The Dissertation Committee for Yasisca Pujols Certifies that this is the approved version of the following dissertation:

The Experimental Effects of Pill Attribution on Sexual Performance Anxiety and Subsequent Erectile Performance

Committee:

Michael J. Telch, Supervisor

Cindy M. Meston

Lawrence K. Cormack

Juan M. Dominguez

Sandeep G. Mistry

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by

Yasisca Pujols, B.A.Art; M.A.

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The Experimental Effects of Pill Attribution on Sexual Performance Anxiety and Subsequent Erectile Performance

Yasisca Pujols, Ph.D.

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Supervisor: Michael J. Telch

Erectile performance anxiety (EPA) is a subset of sexual anxiety characterized by a fear of erectile failure. EPA has been shown to play a pivotal role in male sexual problems including premature ejaculation and erectile dysfunction (Loudon, 1998; Perelman, 2006). EPA affects approximately 14% to 23% of U.S. men across age groups (Laumann, Paik, & Rosen, 1999), and is the most common proximal cause of psychogenic ED (Hale & Strassberg, 1990; Hedon, 2003; Perelman, 1994; Rosen, 2001).

Phosphodiesterase type 5 (PDE5) inhibitors such as sildenafil citrate (brand-name Viagra) are the first line of pharmacological treatment for ED. Recreational use of PDE5 inhibitors – defined as unprescribed use with the goal of sexual enhancement and prevention of erectile failure among men *without* clinically significant erectile difficulties. Approximately 13.4% of young men between the ages of 18 - 30 report using PDE5 inhibitors recreationally. The most commonly reported reason for off-prescription use is to enhance one's sexual performance, i.e., longer lasting erections or impress one's sexual partner (Bechara, Casabe, De Bonis, Helien, & Bertolino, 2010; Harte & Meston,

2011; Holt, 2009; Korkes, Costa-Matos, Gasperini, Reginato, & Perez, 2008; Musacchio, Hartrich, & Garofalo, 2006). Reducing anxiety – specifically EPA is often given as a reason for recreational use, though to a lesser extent (Korkes et al., 2008; Schnetzler, Banks, Kirby, Zou, & Symonds, 2010). However, PDE5 inhibitors do not exert a significant increase in penile tumescence among men without erectile dysfunction (Mondaini et al., 2008). The actual sexual enhancement from recreational use of PDE5 inhibitors among this population would be limited in that blood flow to the healthy erectile tissue is already optimal.

The proposed study aimed to examine the effects of an erection-enhancing pill description misattribution on anticipatory anxiety and subsequent subjective and physiological sexual response to an audiovisual erotic stimulus. Participants underwent two assessments of their subjective and physiological arousal response to an erotic film after randomization to one of three conditions (erection-enhancing pill description, memory-enhancing pill description, or a no pill control). It was hypothesized that compared to those in the memory-enhancing pill group and the no pill control group, participants in the erection-enhancing pill group would respond with greater anticipatory anxiety and dampened penile tumescence in response to a subsequent no-pill erotic film presentation. Results of the study provided partial support for the hypothesized negative effects of the pill attribution manipulation. In the subset of subjects with complete pre and post-manipulation physiological data, those led to believe they ingested an erectile-enhancing herb showed a dampening of erectile tumescence to a subsequent erotic film presentation. Also, consistent with prediction, erectile performance anxiety was

associated with decreased tumescence after the bogus “average” erectile performance feedback compared to baseline. These findings suggest that pill attribution may influence sexual arousal to some extent, despite methodological issues such as partial physiological data loss and believability of the pill instructional set manipulation.

