite suppression ( $r = .16, p < .001$ ). Further, those who were more likely to feel the benefits of NMUPS outweigh the potential risks were less likely to feel that they could lose weight successfully without the help of a stimulant medication ( $r = -.19, p < .001$ ), and were more confident in feeling that they could obtain a stimulant medication if they wanted to ( $r = .13, p < .001$ ).

Those who were more likely to perceive greater social acceptability toward NMUPS were less likely to feel that they could lose weight without the help of a stimulant medication ( $r = -.16, p < .001$ ), in addition to feeling more confident in feeling that they could obtain a stimulant medication if they wanted to ( $r = .32, p < .001$ ).

Additionally, those who were more likely to know at least one person who engages in NMUPS for the purpose of weight loss/appetite suppression were less likely to feel that they could lose weight without the help of a stimulant medication ( $r = -.24, p < .001$ ), in addition to feeling more confident in feeling that they could obtain a stimulant medication if they wanted to ( $r = .32, p < .001$ ).

Those who were more likely to value their friends' / family's / significant other's opinion on whether or not it is okay for people to engage in NMUPS were more likely to feel that they could lose weight without the help of a stimulant medication ( $r = .12, p < .001$ ).

Those who were more likely to believe NMUPS is common were also more likely to feel that they could lose weight without the help of a stimulant medication ( $r = .14, p < .001$ ), in addition to feeling more confident in feeling that they could obtain a stimulant medication if they wanted to ( $r = .36, p < .001$ ).

#### **Fourth Aim**

The MANCOVA showed a significant main effect of the three weight loss groups on body dissatisfaction ( $\alpha = .92$ ), media influence on body image ( $\alpha = .94$ ), eating attitudes ( $\alpha = .95$ ), and depressive symptomatology ( $\alpha = .96$ ), *Pillai's trace* = .13,  $F(8, 2630) = 23.45, p < .001$ , after controlling for gender, age, ethnicity, BMI, and education. Post hoc (Bonferroni) analyses showed that the NMUPS/weight loss group had greater body dissatisfaction ( $M = 17.196, SE = .72$ ) than both the weight loss/no NMUPS group ( $M = 20.94, SE = .18$ ) and no weight loss group ( $M = 24.22, SE = .68; p < .001, p < .001$ , respectively). (Note that lower scores on this body image measure indicate less body satisfaction.) Similarly, the NMUPS/weight loss group felt greater pressure from the media to have an ideal body image ( $M = 24.61, SE = .89$ ) than both the weight loss/no NMUPS group ( $M = 20.66, SE = .23$ ) and no weight loss group ( $M = 15.75, SE = .84; p < .001, p < .001$ , respectively). The NMUPS/weight loss group had poorer eating attitudes and more eating disorder symptomatology ( $M = 3.28, SE = .14$ ) than both the weight loss/no NMUPS group ( $M = 1.91, SE = .04$ ) and no weight loss group ( $M = .65, SE = .14; p < .001, p < .001$ , respectively). Additionally, the NMUPS/weight loss group also exhibited greater depressive

symptomatology ( $M = 33.16$ ,  $SE = 1.81$ ) than both the weight loss/no NMUPS group ( $M = 20.85$ ,  $SE = .47$ ) and no weight loss group ( $M = 17.25$ ,  $SE = 1.71$ ;  $p < .001$ ,  $p < .001$ , respectively). Finally, the three groups each significantly differed from one another on each of the constructs mentioned above except that both the weight loss/no NMUPS group and no weight loss group reported similar rates of depressive symptomatology. See Table 16.

Table 16.

*Three weight loss groups and MANCOVA constructs.*

<b>MANCOVA Construct</b>	<b>Individuals reporting NMUPS/other weight loss methods (<math>n = 77</math>): Mean (SE)</b>	<b>Individuals reporting weight loss methods/no NMUPS (<math>n = 1159</math>): Mean (SE)</b>	<b>Individuals reporting no weight loss methods (<math>n = 89</math>): Mean (SE)</b>	<b><i>p</i></b>
Body Dissatisfaction	17.196 ( $SE = .72$ ) <sub>a</sub>	20.94 ( $SE = .18$ ) <sub>b</sub>	24.22 ( $SE = .68$ ) <sub>c</sub>	< .001
Media Influence on Body Image	24.61 ( $SE = .89$ ) <sub>a</sub>	20.66 ( $SE = .23$ ) <sub>b</sub>	15.75 ( $SE = .84$ ) <sub>c</sub>	< .001
Eating Attitudes	3.28 ( $SE = .14$ ) <sub>a</sub>	1.91 ( $SE = .04$ ) <sub>b</sub>	.65 ( $SE = .14$ ) <sub>c</sub>	< .001
Depressive Symptomatology	33.16 ( $SE = 1.81$ ) <sub>a</sub>	20.85 ( $SE = .47$ ) <sub>b</sub>	17.25 ( $SE = 1.71$ ) <sub>b</sub>	< .001

*Note.*  $n = 1325$ . Lower scores on the body dissatisfaction measure indicate less body satisfaction. Different subscript letters represent values that are significantly different.

Chi-square analyses were also performed to compare the three weight loss groups on the following disordered eating behaviors: binge eating, vomiting, laxative use, excessive exercising, and dietary restraint. Frequency of behaviors was categorized as either regular occurrence (at least four times [i.e., weekly] in the past 28 days) or less than regular (no occurrence or less than four times in the last 28 days). Approximately 50.0% of individuals in the NMUPS/weight loss group reported regular binge eating episodes compared to 26.9%

in the weight loss/no NMUPS group and 4.1% in the no weight loss group,  $\chi^2(2) = 48.75, p < .001$ . Regular vomiting episodes also differed between the NMUPS/weight loss group (21.3%) and the weight loss/no NMUPS group (3.7%) and the no weight loss group (1.0%),  $\chi^2(2) = 63.43, p < .001$ ; however, the latter two groups were not significantly different from one another. Similarly, the NMUPS/weight loss group reported more laxative episodes (13.5%) than the weight loss/no NMUPS group (3.3%) and the no weight loss group (1.0%),  $\chi^2(2) = 26.25, p < .001$ ; again, the latter two groups were not significantly different from one another. For excessive exercise, regular occurrence was defined as “exercising in a driven or compulsive way— as a means of controlling weight, shape or amount of fat, or to burn off calories” at least 20 times over the past 28 days. The NMUPS/weight loss group were more likely to report excessive exercise episodes (13.5%) than the weight loss/no NMUPS group (5.5%) and the no weight loss group (0.0%),  $\chi^2(2) = 16.13, p < .001$ ; the latter two groups were not significantly different. For dietary restraint, regular occurrence was defined as “going for long periods of time (eight hours or more) without eating anything to influence shape or weight” greater than 12 times over the past 28 days. All three weight loss groups were significantly different from one another, with 40.4% of the NMUPS/weight loss group reporting regular dietary restraint, 11.3% of the weight loss/no NMUPS group reporting restraint, and 2.1% of the no weight loss group reporting restraint,  $\chi^2(2) = 75.66, p < .001$ . See Table 17.

Table 17.

*Three weight loss groups and disordered eating behaviors.*

<b>Disordered Eating Behavior</b>	<b>Individuals reporting NMUPS/other weight loss methods (n = 89) % reporting:</b>	<b>Individuals reporting weight loss methods/no NMUPS (n = 1340) % reporting:</b>	<b>Individuals reporting no weight loss methods (n = 97) % reporting:</b>	$\chi^2$
Binge Eating	49.4 <sub>a</sub>	26.9 <sub>b</sub>	4.1 <sub>c</sub>	48.75***
Vomiting	21.3 <sub>a</sub>	3.7 <sub>b</sub>	1.0 <sub>b</sub>	63.43***
Laxative Use	13.5 <sub>a</sub>	3.3 <sub>b</sub>	1.0 <sub>b</sub>	26.25***
Excessive Exercising	13.5 <sub>a</sub>	5.5 <sub>b</sub>	0.0 <sub>b</sub>	16.13***
Dietary Restraint	40.4 <sub>a</sub>	11.3 <sub>b</sub>	2.1 <sub>c</sub>	75.66***

*Note.*  $n = 1526$ . Different subscript letters represent values that are significantly different. \*\*\*  $p < .001$ .

Chi-square analyses were also performed on the two weight loss groups to compare differences in the engagement of other unhealthy and healthy weight loss behaviors. The no weight loss group was excluded from these analyses (as with the SEM) given that participants in this group reported never engaging in any of the assessed weight loss behaviors. Because some of the variables had greater than acceptable skewness and kurtosis scores, the PI dichotomized the weight loss behaviors into “Never Engaged” for participants who never engaged in the behavior in the past year, and “Yes Engaged” for participants reporting having engaged in the behavior at least rarely in the past year (i.e., “rarely” to “on a regular basis”). The NMUPS/weight loss group had greater reporting of many of the behaviors compared to the weight loss/no NMUPS group, including: fasting, use of diet pills, diuretic use, using food substitutions (e.g., powder, special drink), skipping meals, smoking cigarettes for appetite control, and watching portion sizes. See Table 18.

Table 18.

*Two weight loss groups and unhealthy and healthy weight loss behaviors—past year.*

<b>Weight Loss Behavior</b>	<b>Individuals reporting NMUPS/other weight loss methods (<i>n</i> = 89) % reporting:</b>	<b>Individuals reporting weight loss methods/no NMUPS (<i>n</i> = 1340) % reporting:</b>	$\chi^2$
<b>Unhealthy Behaviors</b>			
Ate very little food	95.5	74.4	19.896***
Skipped meals	86.4	61.4	21.99***
Fasted	83.0	41.3	58.19***
Smoked more cigarettes	69.7	20.4	112.90***
Took diet pills	67.0	19.1	110.66***
Drank energy drinks (e.g., Red Bull, Monster)	62.9	33.9	30.68***
Used food substitute (powder/special drink)	60.9	34.7	24.31***
Followed a high protein/low carbohydrate diet (e.g., Atkins or other)	56.8	32.8	21.12***
Used diuretics (water pills)	34.8	8.0	68.33***
<b>Healthy Behaviors</b>			
Exercise	95.5	93.5	.54, <i>ns</i>
Ate less high-fat foods	92.0	84.9	3.33, <i>ns</i>
Ate more fruits and vegetables	91.0	91.3	.01, <i>ns</i>
Watched my portion sizes (serving sizes)	89.9	81.1	4.30*
Ate less sweets	87.5	85.2	.36, <i>ns</i>
Drank less soda pop (not including diet soda)	83.1	80.8	.289, <i>ns</i>

*Note.* *n* ranges from 1410-1427. *ns* = not significant. \*  $p < .05$ , \*\*\*  $p < .001$ .