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CHAPTER 1: INTRODUCTION

1.1 Overview

Since the market introduction of sildenafil (brand-name Viagra) in 1999, over 20 million men with some degree of erectile dysfunction have been treated with phosphodiesterase type 5 inhibitors (PDE5 inhibitors). As with other highly effective pharmacological treatments including stimulants and opiates, PDE5 inhibitors are often obtained and consumed without a prescription and used recreationally among sexually healthy younger men and gay men. Qualitative research highlights the recreational users' positive response to the drug's ability to prevent erectile failure, but the subsequent psychological effects of such use is lacking in the literature. Research on anxiety-reducing "safety" behaviors (i.e., "*unnecessary actions taken to prevent, escape from, or reduce the severity of a perceived threat"* as defined by Telch & Lancaster, 2012), recreational users of PDE5 inhibitors may attribute their sexual performance to the medication. PDE5 inhibitors affect the penile tissue's ability to retain blood, and thus sexually healthy men do not experience enhanced, or robust, erections. Attributing successful erectile performance to the use of an "ED enhancing pill" rather than one's own erectile capabilities could potentially undermine one's self-efficacy and induce erectile performance anxiety for subsequent sexual encounters, particularly when the enhancing agent is unavailable. Research demonstrates that use of safety aids that are expected to reduce anxiety or improve performance can result in poorer outcomes or performance without the aid (Powers, Smits, Whitley, Bystritsky, & Telch, 2008; Weiner

& Samuel, 1975). The present study investigated the effects of pill attribution, by experimentally manipulating young men's beliefs that an erectile-enhancing herb aided their erectile performance. Following this attribution manipulation, we then examined its effects on subjects' anticipatory anxiety and physiological sexual arousal to a subsequent erotic film in the absence of the erection-enhancing pill effects. It was hypothesized that compared to those in the memory-enhancing pill group and the no pill control group, participants in the erection-enhancing pill group would respond with greater anticipatory anxiety and poorer erectile response, specifically penile tumescence, to the subsequent no-pill erotic film presentation. Furthermore, we hypothesized that individuals reporting greater EPA would have greater dampening of penile tumescence and greater anticipatory anxiety compared to those reporting less EPA.

1.2 Erectile Dysfunction

1.2.1 Physiological Process of Erectile Response

The initiation of an erection begins with tactile, auditory, visual, and/or imagined sexual stimulation that is processed in specific areas of the brain, which include the medial amygdala, medial preoptic area, paraventricular nucleus, periaqueductal gray, and ventral tegmentum (Gratzke et al., 2010). The resulting neural output is then transmitted through pathways via the spinal cord and peripheral nervous system. The autonomic nervous system pathway to the penile tissue and the somatic pathway to the perineal muscles are implicated in erectile response. These pathways trigger the release of

numerous transmitters and hormonal substances that activate specific processes locally at the genital region.

A penile erection is produced when the smooth muscles of the corpus cavernosa, two tubular sponge-like structures in the shaft of the penis, become engorged with blood. Engorgement is the result of direct or indirect sexual stimulation that induces the release of nitric oxide from the walls of the cavernosa. Nitric oxide activates the production of cyclic guanosine monophosphate (cGMP), the chemical that relaxes the smooth muscle tissue of the corpus cavernosa (Lin, Lin, & Lue, 2005). Once the smooth muscle tissue is relaxed, blood can easily flow into the cavernosa.

Phosphodiesterase type 5 is the principal enzyme that ends the cGMP activity by inhibiting its production via catalyzing cGMP into GMP. The cavernosa smooth muscle returns to a state of contraction, not allowing for the influx of blood into the structures (Lin et al., 2005).

1.2.2 Prevalence of Erectile Dysfunction

Several large-scale studies on the prevalence of erectile dysfunction (ED) have been published in the past two decades, and the data reveal rates ranging from 11.3% (Laumann, Paik, & Rosen, 1999) to 31.9% (Reis & Abdo, 2010). ED prevalence increases with age. Approximately 5-11% of young men in their 20s and 30s experience ED, and rates increase steadily to 43% for men in their sixties and over 70% for those over 70 years age (Selvin, Burnett, & Platz, 2007). The variability across prevalence studies has been attributed to methodological factors in data collection such as the survey

delivery method (e.g., in-person and telephone interviews, computer-assisted questionnaire, postal survey), the type of ED measure (single item versus empirically validated instrument), variation in ED category inclusion critera, and possible differential responding in studies conducted before and after the mass availability of PDE5 inhibitors.

ED prevalence noticeably increased after the introduction of sildenafil citrate. Prior to sildenafil, Laumann and colleagues (1999) conducted the National Health and Social Life Survey and found the prevalence of ED affected 10 – 15% of men across the lifespan, with approximately 8% of men in early adulthood and 18% in late adulthood (Laumann et al., 1999). Selvin and colleagues (2008) reviewed data collected during 2001 to 2002 from the National Health and Nutrition Examination Survey. Even with stricter ED diagnostic criteria, the authors reported a higher prevalence of ED, 18.4%, than the 1999 prevalence study (Selvin et al., 2008). Greater awareness and normalization of erectile problems due to extensive advertising campaigns and media coverage for sildenafil may have contributed to the increase in ED prevalence.

In other population-based studies, there is a notable increase in ED prevalence, 25.1%, using normative IIEF cut-offs (International Index of Erectile Function; Rosen, Riley, Wagner, Osterloh, Kirkpatrick, & Mishra, 1997), twice that of Lauman and colleagues' findings (Chew, Stucky, Bremner, Earle, & Jamrozik, 2008). Variability in ED prevalence using the IIEF is also found in other countries, ranging from 5.8% (Stulhofer & Bajic, 2006) to as high as 70% (Cho et al., 2003; Low, Tong, & Tan, 2008; Quek, Sallam, Ng, & Chua, 2008).

1.2.3 Etiology of Erectile Dysfunction

Historically, erectile dysfunction (ED) was thought to be psychogenic in nature (Masters & Johnson, 1970). It is now well known that ED can also have organic causes or combined etiologies (Beutel, 1999). Differential diagnostic procedures to identify the type of erectile failure, organic vs. psychogenic, include Nocturnal Penile Tumescence analysis, and self-reports of erection capability during masturbation and partnered sexual activity (Beutel, 1999; Farre, Fora, & Lasheras, 2004). Erectile response is a physiological process that is initiated through either direct or indirect sexual stimuli. Erectile failure can result as interference or disruption in the psychological processes or as physiological impairment to the penile tissue.

1.2.3.1 Organic Causes of Erectile Dysfunction

There are several organic causes that can lead to erectile response difficulties such as hormonal (e.g., changes in production and secretion), neurological (e.g., inadequate activation of neurons, pharmacotherapy that acts on the central and peripheral nervous systems), vascular issues (e.g., inadequate blood flow) and physical damage to implicated tissues in the spinal cord or penile cavernosa (Beutel, 1999; de Tejada et al., 2005; Gratzke et al., 2010).

Medical diseases that are implicated in ED include diabetes (Plaud et al., 1996; Wyllie, 2005), cardiovascular disease (Korenman, 1998; Wyllie, 2005), hypertension (Plaud et al., 1996), and neurological conditions such as multiple sclerosis and epilepsy (Demirkiran, Sarica, Uguz, Yerdelen, & Aslan, 2006; Duncan, Talbot, Sheldrick, &

Caswell, 2009; Lottman, Jongen, Rosier, & Meuleman, 1998). Diabetes and cardiovascular disease rank the highest due to blood circulation impairment, a direct factor in erectile response (Bocchio et al., 2007; Lemogne, Ledru, Bonierbale, & Consoli, 2010; Maroto-Monteroa et al., 2008; Plaud et al., 1996). Several of these illnesses can also be interpreted as age-related factors since many ED-associated diseases occur with greater frequency later in life.

The type of ED etiology is associated with ED severity. Specifically, organic etiologies of ED are associated with greater ED severity. In a study of 162 men, mild ED presentations were significantly more likely to be psychogenic in nature whereas severe ED was more often of mixed etiology: combinations of neurogenic, vascular, hormonal, anatomic, *and* psychogenic causes (Latini, Penson, Wallace, Lubeck, & Lue, 2006). Unlike organic causes of ED, psychogenic causes often have indirect pathways to erectile failure.

1.2.3.2 Psychological Causes and Consequences of Erectile Dysfunction

Evidence suggests that ED may be caused and exacerbated by a broad range of psychological issues. The prevalence of ED is elevated in men with comorbid psychiatric illness, i.e. 18 – 35% of those with depressive disorders, 37% with anxiety disorders, and 47% with psychotic disorders (Farre et al., 2004). Moreover, compared to normal controls, men with ED show significantly greater levels of chronic depression and anxiety (Cho et al., 2003). Not surprisingly, men with severe ED report more loneliness, less positive affect and sexual self-efficacy than men with mild ED (Latini et al., 2006).