Finally, chi-square analyses were also conducted to compare the three weight loss groups on other substance use. Given that many of the substance use variables were highly skewed and kurtotic, the PI dichotomized them into “Never Engaged” for participants who never engaged in the behavior in the past year, and “Yes Engaged” for participants reporting having engaged in the behavior on at least 1-2 occasions in the past year (i.e., 1-2 occasions



to 40 or more occasions). The NMUPS/weight loss group had significantly greater reporting of all of the assessed substances compared to the other two groups. See Table 19.

Table 19.

*Three weight loss groups and other substance use—past year.*

Substance	Individuals reporting NMUPS/other weight loss methods ( <i>n</i> = 89) % reporting:	Individuals reporting weight loss methods/no NMUPS ( <i>n</i> = 1340) % reporting:	Individuals reporting no weight loss methods ( <i>n</i> = 97) % reporting:	$\chi^2$
Alcohol (beer, wine, liquor)	95.5 <sub>a</sub>	83.2 <sub>b</sub>	77.3 <sub>b</sub>	11.92**
Marijuana (pot, weed, hashish, hash oil)	89.8 <sub>a</sub>	40.2 <sub>b</sub>	46.4 <sub>b</sub>	82.82***
Tobacco products (Cigarettes, water pipe, cigars, smokeless tobacco)	83.1 <sub>a</sub>	42.6 <sub>b</sub>	46.4 <sub>b</sub>	55.395***
Energy Drinks	78.4 <sub>a</sub>	57.2 <sub>b</sub>	50.5 <sub>b</sub>	17.63***
MDMA (Ecstasy)	48.9 <sub>a</sub>	7.7 <sub>b</sub>	11.6 <sub>b</sub>	149.96***
Cocaine (crack, rock, freebase, powder)	44.9 <sub>a</sub>	7.6 <sub>b</sub>	11.3 <sub>b</sub>	128.77***
Other amphetamines (bennies)	39.3 <sub>a</sub>	6.3 <sub>b</sub>	6.2 <sub>b</sub>	120.73***
Opiates (heroin, smack)	30.3 <sub>a</sub>	4.6 <sub>b</sub>	7.3 <sub>b</sub>	94.56***
Methamphetamine (crystal meth, ice, crank)	28.1 <sub>a</sub>	3.0 <sub>b</sub>	4.2 <sub>b</sub>	120.68***
Anabolic steroids (Testosterone)	13.6 <sub>a</sub>	2.9 <sub>b</sub>	2.1 <sub>b</sub>	28.52***

*Note.* *n* ranges from 1501-1523. *ns* = not significant. Different subscript letters represent values that are significantly different. \*\* *p* < .01, \*\*\* *p* < .001.

## Discussion

The current study investigated NMUPS for weight loss in a national, young adult sample, and assessed its relation with other problematic cognitions and health behaviors,

including disordered eating. In addition, motivations and attitudes about NMUPS were evaluated, as these constructs might be most amenable to change in a future intervention.

### **Aim 1**

The first aim of this study was to examine the prevalence of NMUPS for weight loss in a broad, national sample of young adults. Young adults, ages 18-25, were recruited because they are the group most likely to engage in NMUPS (SAMHSA, 2012) and are also at high risk for disordered eating behaviors (Neumark-Sztainer et al., 2011). Overall, recruiting participants from MTurk was a relatively easy and inexpensive method, which yielded good quality results. Given that participants were required to be within a certain age range, reside in the U.S., and speak English, the turnaround was fairly quick at approximately 6 months for recruitment. (Additionally, recruitment time would have been quicker had there not been errors with initial implementation.) Moreover, participants' state residencies were highly representative of the U.S. population, and participants were ethnically diverse, although not quite as diverse as the national population. For example, the current sample had lower rates of African-American and Hispanic/Latino participants compared with the national population (U.S. Census Bureau, 2014b). Additionally, the current sample had more females (62.6% versus 50.8%; U.S. Census Bureau, 2014b).

Approximately 12.0% of the total sample reported ever engaging in NMUPS for weight loss, which is comparable to the rate found in a previous study among college students (i.e., 11.7%; Jeffers et al., 2013). However, a limitation of that study included not clearly differentiating between those who misused their own ADHD medication from those who received medication from another source. The current study solely examined those who engaged in non-medical use, given that prescription stimulant use may be especially harmful

for those who do not have a prescription from a physician (Benson et al., 2015), which is similar to the sample examined in the Jeffers & Benotsch (2014) investigation. However, the current study's rate of NMUPS (12.1%) is much higher than results from that study (4.4%). Moreover, the prevalence rate for past year NMUPS for weight loss of 5.8% is higher than the previous investigation's lifetime rate. According to results from the current study, this behavior had statistically significant higher rates in the Northeast region. Thus, the current study's prevalence rate might be higher than the rate in prior studies (i.e., Jeffers & Benotsch, 2014; Jeffers et al., 2013) given that all U.S. regions were examined (i.e., not solely Virginia as with the previous studies), particularly the Northeast region. Higher rates of NMUPS for weight loss in the Northeast is similar to past research that has demonstrated higher rates in this U.S. region for rates of NMUPS, in general (Johnston, O'Malley, & Bachman, 2003; McCabe, Knight, Teter, & Wechsler, 2005). One suggested reason for these high prevalence rates, at least related to college students, is that many of the institutions in the Northeast have more competitive admissions standards; thus, individuals might feel the need to use stimulants to enhance academic performance (McCabe et al., 2005). It could also be that this study's prevalence rate is higher given that both college and non-college populations were examined. Additionally, prior research has demonstrated that the most commonly endorsed motives for NMUPS among college students are related to academics (Flory et al., 2014; Herman-Stahl et al., 2007; Teter et al., 2006), but it could be that individuals are underreporting stimulant use for weight loss due to a perceived stigma surrounding misusing one's medication or engaging in non-medical use for a less "acceptable" purpose.

For example, Lookatch, Moore, and Katz (2014) studied the impact of both gender and motivations on college students' perceptions of NMUPS using vignettes, which included

either a college man or woman engaging in NMUPS for one of three motives: to get high, study, or lose weight. They found that, regardless of gender, using a prescription stimulant as a study aid was viewed more favorably than for the purposes of getting high or losing weight. The authors posited that greater acceptability of using a stimulant to study might be attributable to the similarity to the medication's intended uses, such that individuals with ADHD are often prescribed the medication to improve concentration and attention. Thus, an individual without ADHD using the medication for the same purposes is seen as acceptable. Consequently, college students may be more willing to share their experiences with NMUPS regarding "acceptable" study motives, compared with using the medication as a weight loss aid.

The top five reported motivations for both lifetime and past year NMUPS were: to increase concentration, to increase energy, as a study aid, to increase alertness, and to get high. Unsurprisingly, the majority of these motives are related to enhancing academic (or other work-related) performance and are consistent with findings from previous research (Teter et al., 2006). However, although weight loss/appetite suppression is not one of the most commonly reported motives, a substantial percentage of individuals reported engaging in this behavior over their lifetime (12.1%), over one-third of participants reporting NMUPS reported doing so for this purpose, and of those reporting NMUPS for weight loss, approximately half reported past year use.

## **Aim 2**

The second aim of this study was to investigate correlates of NMUPS for weight loss, including negative consequences associated with this misuse, age of onset, factors influencing participants' decision to use prescription stimulants for weight loss, knowledge

about these medications, medication source, and perceived effectiveness of NMUPS for weight loss. Female and transgender participants were more likely than males to report engaging in NMUPS for weight loss. This finding is different from prior research in which rates were comparable among both men and women (Jeffers & Benotsch, 2014; Jeffers et al., 2013). The current study provides evidence that, in the general young adult population, women may be more likely to engage in this behavior, whereas, in college-only populations, like women, men are increasingly concerned about body image and weight (Pope, Gruber, Choi, Olivardia, & Phillips, 1997) and are not immune to engaging in unhealthy weight loss behaviors (Petrie, Greenleaf, Reel, & Carter, 2008). Indeed, the college environment has been implicated in the development of body dissatisfaction and disordered eating in both women (Fitzsimmons-Craft, 2011) and men (Davila et al., 2014), and individuals may be especially prone to seek out novel ways to lose weight. Additionally, the current study is the first to examine such use among transgender individuals; however, it is important to note that the sample size of transgender participants was relatively small (i.e.,  $n = 33$ ). White and non-White participants reported similar rates of the behavior. Results regarding race have been inconsistent in prior research; rates among both Whites and non-Whites have been comparable (Jeffers & Benotsch, 2014), and results have also demonstrated Whites are more likely to engage in the behavior compared with non-White participants (Jeffers et al., 2013). Thus, current results provide evidence that the racial/ethnic gap regarding weight concerns and related behaviors is closing (Neumark-Sztainer et al., 2002). Indeed, research has shown that among adolescents, weight-related concerns (e.g., body dissatisfaction) and behaviors (e.g., vomiting) are prevalent irrespective of racial/ethnic background (Neumark-Sztainer et al., 2002). Further, slightly older participants were more likely to report NMUPS for weight

loss, compared to previous studies where age did not differ with only college student samples (Jeffers & Benotsch, 2014; Jeffers et al., 2013). It is likely that these previous studies did not have the power to distinguish between slight differences in age given the smaller sample sizes. Participants reporting NMUPS for weight loss were also more likely to have a slightly higher BMI than those who did not. Prior research has found NMUPS for weight loss to be associated with both having a lower BMI (Jeffers & Benotsch, 2014), as well as no differences between those reporting NMUPS for weight loss and those not reporting the behavior (Jeffers et al., 2013). Results of the current study make sense in that NMUPS for weight loss might be more appealing to individuals who are overweight. Thus, they may be more willing to engage in a risky behavior to lose weight. However, it could be that in previous research where NMUPS for weight loss was associated with a lower BMI, individuals indeed had a lower BMI as a result of engaging in this behavior. It is also important to note that the current sample was slightly overweight in general. Further research should better identify which individuals are most likely to engage in this behavior, and individuals' perceptions of their BMI's before and after using a stimulant for weight loss.