Situational stressors may include job-related stress and responsibility (Hedon, 2003), relationship stress, e.g. conflict, divorce, and widower status (Beutel, 1999; McCarthy, 1992), life-endangering traumatic events and/or injury (Ulvik, Kvale, Wentzel-Larsen, & Flaatten, 2008), and having a negative perception towards aging (Hedon, 2003). Perelman (1994) also suggested that fatigue may impede erection function. The most common self-reported psychological reason for ED is anxiety, both sexually related and nonsexual anxiety (O'Donoghue, 1996). ED is robustly associated with anxiety and in turn, anxiety is significantly associated with life stressors (Corona et al., 2006; Sugimori et al., 2005).

The interpretation of sexual stimuli at the brain level is most likely the primary factor in psychogenic ED (Farre et al., 2004; Levine & Althof, 1991). Where the erotic nature of the stimuli may be viewed positively by men with ED (Nobre & Gouveia, 2000), concurrent anxiety about sexual performance activates the hypothalamic-pituitary-adrenal axis, the system that regulates a key stress hormone, cortisol (Farre et al., 2004; Miller, Chen, & Zhou, 2007). The cascade effects of cortisol release and cognitive distraction from sexual stimuli can impact male sexual functioning (Farre et al., 2004; Schiffer, Rao, & Fogel, 2003).

1.3 Treatment for Erectile Dysfunction

1.3.1 Early Medical treatments

Early treatment of erectile dysfunction consisted of injection therapy and mechanical devices. Currently, papaverine and alprostadil continue to be the principal substances used as intracavernous injections. These have demonstrated high efficacy as treatments (70% to 92% across clinical trials) by immediately producing an erectile response regardless of the individual's state of mental sexual arousal (Bechara et al., 1997; Linet & Ogrinc, 1996). Side effects include penile pain and priapism but other more systemic effects such as mild hypotension are rare (Hatzimouratidis & Hatzichristou, 2005).

Non-pharmacological alternatives consist of mechanical devices and penile implants. Mechanical vacuum devices draw blood into the corpus cavernosa with vacuum suction; the blood is kept within the penile tissue with a constrictive rubber ring. Although efficacy is high over 95% when the device is used properly, satisfaction with erection varies from 27% to 94% (Turner et al., 1991; Witherington, 1989). Penile implants remain a last option for severe ED, often non-responsive to first-line treatments, given the risks associated with surgical implantation. Rigid and semi-rigid implants were developed in the 1940s and 1950s. The first inflatable penile implant was developed much later, in 1973 (Subrini, 1982). Across the implant types, efficacy rates have remained at 100% due to the structural nature of the implant, though complications such as mechanical failures and infections can occur (Hatzimouratidis & Hatzichristou, 2005;

Hellstrom et al., 2010). With the advent of phosphodiesterase type 5 inhibitors (see Section 1.3.2) injection therapy and mechanical devices are now considered second line treatments for ED, and are typically used for those who are not responsive to PDE5 inhibitors.

1.3.2 Phosphodiesterase Type 5 Inhibitors

The mechanism of action for PDE5 inhibitors is through the inhibition of the enzyme phosphodiesterase type 5 and allowing the action of cGMP, which maintains the relaxation of the smooth muscles of the corpus cavernosa. Although PDE5 inhibitors produce a robust erectile response, there are also non-erectile effects that benefit the user (i.e., augment therapy for pulmonary hypertension, gastrointestinal disorders, and endothelial dysfunction) (Mostafa, 2008).

The first clinically effective PDE5 inhibitor was sildenafil. The landmark study that significantly changed the medical approach to treating ED resulted in 74% of men reporting improved erectile response with the drug (Goldstein et al., 1998). In the study, 19% of men taking placebo experienced improved erectile response (Goldstein et al., 1998). The second PDE5 inhibitor, vardenafil, was approved by the FDA in 2003 after a series of successful clinical trials. In the initial clinical efficacy trial, 72.8% of participants reported improved erections (Hellstrom et al., 2002). One noted effect is that the absorption of sildenafil and vardenafil may be affected by high fat foods and alcohol (McNamara & Donatucci, 2011). To that result, a third PDE5 inhibitor, tadalafil, was developed using a more selective mechanism of action and is not affected by food or

alcohol ingestion (McNamara & Donatucci, 2011). Clinical trials of tadalafil resulted in 74% of men with mild to severe ED experiencing improved erections (Brock et al., 2002). Tadalafil has also been shown to reach maximum effectiveness within an hour and remain active for 17 hours, more immediate than sildenafil or vardenafil (Porst et al., 2003).