Additionally, participants with a high school diploma/GED or less than a high school education were more likely to report use for weight loss compared to participants who had completed at least one year of college/university or higher. This seems counterintuitive given that many studies report higher rates of NMUPS among college students than their non-college peers (Herman-Stahl et al., 2007). However, these studies typically focus on motives related to improving school performance. It makes sense that individuals attending or who have previously attended college would be more likely to use ADHD medications for such motivations; whereas, losing weight is important for all types of people in the general

population. This finding provides evidence that non-college young adults are clearly at risk of engaging in NMUPS for weight loss.

Participants also reported a number of negative consequences associated with NMUPS. While all participants who had ever engaged in NMUPS were asked about negative consequences, only those who had ever engaged in NMUPS for weight loss were selected in analyses. Thus, it is important to note that it cannot be discerned whether consequences experienced were a result of NMUPS for weight loss, or NMUPS, in general. The top reported consequence experienced in one's lifetime, but not in the past year, was losing weight or not eating properly. Approximately one-third of participants also reported that they enjoyed using stimulants, had taken stimulants in larger amounts or over a longer period of time than planned, felt bad physically due to stimulant use, and had done impulsive things they later regretted. Approximately 8.0% of participants reported that they needed medical treatment and 11.0% reported that they had to go to the ER as a consequence of NMUPS.

According to a news release from Johns Hopkins Bloomberg School of Public Health (Johns Hopkins Bloomberg School of Public Health, 2016), a recent study found that the number of prescriptions for Adderall has remained unchanged, but rates of non-medical use and ER visits related to the drug have increased dramatically among young adults (Chen et al., 2016). Such medical consequences undoubtedly have productivity and financial implications. For example, individuals undergoing treatment are pulled away from work and other obligations. Additionally, although there are no economic data on the abuse of prescription stimulants, prescription opioid abuse alone costs health insurers up to \$72.5 billion a year (Coalition Against Insurance Fraud, 2007). One could expect a similarly significant financial burden given a rise in non-medical use and ER visits related to

prescription stimulants. Estimating this financial impact is an important gap for future research to explore.

Past year consequences associated with NMUPS for weight loss were similar. The top five commonly-reported consequences were the same with the exception that approximately 40.0% of participants felt guilty or ashamed due to their stimulant use, and taking stimulants in larger amounts or over a longer period of time than planned was moved to eighth on the list. To the PI's knowledge, this is the first study to examine an extensive list of consequences associated with NMUPS, particularly NMUPS for weight loss. Prior research has demonstrated associations with NMUPS and negative consequences, including major depressive episodes (Ali et al., 2015), but causality cannot be determined. Future research should incorporate longitudinal studies to provide better indications of temporal precedence, and examinations of a broad range of consequences similar to that of the current study, in addition to examining consequences solely as a result of NMUPS for weight loss.

Participants reported that they started engaging in NMUPS for weight loss ranging from 12 to 24 years, with a mean age of 18 years. Around 8.5% of participants reported starting during middle school, over one-third reported starting during high school years, and the majority reported starting at age 18 and over. It is not surprising that a substantial minority of participants reported that they started engaging in NMUPS for weight loss during adolescence, as adolescents are the second largest age group (following young adults) to engage in NMUPD (SAMHSA, 2014). Moreover, NMUPS can begin as early as grade school (Wilens et al., 2008). A systematic review examining the misuse and diversion of medications prescribed for ADHD found that children with medications receive requests to give, sell, or trade them to other students in elementary and high school (Wilens et al., 2008).



Further, adolescents with stimulant prescriptions for ADHD are more likely to be approached to divert their medications compared to individuals with prescriptions for pain, anti-anxiety, and sleeping medications (McCabe et al., 2011).

Almost 75.0% of the participants reported that they decided to try a prescription stimulant without a doctor's orders specifically for the purpose of weight loss/appetite suppressive effects due to knowing someone else who was doing it or someone else giving his/her ADHD medication specifically for that purpose. This is not surprising given the high rates with which ADHD medications are diverted (McCabe et al., 2011), especially from friends and family (Jeffers et al., 2014; NIDA, 2013). Indeed, friends and family were the top two sources of stimulant medications. Almost 20.0% heard about the idea from the media, and the rest of the participants decided to try this behavior for other reasons not listed. Participants also reported receiving medication from the Internet, a stranger, and other sources. Stealing medication was reported by at least one participant who reported getting the medication from a "teenager whose house I was watching while they were away."

A majority of participants reported that engaging in NMUPS for weight loss was either "mildly" or "very effective" (43.1%, 21.3%, respectively). Perceived effectiveness was somewhat better in this study compared to prior work (Jeffers et al., 2014). Indeed, a smaller percentage of participants reported that NMUPS for weight loss was "not at all effective." Future work should examine individuals' perceptions regarding the pros and cons when utilizing this weight loss technique.

The greatest source of exposure to information about side effects associated with the use of ADHD medication was the Internet. This is in line with prior research demonstrating that some of the most frequently sought topics on the Internet are related to health and

medical information (McMullan, 2006). It is likely that the other students/friends who acted as the next greatest sources of information were also the medication suppliers. Finally, approximately one-third of participants reported receiving exposure to information about ADHD medication in school.

The majority of participants reported that they considered themselves to be knowledgeable about the side effects associated with the use of stimulant medication normally used to treat ADHD. However, there was only a moderate correlation between participants' confidence in their knowledge about side effects and their actual knowledge. The total mean score of side effects and contraindications that were answered correctly were 60.0% and 43.0%, respectively. These percentages are concerning given that individuals are taking a medication that could negatively impact their health, especially without medical supervision. Further, it is not clear whether individuals had this knowledge prior to engaging in NMUPS, or whether their knowledge was a consequence of having experienced a particular side effect (e.g., correctly identified tachycardia as a possible side effect because of experiencing a racing heart while taking the medication). Judson and Langdon (2009) also found that college students who engaged in illicit use without a prescription had higher knowledge scores compared with non-users, and suggested that such knowledge primarily results from experience.

### **Aim 3**

The third aim of this study was to evaluate the utility of the TPB model to predict membership in one of two groups: individuals who had engaged in NMUPS for weight loss in the past year and individuals who had tried to lose weight via other methods in the past year. Using items modeled after a sample TPB questionnaire (Ajzen, n.d.-a) and Judson and

Langdon (2009), the TPB did provide adequate overall fit to the data. Although the chi-square test was statistically significant, thus indicating a poor fitting model, this fit index is impacted by sample size and is typically significant for models with greater than 200 cases (Kenny, 2015). Therefore, it is important to examine more than one fit index. Currently, the most popular measure of model fit is the RMSEA (Kenny, 2015), which indicated an adequately fitting model for the current results. Indeed, half of the subjective norms factors and both perceived behavioral control factors were significantly associated with NMUPS for weight loss, indicating that those with greater subjective norms regarding knowing at least one person who uses stimulant medication for the purpose of weight loss/appetite suppression, in addition to believing that NMUPS is common were more likely to report NMUPS for weight loss. Further, participants reporting NMUPS for weight loss had lower perceived behavioral control, indicating that they were more likely to agree that they do need stimulant medication to help them lose weight/control their appetite, and that they could not lose weight successfully without the help of a stimulant medication. Those reporting NMUPS for weight loss also had higher perceived behavioral control regarding feeling confident that they could obtain a stimulant medication from someone if they wanted to. Thus, the hypothesis that “individuals who have engaged in NMUPS for weight loss will have more favorable attitudes toward the behavior (e.g., view the behavior as ethical), view the behavior as common, and have lower perceived behavioral control to lose weight without the help of stimulants, as well as higher perceived behavioral control to obtain stimulant medication compared to the other group” was partially supported.

It is interesting that attitudes was not associated with NMUPS for weight loss in the TPB model, especially given that there were significant correlations among the three

attitudes factors, and that many of the separate factors of the latent constructs were correlated in their expected directions. For example, those who were more likely to feel that engaging in NMUPS is ethical and safe were less likely to be concerned that NMUPS would adversely affect a person's health, in addition to feeling the benefits of NMUPS outweigh the potential risks. Further, those who were less likely to be concerned that NMUPS would adversely affect a person's health were more likely to feel the benefits of NMUPS outweigh the potential risks.

There were also significant correlations among some of the attitude and subjective norms factors, such that those who were more likely to feel that engaging in NMUPS is ethical and safe were also more likely to perceive greater social acceptability toward NMUPS, in addition to knowing at least one person who engages in NMUPS for the purpose of weight loss/appetite suppression. Those who were less likely to be concerned that NMUPS would adversely affect a person's health were more likely to perceive greater social acceptability toward NMUPS, in addition to knowing at least one person who engages in NMUPS for the purpose of weight loss/appetite suppression. Further, those who were more likely to be concerned that NMUPS would adversely affect a person's health were more likely to value their friends'/ family's / significant other's opinion on whether or not it is okay for people to engage in NMUPS, in addition to believing NMUPS is common. Those who were more likely to feel the benefits of NMUPS outweigh the potential risks were also more likely to perceive greater social acceptability toward NMUPS, in addition to knowing at least one person who engages in NMUPS for the purpose of weight loss/appetite suppression.

Finally, there were many significant correlations among the attitudes and perceived behavioral control factors. Those who were more likely to feel that engaging in NMUPS is

ethical and safe were less likely to feel that they could lose weight without the help of a stimulant medication, in addition to feeling that they could obtain a stimulant medication if they wanted to. Those who were more likely to be concerned that NMUPS would adversely affect a person's health were more likely to feel that they could lose weight successfully without the help of a stimulant medication. Further, those who were more likely to feel the benefits of NMUPS outweigh the potential risks were less likely to feel that they could lose weight successfully without the help of a stimulant medication, and were more confident in feeling that they could obtain a stimulant medication if they wanted to.

The current study's findings are slightly different from Judson and Langdon's (2009) results. They found that, among college students who engaged in NMUPS, results were consistent with the TPB, such that they had fewer concerns regarding adverse health effects and ethics of use, higher perceived positive social norms, and lower perceived behavioral control (i.e., felt more dependent on stimulant medications). For those who misused their own prescriptions, only social norms approached significance for predicting use.

In Gallucci's (2011) dissertation study of undergraduates, attitudes and perceived behavioral control were related to lifetime NMUPS; social norms, however, were not related. His study also differs from the current study's results, but it is important to note that the social norm variables in the former study were associated with higher numbers of participants who had incomplete data, and that this may have been a result of survey administration (e.g., close proximity to friends in the classroom during survey completion), whereas the current study provided participants complete privacy in an online environment. Only perceived behavioral control was related to recent non-medical use (i.e., past 30 days), which is one of the main findings Gallucci published from his dissertation (Gallucci et al.,

2015). The authors note that non-significant relations between current NMUPS and attitudes and subjective norms differs from Judson and Langdon's (2009) results, but that the inconsistencies could be attributable to differing time frames used in the studies. Gallucci et al. examined past 30 day use, whereas Judson and Langdon examined lifetime NMUPS. However, lower perceived behavioral control was related to NMUPS in both studies. Another important distinction between Gallucci et al.'s study and the current study is that the former examined individuals who engaged in both NMUPS and misuse, whereas this study examined NMUPS only. Additionally, Judson and Langdon examined illicit use separately among prescription and non-prescription holders and found differing results.

In Srigley's (2013) master's thesis, both attitude toward use and perceived behavioral control emerged as strong predictors of intention to engage in NMUPD within the next year in a sample of 131 college students. Srigley's findings also differ from the current study's results, but inconsistencies might be attributable to such large differences in sample size, college student sample versus national young adult sample, or that Srigley examined intention to use, whereas the current study predicted past year use. However, it is important to note that, as with Gallucci et al.'s (2015) study and Judson and Langdon's (2009) study, the current study did not measure intention to use because Ajzen (1991, 2002) claimed that addictive behaviors have the potential to bypass intention. Thus, it can be assumed that any participant who reported engaging in past year NMUPS for weight loss intended on doing so (Gallucci et al., 2015).

Lastly, Ponnet and colleagues (Ponnet et al., 2015) used an extended model of the TPB to examine Flemish college students' intention to engage in NMUPS to enhance academic performance. They found that subjective norms, followed by attitudes and

perceived behavioral control predicted intention to use, among other variables (e.g., substance abuse).

There are a variety of factors that might contribute to the inconsistent findings among the current study and the previous studies utilizing the TPB to predict NMUPS. Differing time frames (e.g., lifetime, recent, past year use), differentiating between NMUPS and misuse, large versus small sample sizes, college student samples versus national sample, motives for use (i.e., in general, for academic purposes only, and for weight loss), and how the constructs (i.e., attitudes, norms, perceived behavioral control) were conceptualized might attribute to inconsistent results. Thus, it is difficult to discern whether the TPB appears to have limited utility in predicting NMUPS due to such methodological differences, or whether the TPB is in fact not the best model for predicting this behavior. Overall, however, in the majority of these studies, at least some elements of the TPB significantly predict NMUPS, the most consistent being perceived behavioral control. Findings indicate that this TPB element might be most useful in predicting NMUPS, whether in general or for weight loss purposes.

#### **Aim 4**

The fourth aim of this study was to compare the three groups on additional relevant behaviors and constructs: disordered eating behaviors, body image, other substance use, and depressive symptomatology. The NMUPS/weight loss group had greater body dissatisfaction than both the weight loss/no NMUPS group and no weight loss group. Further, results for body dissatisfaction were observed in expected directions among the three groups, such that the weight loss/no NMUPS group had even greater body dissatisfaction than the no weight loss group. Similarly, the NMUPS/weight loss group felt greater pressure from the media to

have an ideal body image than both the weight loss/no NMUPS group and no weight loss group; the same linear pattern was observed. These findings are consistent with past research (Jeffers & Benotsch, 2014). However, the current study provides evidence that those engaging in NMUPS for weight loss are even more dissatisfied with their bodies and feel even greater pressure from the media to have an ideal body type compared with individuals who engage in weight loss methods other than NMUPS.

The NMUPS/weight loss group had poorer eating attitudes and more eating disorder symptomatology than the weight loss/no NMUPS group, and again, this weight loss group had poorer eating attitudes and symptomatology than the no weight loss group. Both regular binge eating episodes and dietary restraint were most commonly reported by individuals in the NMUPS/weight loss group, followed by individuals in the weight loss/no NMUPS group, followed by individuals in the no weight loss group. Regular episodes of vomiting, laxative use, and excessive exercise were all more frequently reported in the NMUPS/weight loss group; however, rates were similar for the weight loss/no NMUPS group and no weight loss group. Further, the NMUPS/weight loss group had greater reporting of all of the additional unhealthy weight loss behaviors that were assessed compared to the weight loss/no NMUPS group: fasting, eating very little food, using diet pills, using diuretics, using food substitutions, skipping meals, smoking more cigarettes for appetite control, following a high protein/low carbohydrate diet (i.e., fad diet), and drinking energy drinks for appetite control. Overall, findings are consistent with past research (Jeffers & Benotsch, 2014; Jeffers et al., 2013). However, the current study provides evidence that those engaging in NMUPS for weight loss have even poorer eating attitudes, are engaging in even more binge eating episodes, and dietary restraint compared with individuals who engage in weight loss methods



other than NMUPS. It could be that rates for regular episodes of vomiting, laxative use, and excessive exercise were similar for the weight loss/no NMUPS group and no weight loss groups because such low rates were reported in general among the two groups. Regardless, individuals who engage in NMUPS for weight loss tend to endorse more unhealthy attitudes and behaviors compared with those who utilize other weight loss techniques.

All healthy weight loss behaviors that were assessed had similar frequency rates among the two groups, with the exception of the NMUPS/weight loss group reporting higher frequency of watching portion sizes. This finding might make sense in that watching portion sizes may easily lend itself into becoming an unhealthy behavior, such as eating very little food. Given these data, it appears that individuals who engage in NMUPS for weight loss are not simply just engaging in any and every weight loss technique (i.e., both healthy and unhealthy strategies), but are much more likely to engage in problematic and unhealthy weight loss strategies.

Additionally, the NMUPS/weight loss group also exhibited greater depressive symptomatology than both the weight loss/no NMUPS group and no weight loss group. However, the weight loss/no NMUPS group and no weight loss group reported comparable rates of depressive symptomatology. The current findings are consistent with past research; NMUPD has been associated with poor mental health, including depressive symptoms, suicidality, and anxiety among college students (Dussault & Weyandt, 2013; Zullig & Divin, 2012). Ali et al. (2015) also found a positive relation between NMUPD and major depressive episodes among adolescents.

Finally, the NMUPS/weight loss group had significantly greater reporting of all of the assessed substances compared to the other two groups, which reported comparable substance

use rates. Indeed, the NMUPS/weight loss group reported surprisingly high rates for many of the substances, including: marijuana (89.8%, almost double that of the other two groups), cocaine (44.9%, approximately four-times that of the other groups), and ecstasy (48.9%, approximately four-times that of the other groups). This is similar to prior research in which college students who reported NMUPS for weight loss were more likely to report using illicit drugs but not alcohol over the past 3 months compared to non-users (Jeffers & Benotsch, 2014); although, in the current study, users were more likely to report alcohol use compared with non-users. Additionally, NMUPS has been associated with other substance use including use of alcohol, tobacco, marijuana, cocaine, and ecstasy (Lanier & Farley, 2011). NMUPS is also associated with past year alcohol or drug use disorders in both males and females (Wu et al., 2007).

Data from this national sample demonstrates that individuals who are engaging in stimulant use for weight loss are also highly more likely to use many other substances. Future research should examine whether ADHD medication facilitates more as a gateway drug, or if other substance use precipitates using ADHD medication non-medically. In one longitudinal study of college students, energy drink users consumed more alcohol and were more likely to have used other drugs, both in the same year and in the preceding year (Arria et al., 2010). Results demonstrated that Year 2 energy drink use was significantly associated with Year 3 NMUPS and non-medical use of prescription analgesics, but was not associated with other drug use in Year 3. Additionally, Woolsey et al. (2015) found that energy drink use frequency was a significant predictor of NMUPS. Using data from the same longitudinal study mentioned above, Arria et al. (2013) found that as cannabis and alcohol use increased, college students experienced associated increases in skipping class and decreases in GPA,

which in turn led to a higher likelihood of engaging in NMUPS for study purposes. Data from national samples have demonstrated that NMUPD is a risk factor for future drug dependence (Schepis & Krishnan-Sarin, 2008), binge drinking (McCauley et al., 2011), and substance use disorders (Schepis & Hakes, 2011). Additional longitudinal work is needed to disentangle which substance comes first, and whether this is dependent upon motive (e.g., energy drink use leads to NMUPS for study aid purposes, NMUPS leads to cocaine use for getting high purposes). Moreover, future work should determine if individuals engaging in NMUPS for weight loss are using some of these drugs simultaneously.

The hypothesis that “the three groups will differ on various constructs, such that individuals who engage in NMUPS for weight loss will have poorer body image, higher rates of disordered eating, higher rates of other substance use, and greater depressive symptomatology compared to the other two groups” was fully supported.