The high efficacy of PDE5 inhibitors and ease of use has made these medications susceptible to misuse. PDE5 inhibitors have become a notoriously popular counterfeit drug; between 2004 and 2008, approximately 35 million counterfeit tablets were seized in Europe, 96% of which were purported to be sildenafil (Jackson, Arver, Banks, & Stecher, 2010).

1.4 Recreational Use of PDE5 Inhibitors

Recreational use of phosphodiesterase type 5 (PDE5) inhibitors consists of occasional and often unprescribed use for sexual enhancement and erectile failure prevention among men *without* clinically significant erectile difficulties. Street availability of PDE5 inhibitors appeared in European night clubs in 1999, only one year after the first PDE5 inhibitor, sildenafil, went on the market (Aldridge & Measham, 1999). Recreational use of PDE5 inhibitors has shown a significant increase over time since the licensing of sildenafil from 3.2% in 1999 to 17% in 2003 (McCambridge, Mitcheson, Hunt, & Winstock, 2006). With the increase in reported use, McCambridge (2006) also found a corresponding decrease in age of first use from 27.7 to 25.1 years. Consistent with this trend, Korkes and colleagues (2008) reported the age of first use to

be 21 years. Recent rates of recreational use among college-aged men have ranged from 5.3% - 12.7% of undergraduates ((Harte & Meston, 2011; Musacchio et al., 2006) to 9% - 21.5% of medical students (Bechara et al., 2010; Korkes et al., 2008). Recreational PDE5 inhibitor use is even greater among gay and bisexual populations, ranging from 26.3% (Nettles, Benotsch, & Uban, 2009) to 37.5% (McCambridge et al., 2006; Nettles et al., 2009).

It is often the case that recreational users cannot obtain a prescription of PDE5 inhibitors from a health care provider because they are not experiencing erectile difficulties. PDE5 inhibitors are often obtained through alternative means that do not require a prescription such as online websites, free drug samples, friends, and illicit drug dealers. From 32.3% to 69% of recreational users obtain ED medication without a prescription (Bechara et al., 2010; Benotsch et al., 2006; Korkes et al., 2008; Schnetzler et al., 2010). The remaining users consult with a health care provider to some extent, receive a prescription based on self-reported ED symptoms or receive a sample packet of the medication. It is important to note that approximately 12.5% -12.7% of recreational users self-report mild to significant erectile difficulties though it is unclear if erectile difficulties were present before first using PDE5 inhibitors (Harte & Meston, 2011; Korkes et al., 2008; Musacchio et al., 2006).

The most commonly reported reason for off-prescription use of PDE5 inhibitors among younger men and gay/nonstraight populations is to enhance one's sexual performance, i.e. increase penile rigidity, longer lasting erections, to delay ejaculation, attain more erections per sexual encounter, and impress one's sexual partner (Bechara et

al., 2010; Harte & Meston, 2011; Holt, 2009; Korkes et al., 2008; Musacchio et al., 2006). Other common reasons include preventing potential erectile failures. Between 57% and 67% of men reported using PDE5 inhibitors to prevent erectile failure when putting on a condom (Korkes et al., 2008; Musacchio et al., 2006) and when consuming alcohol and other substances such as marijuana, cocaine, GHB, and methamphetamine – substances known to limit erectile tumescence (Musacchio et al., 2006). General sexual anxiety and EPA are sometimes reported as reasons for recreational use, though to a lesser extent (Korkes et al., 2008; Schnetzler et al., 2010).