### **Limitations and Strengths**

Limitations of this study should be considered when interpreting findings. All measures were based on self-report, which may have resulted in biases or errors in reporting. For example, BMI was calculated based on self-reported weight and height; thus, data analyses regarding BMI might have been slightly inaccurate. However, prior research has demonstrated that web-based self-reports of height and weight are moderately to highly correlated with actual height and weight, and suggest that online self-reported measurements can be a valid method of data collection (Bonn, Lagerros, & Bälter, 2013; Pursey, Burrows, Stanwell, & Collins, 2014). Similarly, the online nature of the study did not allow for a controlled testing environment, such as preventing or controlling for outside distractions. Further, there may have been a response bias as participants self-selected to participate in a

study titled “Substance use, eating behaviors, mental health, and weight loss.” Such self-selection might impact the generalizability of results to the overall population. Further, an Internet sample might not be representative of the general population. For example, MTurk workers tend to be more educated than the general U.S. population, which may reflect higher education levels among technology users (Paolacci et al., 2010). MTurk samples also have a large proportion of both White and female participants, which is comparable to characteristics of other Internet samples (Casler et al., 2013; Shapiro et al., 2013). Indeed, the current sample also had a larger proportion of females compared with the national population; however, this is not atypical of many psychological studies. Additionally, the observational design limits interpretations of causality.

Despite limitations, this study had numerous strengths. To the PI’s knowledge, this is the first study to examine NMUPS for weight loss in a national sample of young adults, as well as the first to examine this behavior in both participants attending college and those not attending college. Further, there was a large correlation between participants’ state residencies and the U.S. population, and participants were fairly ethnically diverse. This is also the first study to apply a theoretical model when examining NMUPS for weight loss. Further, using SEM allowed for the estimation of latent variables, thus eliminating random error (Hays et al., 2005). The current study also provides additional evidence regarding prior inconsistent results for “building a profile” of the typical NMUPS for weight loss user, including supporting higher rates among females and similar rates among White and non-White participants. This is also the first study to examine such use among transgender individuals (who, along with female participants, were more likely to report this behavior compared with males). However, it is important to note that this sample included a small

percentage of transgender participants and findings are preliminary. To the PI's knowledge, this is the first study to examine an extensive list of consequences associated with NMUPS. This is also one of the first studies to indicate that many individuals begin NMUPS for weight loss during adolescence.

### **Implications and Future Directions**

This study provides evidence that a large percentage of young adults are engaging in NMUPS (approximately one-third), and a substantial minority of individuals are engaging in NMUPS for weight loss (approximately 12.0%). Many of these young adults also report a variety of negative consequences associated with this use. Future research should utilize longitudinal designs and examine how subsequent use is related to such consequences (e.g., continuing use despite a trip to the ER as a result of NMUPS), in addition to examining consequences resulting solely as a function of NMUPS for weight loss. Additionally, future research should examine individuals' perceptions regarding the pros and cons when utilizing this weight loss technique, and why they feel the "need" to use stimulants to lose weight. Further, additional work should examine this behavior among transgender individuals given the high rate found in this study.

Investigation into NMUPS for weight loss in adolescents is also needed, as current results suggest this behavior often begins during this developmental stage. Further, prior research provides evidence that NMUPD frequently begins during adolescence (Wilens et al., 2008; Young, Glover, & Havens, 2012). The relation between NMUPD and other substance use also begins in adolescence (Nakawaki & Crano, 2012; Young et al., 2012). Moreover, adolescence is a common time for the onset of many eating disorder symptoms and unhealthy weight control behaviors (Hoste, Labuschagne, & Le Grange, 2012; Neumark-Sztainer et al.,

2011; Rawana, Morgan, Nguyen, & Craig, 2010; Vander Wal, 2012). Only one study has examined motivations for NMUPD in a nationally representative sample of high school seniors, and prescription stimulants were the largest class of non-medically used drugs (McCabe & Cranford, 2012). Notably, 35.5% of individuals who reported NMUPS indicated doing so to help with weight loss.

The current study clearly provides evidence that non-college young adults are at risk of engaging in NMUPS, and for weight loss in particular. Given the finding that participants with a high school diploma/GED or less than a high school education were more likely to report use compared to participants who had completed at least one year of college/university or higher, future investigations should better elucidate NMUPS for weight loss rates, and other motives (e.g., academic) among different educational groups. For example, future work might compare/contrast non-college individuals, individuals currently attending college, and those who have graduated college. Further, as with Lookatch et al.'s study (2014), it could be useful to examine how stigma surrounding certain motives might also play a role.

Despite the finding that attitudes were not significant in the final SEM, the TPB did provide an adequate overall fit to the data. Two of the four subjective norms factors and both perceived behavioral control factors were significantly associated with NMUPS for weight loss, and many of the separate factors of the latent constructs were significantly correlated with each other in expected directions; thus, the TPB could provide useful information when examining NMUPS for weight loss in future samples. Additionally, current results and prior studies provide evidence that perceived behavioral control significantly predicts NMUPS, and might be most useful in predicting NMUPS, whether in general or for weight loss purposes.

Future investigations should also examine misuse of prescription stimulants for weight loss in a national sample, the utility of the TPB to predict this behavior, in addition to other correlates examined in the current study. It would be interesting to see whether findings differ depending on whether one engages in non-medical use, misuses one's own prescription, or if engaging in both of these behaviors yields different results. Future longitudinal research should examine whether ADHD medication facilitates as a gateway drug, or if other substance use precipitates misusing one's ADHD medication, or using non-medically.

Additionally, future qualitative work may aid in the exploration of this research and gain a complex, detailed understanding of the issue. In particular, it is important to capture the "essence" of the behavior by understanding experiences of NMUPS for weight loss and the context and situations that influence the behavior. Additionally, answers that are not easily captured in quantitative surveys (or are limited in their response), such as the advantages/disadvantages to losing weight this way, situations that promote this behavior, and perhaps instances of polysubstance use would benefit from qualitative inquiry. Moreover, qualitative methodology has typically been neglected in past NMUPD research (DeSantis et al., 2008), and especially with regard to NMUPS for weight loss.

Eating disorder prevention and intervention programs would benefit from assessing NMUPS for weight loss and educating young adults about associated dangers. Clinicians should also include this behavior when assessing unhealthy weight loss practices given that many of the individuals who have engaged in NMUPS for weight loss have also engaged in better known problematic ways to lose weight. Approximately 67.0%, 35.0%, 21.0%, and 14.0% of participants reporting this behavior also took diet pills, used diuretics, vomited to lose weight, and used laxatives, respectively. When prescribing ADHD medications,

physicians should emphasize the harmful consequences associated with sharing prescriptions and taking medications for purposes other than intended. Quality education concerning side effects and contraindications is especially important given such disconcertingly low rates regarding medication knowledge. NMUPD awareness campaigns should include information regarding NMUPS for weight loss and negative health consequences.

Programs and interventions focused on preventing or reducing NMUPS for weight loss could address beliefs about use and other motives. Because there are a variety of motives associated with NMUPS and many individuals endorse more than one motive, interventions might benefit from shining light on these other motives. Messages framed to suggest that despite the perception that non-medical use might seem socially acceptable, but is indeed illegal, unethical, and unsafe might be beneficial. An additional component might include providing anecdotal and/or statistical evidence of negative consequences including ER visits (e.g., 10.9%), feeling bad physically (e.g., 27.1%), and doing impulsive things that are subsequently regretted (e.g., 26.9%). Moreover, given that non-medical users were more likely to perceive that they “needed” stimulant medication to aid in successful weight loss, methods aimed at increasing perceived behavioral control regarding stimulant use and weight loss could be a particularly essential component in an intervention. Further, methods aimed at changing perceptions surrounding subjective norms regarding the belief that NMUPS is common would be useful.

Emphasizing healthful and sustaining weight loss strategies, while simultaneously underscoring negative consequences associated with use and the harms of taking a prescription without supervision for unintended purposes could be beneficial. Further, given that almost half of individuals reporting NMUPS for weight loss in the past year reported



engaging in regular binge eating episodes in the past 28 days, specific techniques to deal with binge eating should be addressed. Techniques might include focusing on positive cognitive-emotional coping skills, such as identifying potential stressors related to bingeing and brainstorming steps to deal with them (Kelly, Lydecker, & Mazzeo, 2012). Additionally, a key component of binge eating disorder is the sense of loss of control that accompanies a binge episode, which is similar to the loss of control that is associated with substance use disorders (Reese, Pollert, & Veilleux, 2016). This feature is one such commonality that has led researchers to conceptualize binge eating disorder as an addictive-spectrum disorder, like substance use disorders (Schreiber, Odlaug, & Grant, 2013). Thus, increasing self-control, and specifically addressing the perspective that self-control, or willpower, is a limited resource might be beneficial in reducing bingeing and substance use behavior (Reese et al., 2016)—which seems applicable to an intervention targeting NMUPS for weight loss.

Interventions might also benefit from incorporating components to improve mental health, particularly related to body image and depressive symptomatology. Body dissatisfaction may be especially important to highlight in relation to perceived pressures from the media, which have become increasingly focused on the thin-ideal for women and muscularity for men (Leit, Pope, & Gray, 2001; Mazur, 1986). Interventions should emphasize how such media images are often unrealistic (Heinberg, Thompson, & Stormer, 1995). Increasing body appreciation may be worthwhile as this has been suggested to be an easier feat than attempting to decrease levels of body dissatisfaction (Andrew, Tiggemann, & Clark, 2014; Andrew, Tiggemann, & Clark, 2015). Strategies might include encouraging activities that emphasize the function, rather than the appearance, of the body, such as yoga and other athletics (Andrew et al., 2015; Menzel & Levine, 2011; Tylka, 2012). Interventions

should also include a screen for depression, in addition to coping techniques and counseling referrals. Further, given such high rates of additional substance use, interventions aimed at reducing other substance use, and educating about the harms associated with mixing substances and polysubstance use might result in a reduction of the behavior. Education surrounding seemingly harmless substances including energy drinks, as well as more well-known harmful agents such as marijuana, cocaine, and methamphetamine should be incorporated.

### **Conclusion**

A substantial minority of young adults are obtaining prescription stimulant medication for the appetite suppression and weight loss effects. Research has demonstrated that this non-medical use is related to disordered eating behaviors; other substance use; and psychological concerns, including body dissatisfaction and depressive symptomatology. Moreover, individuals who engage in NMUPS for weight loss tend to endorse more unhealthy attitudes and behaviors compared with those who utilize other weight loss techniques. NMUPS for weight loss is also associated with a variety of negative consequences and users are not well-informed regarding stimulant medication knowledge. While there have been mixed results concerning who engages in this behavior, prescription stimulants may be more appealing to women and transgender individuals (although men are not immune from engaging in this behavior), as well as both White and non-White individuals. Prospective research is needed to further examine this behavior in other populations (e.g., adolescents), utilizing various methodologies (e.g., qualitative inquiry), and longitudinal investigation. This study extends the literature on the utility of the TPB in examining NMUPS, and provides the first research on utilizing the TPB to examine NMUPS

for weight loss. Findings demonstrate that methods aimed at increasing perceived behavioral control regarding stimulant use and weight loss, and changing perceptions surrounding subjective norms could be particularly essential components in an intervention. Emphasizing healthful and sustaining weight loss strategies, improving mental health, educating about polysubstance use, and underscoring negative consequences associated with use are other potential intervention targets.

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**Appendix A**  
**Demographics**

1. Which best describes you?

Male  
Female  
Transgender

2. Which best describes you?

White  
African-American  
Hispanic/Latino  
Asian-American  
Native American  
Other \_\_\_\_\_

3. How old are you? \_\_\_\_\_

4. How tall are you (in inches)? \_\_\_\_\_

5. How much do you weigh (in pounds)? \_\_\_\_\_

6. Which of the following best describes your highest achieved education level?

Less than high school  
High school/GED  
College or University/1<sup>st</sup> year completed  
College or University/2<sup>nd</sup> year completed  
College or University/3<sup>rd</sup> year completed  
College or University/4<sup>th</sup> year completed  
College or University/5<sup>th</sup> or higher year completed  
2-year college degree (Associates)  
4-year college degree (BA, BS)  
Master's Degree  
Doctoral Degree

Professional Degree (MD, JD)

7. What was your total household income last year?

- \$0-25,999
- \$26,000-\$51,999
- \$52,000-74,999
- more than \$75,000
- don't know/decline to say

8. Are you **currently** enrolled at a college or university?

- Yes
- No

9. Have you **ever** been diagnosed with Attention deficit hyperactivity disorder (ADHD)?

- Yes
- No

10. Have you **ever** been prescribed a prescription stimulant medication by a doctor to treat ADHD (e.g., Adderall, Ritalin, Vyvanse)?

- Yes
- No

11. Are you **currently** being prescribed a prescription stimulant medication by a doctor to treat ADHD (e.g., Adderall, Ritalin, Vyvanse)?

- Yes
- No

12a. Have you **ever** been prescribed a medication by a doctor for weight loss?

- Yes
- No

12b. If yes, please list the medication(s). \_\_\_\_\_

13. Are you **currently** being prescribed a medication by a doctor for weight loss?

- Yes
- No

14. Are you **currently** trying to:

- a) Lose weight
- b) Stay the same weight
- c) Gain weight
- d) I am not trying to do anything about my weight

15. How often have you gone on a diet during the **last year**? By “diet” we mean changing the way you eat so you can lose weight.

- a) never
- b) 1-4 times
- c) 5-10 times
- d) more than 10 times
- e) I am always dieting

16. Have you **ever** tried to lose weight?

- Yes
- No

17. In which state do you live? \_\_\_\_\_

18. Which best describes your place of residence?

- Urban
- Rural

19. Who is the president of the United States?\* \_\_\_\_\_  
\*(Quality assurance question #1)

## NMUPS Frequency

1a. On how many occasions (if any) in your **lifetime** have you used a prescription stimulant normally used to treat ADHD (e.g., Adderall, Ritalin, Concerta, Vyvanse), **NOT** prescribed to you?

- 1) no occasions
- 2) 1-2 occasions
- 3) 3-5 occasions
- 4) 6-9 occasions
- 5) 10-19 occasions
- 6) 20-39 occasions
- 7) 40 or more occasions

1b. On how many occasions (if any) in the **past 12 months** have you used a prescription stimulant normally used to treat ADHD (e.g., Adderall, Ritalin, Concerta, Vyvanse), **NOT** prescribed to you?

- 1) no occasions
- 2) 1-2 occasions
- 3) 3-5 occasions
- 4) 6-9 occasions
- 5) 10-19 occasions
- 6) 20-39 occasions
- 7) 40 or more occasions

### Motivations for NMUPS (Lifetime)

Why have you <u>ever</u> used prescription stimulants not prescribed to you?	Yes	No
1. To get high	1	2
2. Pain relief	1	2
3. Weight loss/appetite suppression	1	2
4. Increased energy	1	2
5. Sexual stimulant	1	2
6. Study aid	1	2
7. Coping with a difficult problem	1	2
8. To forget my worries	1	2
9. To fit in and not be excluded	1	2
10. To feel more self-confident	1	2
11. To reduce anxiety	1	2
12. To increase concentration	1	2
13. To try something new	1	2
14. Because it helps increase my alertness	1	2
15. Because it counteracts the effects of other drugs	1	2
16. Because of experimentation	1	2
17. Because it's safer than street drugs	1	2
18. Because I'm addicted	1	2

Please fill in any additional reasons you have ever used a prescription stimulant medication not prescribed to you. \_\_\_\_\_

### Motivations for NMUPS (Past Year)

In the <b>past year</b> , why have you used prescription stimulants not prescribed to you?	Yes	No
1. To get high	1	2
2. Pain relief	1	2
3. Weight loss/appetite suppression	1	2
4. Increased energy	1	2
5. Sexual stimulant	1	2
6. Study aid	1	2
7. Coping with a difficult problem	1	2
8. To forget my worries	1	2
9. To fit in and not be excluded	1	2
10. To feel more self-confident	1	2
11. To reduce anxiety	1	2
12. To increase concentration	1	2
13. To try something new	1	2
14. Because it helps increase my alertness	1	2
15. Because it counteracts the effects of other drugs	1	2
16. Because of experimentation	1	2
17. Because it's safer than street drugs	1	2
18. Because I'm addicted	1	2

Please fill in any additional reasons you have used a prescription stimulant medication not prescribed to you within the **past year**. \_\_\_\_\_

### NMUPS Age of Onset

1. How old were you when you started using a prescription stimulant without a doctor's orders? If you can't remember, please make your best guess.

\_\_\_\_\_

2. How old were you when you started using a prescription stimulant without a doctor's orders specifically for the purpose of weight loss/appetite suppressive effects? If you can't remember, please make your best guess.

\_\_\_\_\_

### Decision to Engage in NMUPS for Weight Loss

1. What made you decide to try a prescription stimulant without a doctor's orders specifically for the purpose of weight loss/appetite suppressive effects?

- a) You knew someone else who was doing it
- b) You heard about the idea from the media (e.g., TV, radio, Internet)
- c) Someone else gave you their ADHD medication specifically for that purpose
- d) Other \_\_\_\_\_



## Medication Source for Those Who Have Engaged in NMUPS

1. If you have ever used a prescription stimulant medication not prescribed to you, who did you get it from?

- a) Friends
- b) Family
- c) Internet
- d) Stranger
- e) Other \_\_\_\_\_

## Perceived Effectiveness of NMUPS for Weight Loss

1. How effective has using a prescription stimulant without a doctor's orders been in helping you lose weight?

- 1) Not at all effective
- 2) Mildly effective
- 3) Somewhat effective
- 4) Very effective

## Negative Consequences Associated With NMUPS

1. How often (if ever) have you experienced the following as a result of using a prescription stimulant without a doctor's orders?

	Never	Lifetime but not past year	1-2 occasions in past year	3-5 occasions in past year	6-9 occasions in past year	10-19 occasions in past year	20-39 occasions in past year	40+ times in past year
<b>1. Said or done something embarrassing</b>	0	1	2	3	4	5	6	7
<b>2. Felt guilty or ashamed</b>	0	1	2	3	4	5	6	7
<b>3. Performed poorly at school or work</b>	0	1	2	3	4	5	6	7
<b>4. Felt bad physically</b>	0	1	2	3	4	5	6	7
<b>5. Spent too much money or lost a lot of money</b>	0	1	2	3	4	5	6	7
<b>6. Missed school, work, or activities with friends</b>	0	1	2	3	4	5	6	7
<b>7. Done impulsive things you later regretted</b>	0	1	2	3	4	5	6	7
<b>8. Spent a significant amount of time thinking about, looking for, or using</b>	0	1	2	3	4	5	6	7
<b>9. Taken drugs in larger amounts or over longer period of time than you planned</b>	0	1	2	3	4	5	6	7

	Never	Lifetime but not past year	1-2 occasions in past year	3-5 occasions in past year	6-9 occasions in past year	10-19 occasions in past year	20-39 occasions in past year	40+ times in past year
10. Failed to do what was expected of you	0	1	2	3	4	5	6	7
11. Need more drugs to get the same effect or don't get the same effect with the usual amount	0	1	2	3	4	5	6	7
12. Lost interest in activities or hobbies	0	1	2	3	4	5	6	7
13. Been unhappy because of my stimulant use	0	1	2	3	4	5	6	7
14. Lost weight or not eaten properly because of my stimulant use	0	1	2	3	4	5	6	7
15. Gotten into a physical fight	0	1	2	3	4	5	6	7
16. Lost a close relationship	0	1	2	3	4	5	6	7
17. My personality has changed for the worse	0	1	2	3	4	5	6	7
18. Take more to avoid or reduce withdrawal	0	1	2	3	4	5	6	7
19. Gotten into legal trouble or arrested	0	1	2	3	4	5	6	7

	Never	Lifetime but not past year	1-2 occasions in past year	3-5 occasions in past year	6-9 occasions in past year	10-19 occasions in past year	20-39 occasions in past year	40+ times in past year
<b>20. Been suspended, expelled from school, or fired from work</b>	0	1	2	3	4	5	6	7
<b>21. Enjoyed using drugs</b>	0	1	2	3	4	5	6	7
<b>22. While using stimulants I said harsh or cruel things to someone</b>	0	1	2	3	4	5	6	7
<b>23. Wanted or tried to limit, cut down, or stop</b>	0	1	2	3	4	5	6	7
<b>24. Continued to use despite psychological or physical consequence</b>	0	1	2	3	4	5	6	7
<b>25. Needed medical treatment</b>	0	1	2	3	4	5	6	7

## Medication Knowledge

1. Please indicate the extent to which you agree/disagree with the following statement: I consider myself to be knowledgeable about the side effects associated with the use of stimulant medication normally used to treat ADHD (e.g., Adderall, Ritalin, Vyvanse).

1. Strongly Disagree
2. Disagree
3. Neither
4. Agree
5. Strongly Agree

2. Have you ever been exposed to information about the side effects associated with the use of stimulant medication normally used to treat ADHD (e.g., Adderall, Ritalin, Vyvanse)? (Please indicate all sources that apply)

- No I have not
- Internet
- Magazine
- Healthcare facility pamphlet
- In class
- Information session
- Other students/friends
- Parents
- Television
- Books
- Other

3. Individuals taking stimulant medication may experience the following short term or long term side effects and/or adverse consequences (Please answer “Yes,” for those that are side effects, “No” for those that are not side effects, and “Don’t know” if you do not know the answer):

	<b>Yes</b>	<b>No</b>	<b>Don't know</b>
Nighttime wakefulness (insomnia)	<b>Yes</b>	<b>No</b>	<b>Don't know</b>
Increase in blood pressure	<b>Yes</b>	<b>No</b>	<b>Don't know</b>
Sore throat	<b>Yes</b>	<b>No</b>	<b>Don't know</b>
Increase in heart rate	<b>Yes</b>	<b>No</b>	<b>Don't know</b>
Reductions in appetite	<b>Yes</b>	<b>No</b>	<b>Don't know</b>
Adverse psychiatric problems	<b>Yes</b>	<b>No</b>	<b>Don't know</b>
Sudden death	<b>Yes</b>	<b>No</b>	<b>Don't know</b>
Nausea	<b>Yes</b>	<b>No</b>	<b>Don't know</b>
Cardiovascular adverse reactions	<b>Yes</b>	<b>No</b>	<b>Don't know</b>
Dry mouth	<b>Yes</b>	<b>No</b>	<b>Don't know</b>
Headache	<b>Yes</b>	<b>No</b>	<b>Don't know</b>
Abdominal pain	<b>Yes</b>	<b>No</b>	<b>Don't know</b>

Vomiting	<b>Yes</b>	<b>No</b>	<b>Don't know</b>
Agitation	<b>Yes</b>	<b>No</b>	<b>Don't know</b>
Anxiety	<b>Yes</b>	<b>No</b>	<b>Don't know</b>
Dizziness	<b>Yes</b>	<b>No</b>	<b>Don't know</b>
Tachycardia (excessively rapid heartbeat)	<b>Yes</b>	<b>No</b>	<b>Don't know</b>
Diarrhea	<b>Yes</b>	<b>No</b>	<b>Don't know</b>

4. Below are contraindications (specific situations in which a drug should not be used because it may be harmful) listed for stimulant medications that may or may not be true (Please answer "True," for those that are contraindications, "False" for those that are not contraindications, and "Don't know" if you do not know the answer):

	<b>True</b>	<b>False</b>	<b>Don't know</b>
History of drug abuse	<b>True</b>	<b>False</b>	<b>Don't know</b>
Hyperthyroidism	<b>True</b>	<b>False</b>	<b>Don't know</b>
Glaucoma	<b>True</b>	<b>False</b>	<b>Don't know</b>
Serious cardiac (heart) problems	<b>True</b>	<b>False</b>	<b>Don't know</b>
During or within 14 days following MAOI (antidepressant medication) use	<b>True</b>	<b>False</b>	<b>Don't know</b>
Crohn's disease	<b>True</b>	<b>False</b>	<b>Don't know</b>
Migraines	<b>True</b>	<b>False</b>	<b>Don't know</b>
Influenza	<b>True</b>	<b>False</b>	<b>Don't know</b>

5. What would you want your last meal to be?\* \_\_\_\_\_  
 \*(Quality assurance question #2)

### Attitudes (TPB)

Please rate the extent to which you agree or disagree with each of the following questions (Choose one): strongly disagree, moderately disagree, somewhat disagree, no opinion, somewhat agree, moderately agree, strongly agree.

1. It is ethical for people *without* diagnosed ADHD to use stimulant medication for any reason.
2. It is ethical for people diagnosed *with* ADHD to use stimulant medication in excess or for purposes other than prescribed by a physician.
3. It is ethical for people *with* diagnosed ADHD to use stimulant medication *to lose weight/control appetite*.
4. It is ethical for people *without* diagnosed ADHD to use stimulant medication *to lose weight/control appetite*.
5. I believe it is safe for people to use stimulant medication in *excess or for purposes other* than prescribed by a physician.
6. I am concerned that taking stimulant medication in excess or for purposes other than prescribed by a physician will adversely affect a person's health.
7. I am concerned that taking stimulant medication *to lose weight/control appetite* will adversely affect a person's health.
8. I feel that the *benefits* of using a prescription stimulant medication without a doctor's orders for any reason *outweigh* the potential *risks*.
9. I feel that the *benefits* of someone misusing their own prescription stimulant medication for any reason *outweigh* the potential *risks*.



### Subjective Norms (TPB)

Please rate the extent to which you agree or disagree with each of the following questions (Choose one): strongly disagree, moderately disagree, somewhat disagree, no opinion, somewhat agree, moderately agree, strongly agree.

1. It is socially acceptable for people *without* diagnosed ADHD to use stimulant medication for any reason.
2. It is socially acceptable for people diagnosed *with* ADHD to use stimulant medication *in excess or for purposes other* than prescribed by a physician.
3. My friends/family/significant other believe that it is ok for people *without* diagnosed ADHD to use stimulant medication for any reason.
4. My friends/family/significant other believe that it is ok for people diagnosed *with* ADHD to use medication in excess or for purposes other than prescribed.
5. I know at least one person (e.g., family member/friend/significant other) who uses stimulant medications for the purpose of weight loss/appetite suppression without a doctor's prescription.
6. I know at least one person (e.g., family member/friend/significant other) who misuses his/her own stimulant medication for the purpose of weight loss/appetite suppression.
7. I value my friends'/ family's/significant other's opinion on whether or not it is ok for people *with* a prescription to use the stimulant medication in excess or for purposes other than prescribed.
8. I value my friends'/ family's/significant other's opinion on whether or not it is ok for people *without* a prescription to use the stimulant medication for any reason.
9. I believe the use of stimulant medication by people *without* diagnosed ADHD, is common.
10. I believe the use of stimulant medication by people diagnosed *with* ADHD *in excess or for purposes other* than prescribed, is common.

### Perceived Behavioral Control (TPB)

Please rate the extent to which you agree or disagree with each of the following questions (Choose one): strongly disagree, moderately disagree, somewhat disagree, no opinion, somewhat agree, moderately agree, strongly agree.

1. I feel I do not need stimulant medication *to help me lose weight/control my appetite*.
2. I am confident that I could get a stimulant medication from someone if I wanted to.
3. I feel I could lose weight successfully without the help of a stimulant medication.
4. I know people that would give/sell me a prescription stimulant medication if I wanted it.

Please check the number four below:\*

1      2      3      4      5      6

\*(Quality assurance question #3)

## Disordered Eating Attitudes/Behaviors (Past 28 Days; EDE-Q)

Instructions: The following questions are concerned with the past four weeks (28 days) only. Please read each question carefully. Please answer all the questions.

**Questions 1 to 12: Please choose the appropriate response. Remember that questions only refer to the past four weeks (28 days) only.**

**On how many of the past 28 days...**

1. Have you been deliberately trying to limit the amount of food you eat to influence your shape or weight (whether or not you have succeeded)?

0            1            2            3            4            5            6  
*No days    1-5 days    6-12 days    13-15 days    16-22 days    23-27 days    Every day*

2. Have you gone for long periods of time (8 waking hours or more) without eating anything at all in order to influence your shape or weight?

0            1            2            3            4            5            6  
*No days    1-5 days    6-12 days    13-15 days    16-22 days    23-27 days    Every day*

3. Have you tried to exclude from your diet any foods that you like in order to influence your shape or weight (whether or not you have succeeded)?

0            1            2            3            4            5            6  
*No days    1-5 days    6-12 days    13-15 days    16-22 days    23-27 days    Every day*

4. Have you tried to follow definite rules regarding your eating (for example, a calorie limit) in order to influence your shape or weight (whether or not you have succeeded)?

0            1            2            3            4            5            6  
*No days    1-5 days    6-12 days    13-15 days    16-22 days    23-27 days    Every day*

5. Have you had a definite desire to have an empty stomach with the aim of influencing your shape or weight?

0            1            2            3            4            5            6  
*No days    1-5 days    6-12 days    13-15 days    16-22 days    23-27 days    Every day*

6. Have you had a definite desire to have a totally flat stomach?

0            1            2            3            4            5            6  
*No days    1-5 days    6-12 days    13-15 days    16-22 days    23-27 days    Every day*

7. Has thinking about food, eating, or calories made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?

0            1            2            3            4            5            6  
*No days    1-5 days    6-12 days    13-15 days    16-22 days    23-27 days    Every day*

8. Has thinking about shape or weight made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?

0            1            2            3            4            5            6  
*No days    1-5 days    6-12 days    13-15 days    16-22 days    23-27 days    Every day*

9. Have you had a definite fear of losing control over eating?

0            1            2            3            4            5            6  
*No days    1-5 days    6-12 days    13-15 days    16-22 days    23-27 days    Every day*

10. Have you had a definite fear that you might gain weight?

0            1            2            3            4            5            6  
*No days    1-5 days    6-12 days    13-15 days    16-22 days    23-27 days    Every day*

11. Have you felt fat?

0            1            2            3            4            5            6  
*No days    1-5 days    6-12 days    13-15 days    16-22 days    23-27 days    Every day*

12. Have you had a strong desire to lose weight?

0            1            2            3            4            5            6  
*No days    1-5 days    6-12 days    13-15 days    16-22 days    23-27 days    Every day*

**Questions 13-18: Please fill in the appropriate number on the line below. Remember that the questions only refer to the past four weeks (28 days).**

**Over the past four weeks (28 days)...**

13. Over the past 28 days, how many times have you eaten what other people would regard as an unusually large amount of food (given the circumstances)?

\_\_\_\_\_

14. ... On how many of these times did you have a sense of having lost control over your eating (at the time that you were eating)?

---

15. Over the past 28 days, on how many **DAYS** have such episodes of overeating occurred (i.e., you have eaten an unusually large amount of food and have had a sense of loss of control at the time)?

---

16. Over the past 28 days, how many times have you made yourself sick (vomit) as a means of controlling your shape or weight?

---

17. Over the past 28 days, how many times have you taken laxatives as a means of controlling your shape or weight?

---

18. Over the past 28 days, how many times have you exercised in a “driven” or “compulsive” way as a means of controlling your weight, shape or amount of fat, or to burn off calories?

---

**Questions 19 to 21: Please choose the appropriate response. Please note that for these questions the term “binge eating” means eating what others would regard as an unusually large amount of food for the circumstances, accompanied by a sense of having lost control over eating.**

19. Over the past 28 days, on how many days have you eaten in secret (i.e., furtively)?  
... Do not count episodes of binge eating

0	1	2	3	4	5	6
<i>No days</i>	<i>1-5 days</i>	<i>6-12 days</i>	<i>13-15 days</i>	<i>16-22 days</i>	<i>23-27 days</i>	<i>Every day</i>

20. On what proportion of the times that you have eaten have you felt guilty (felt that you’ve done wrong) because of its effect on your shape or weight?  
... Do not count episodes of binge eating

0	1	2	3	4	5	6
<i>None of the times</i>	<i>A few of the times</i>	<i>Less than half</i>	<i>Half of the times</i>	<i>More than half</i>	<i>Most of the time</i>	<i>Every time</i>

21. Over the past 28 days, how concerned have you been about other people seeing you eat?  
... Do not count episodes of binge eating

0	1	2	3	4	5	6
<i>Not at all</i>		<i>Slightly</i>		<i>Moderately</i>		<i>Markedly</i>

**Questions 22 to 28: Please choose the appropriate response. Remember that the questions only refer to the past four weeks (28 days).**

**Over the past 28 days...**

22. Has your weight influenced how you think about (judge) yourself as a person?

0            1            2            3            4            5            6  
*Not at all*                      *Slightly*                      *Moderately*                      *Markedly*

23. Has your shape influenced how you think about (judge) yourself as a person?

0            1            2            3            4            5            6  
*Not at all*                      *Slightly*                      *Moderately*                      *Markedly*

24. How much would it have upset you if you had been asked to weigh yourself once a week (no more, or less, often) for the next four weeks?

0            1            2            3            4            5            6  
*Not at all*                      *Slightly*                      *Moderately*                      *Markedly*

25. How dissatisfied have you been with your weight?

0            1            2            3            4            5            6  
*Not at all*                      *Slightly*                      *Moderately*                      *Markedly*

26. How dissatisfied have you been with your shape?

0            1            2            3            4            5            6  
*Not at all*                      *Slightly*                      *Moderately*                      *Markedly*

27. How uncomfortable have you felt seeing your body (for example, seeing your shape in the mirror, in a shop window reflection, while undressing or taking a bath or shower)?

0            1            2            3            4            5            6  
*Not at all*                      *Slightly*                      *Moderately*                      *Markedly*

28. How uncomfortable have you felt about others seeing your shape or figure (for example, in communal changing rooms, when swimming, or wearing tight clothes)?

0            1            2            3            4            5            6  
*Not at all*                      *Slightly*                      *Moderately*                      *Markedly*

## Healthy and Unhealthy Weight Loss Behaviors (Past 12 Months)

1. How often have you done each of the following things in order to lose weight or keep from gaining weight during the **past year**?

	Never	Rarely	Sometimes	On a regular basis
<b>Fasted</b>	1	2	3	4
<b>Ate very little food</b>	1	2	3	4
<b>Exercise</b>	1	2	3	4
<b>Took diet pills</b>	1	2	3	4
<b>Ate more fruits and vegetables</b>	1	2	3	4
<b>Ate less high-fat foods</b>	1	2	3	4
<b>Used diuretics (water pills)</b>	1	2	3	4
<b>Ate less sweets</b>	1	2	3	4
<b>Used food substitute (powder/special drink)</b>	1	2	3	4
<b>Drank less soda pop (not including diet soda)</b>	1	2	3	4
<b>Skipped meals</b>	1	2	3	4
<b>Smoked more cigarettes</b>	1	2	3	4
<b>Watched my portion sizes (serving sizes)</b>	1	2	3	4
<b>Followed a high protein/low carbohydrate diet (e.g., Atkins or other)</b>	1	2	3	4
<b>Drank energy drinks (e.g., Red Bull, Monster)</b>	1	2	3	4
<b>While watching the television, how often have you ever had a fatal heart attack?*</b> *(Quality assurance question #4)	1	2	3	4

### Body Dissatisfaction (MBSRQ; Appearance Evaluation Subscale)

<b>Please read each of the following items carefully and indicate the number that best reflects your agreement with the statement.</b>	<b>Definitely Disagree</b>	<b>Mostly Disagree</b>	<b>Neither Agree Nor Disagree</b>	<b>Mostly Agree</b>	<b>Definitely Agree</b>
<b>1. My body is sexually appealing.</b>	1	2	3	4	5
<b>2. I like my looks just the way they are.</b>	1	2	3	4	5
<b>3. Most people would consider me good-looking.</b>	1	2	3	4	5
<b>4. I like the way I look without my clothes on.</b>	1	2	3	4	5
<b>5. I like the way my clothes fit me.</b>	1	2	3	4	5
<b>6. I dislike my physique.</b>	1	2	3	4	5
<b>7. I am physically unattractive.</b>	1	2	3	4	5



**Media Influence on Body Image (SATAQ-3; Pressures Subscale)**

<b>Please read each of the following items carefully and indicate the number that best reflects your agreement with the statement.</b>	<b>Definitely Disagree</b>	<b>Mostly Disagree</b>	<b>Neither Agree Nor Disagree</b>	<b>Mostly Agree</b>	<b>Definitely Agree</b>
<b>1. I've felt pressure from TV or magazines to lose weight.</b>	1	2	3	4	5
<b>2. I <u>do not</u> feel pressure from TV or magazines to look pretty (or muscular).</b>	1	2	3	4	5
<b>3. I've felt pressure from TV and magazines to be thin (or muscular).</b>	1	2	3	4	5
<b>4. I've felt pressure from TV or magazines to have a perfect body.</b>	1	2	3	4	5
<b>5. I've felt pressure from TV or magazines to diet.</b>	1	2	3	4	5
<b>6. I've felt pressure from TV or magazines to exercise.</b>	1	2	3	4	5
<b>7. I've felt pressure from TV or magazines to change my appearance.</b>	1	2	3	4	5

### Depressive Symptomatology (CESD-R)

Below is a list of the ways you might have felt or behaved. Please check the boxes to tell me how often you have felt this way in the past week or so.	Not at all or less than 1 day	1 - 2 days	3 - 4 days	5 - 7 days	Nearly every day for 2 weeks
1. My appetite was poor.	0	1	2	3	4
2. I could not shake off the blues.	0	1	2	3	4
3. I had trouble keeping my mind on what I was doing.	0	1	2	3	4
4. I felt depressed.	0	1	2	3	4
5. My sleep was restless.	0	1	2	3	4
6. I felt sad.	0	1	2	3	4
7. I could not get going.	0	1	2	3	4
8. Nothing made me happy.	0	1	2	3	4
9. I felt like a bad person.	0	1	2	3	4
10. I lost interest in my usual activities.	0	1	2	3	4
11. I slept much more than usual.	0	1	2	3	4
12. I felt like I was moving too slowly.	0	1	2	3	4
13. I felt fidgety.	0	1	2	3	4
14. I wished I were dead.	0	1	2	3	4
15. I wanted to hurt myself.	0	1	2	3	4
16. I was tired all the time.	0	1	2	3	4
17. I did not like myself.	0	1	2	3	4
18. I lost a lot of weight without trying to.	0	1	2	3	4
19. I had a lot of trouble getting to sleep.	0	1	2	3	4
20. I could not focus on the important things.	0	1	2	3	4

### Other Substance Use

Please indicate on how many occasions (if any) you have used the following in the past year:	No occasions	1-2 occasions	3-5 occasions	6-9 occasions	10-19 occasions	20-39 occasions	40 or more occasions
Energy Drinks	1	2	3	4	5	6	7
Tobacco products (Cigarettes, water pipe, cigars, smokeless tobacco)	1	2	3	4	5	6	7
Alcohol (beer, wine, liquor)	1	2	3	4	5	6	7
Marijuana (pot, weed, hashish, hash oil)	1	2	3	4	5	6	7
Cocaine (crack, rock, freebase, powder)	1	2	3	4	5	6	7
Methamphetamine (crystal meth, ice, crank)	1	2	3	4	5	6	7
Other amphetamines (bennies)	1	2	3	4	5	6	7
Anabolic steroids (Testosterone)	1	2	3	4	5	6	7
Opiates (heroin, smack)	1	2	3	4	5	6	7
MDMA (Ecstasy)	1	2	3	4	5	6	7

If you have used any other recreational drugs in the **past year** please list them.

\_\_\_\_\_

1. What do you think the purpose of this study was? (Please make your best guess.)\*

\_\_\_\_\_  
 \*(Quality assurance question #5)

## Vita

Amy June Jeffers was born on December 22, 1987 in Virginia Beach, Virginia. She graduated from Salem High School in Virginia Beach, Virginia in 2006. She earned her Bachelor of Science in Psychology from Old Dominion University, Norfolk, Virginia in 2010. She began the doctoral program in Health Psychology at Virginia Commonwealth University in 2010, and received her Master of Science in Psychology in 2012.