Despite the expectation among recreational users that PDE5 inhibitors will enhance their erectile performance, the effects of PDE5 inhibitors on healthy young men are negligible. Research on PDE5 inhibitors, specifically sildenafil, among healthy men indicates that use of the medication does not significantly improve sexual performance compared to placebo (Mondaini et al., 2003). In fact, the only reported improvement has been a reduction of post-ejaculatory recovery time experienced by less than half of Mondaini and colleagues' sample. In another at-home double-blind, placebo-controlled study of 10 men, self-reported ratings revealed marginally significant effects for sildenafil over placebo (Kamin, Ben Zion, Chudakov, & Belmaker, 2006). Based on these findings, PDE5 inhibitors may not play a direct role in the physiological sexual arousal of sexually functional males. One possibility is that recreational users attribute their successful performance to the PDE5 inhibitors, thus reinforcing the belief that the medication is enhancing their sexual performance.

1.5 Sexual Performance Anxiety

Sexual anxiety has been defined in the literature as the expectancy of punishment for violating a socially accepted standard of sexual behavior (Janda & O'Grady, 1980). This expectancy of negative evaluation can lead to distress or discomfort in initiating or engaging in sexual activity. One's level of anxiety with sexual situations has been linked to sexual esteem, sexual assertiveness, sexual avoidance, sexual functioning after a history of sexual abuse, and identifying with a non-traditional gender role (Katz & Farrow, 2000; Simon & Feiring, 2008; Wiederman, 2000). Sexual anxiety, and not general worry, has also been identified as a factor in sexual dysfunction. For example, there is evidence that sexual anxiety may serve as a maintaining factor in sexual aversion disorder (Katz & Jardine, 1999; Minnen & Kampman, 2000). Sexual performance anxiety, a subset of sexual anxiety, has also been shown to play a pivotal role in male sexual problems including premature ejaculation and erectile dysfunction (Loudon, 1998; Perelman, 2006).

There is empirical evidence for a link between erectile functioning, general anxiety, and sexual anxiety (Althof, 2002; Beck & Barlow, 1986b; Gralla et al., 2008). Sexual anxieties encompass numerous areas of concern, including concerns about appearance, performance, evaluation by one's partner, and sexual activity in general (McCabe, 1998) Erectile performance anxiety (EPA) is a subset of sexual anxiety and is characterized by a fear of erectile failure. It affects approximately 14% to 23% of U.S. men across age groups (Laumann et al., 1999), and it is the most common proximal cause

of psychogenic ED (Hale & Strassberg, 1990; Hedon, 2003; Perelman, 1994; Rosen, 2001).

During sexual activity, men with EPA often engage in *spectatoring* - a term coined by Masters and Johnson (1970). Spectatoring refers to inspecting, monitoring, and evaluating one's erectile response during sexual activity. Masters and Johnson speculated that focusing one's attention externally on erectile performance as an observer without paying attention to the pleasurable sensations and emotions accompanying sexual arousal. Placing oneself in a spectator role may increase EPA and subsequently impair erectile performance.

Based on a series of elegant experiments (Barlow, Sakheim, & Beck, 1983; Beck & Barlow, 1986a), Barlow (1986) proposed a model of erectile dysfunction where the maintaining factor of the dysfunction is anxiety. The model is described as a *negative feedback loop* for sexually dysfunctional men beginning with the perceptual reaction to sexual stimuli and a demand for sexual performance (e.g., initiating sexual activity). For the sexually dysfunctional man, performance demand invokes negative affect, expectancies, and less perceived control over the individual's erection. Attentional focus and processing is directed away from erotic cues (i.e., pleasurable sensations and arousing sexual stimuli) to self-evaluation, which includes spectatoring and examining the consequences of inadequate performance. The attentional focus on these non-erotic cues increases autonomic arousal, thus further increasing attentional resources on the consequences of inadequate erectile performance. With increasing attention on failure rather than erection-facilitating erotic cues, erectile response is inhibited. The inadequate

erectile response is perceived as a negative outcome and may lead to avoidance of sexual activity. Erectile failure, or even inadequate erectile performance, can lead to anticipatory anxiety about future erectile performances, thus maintaining erectile difficulties and ED (Althof & Wieder, 2004; Slowinski, 2007).

Anxiety, more specifically EPA, in Barlow's model (1986) is represented as the cognitive and physiological process of focusing on "public consequences of not performing" and "increased autonomic arousal". EPA, or attentional focus on underperforming, occurs during the later stages of the model as well as at the onset of sexual activity. Anticipatory anxiety is implied by sexual avoidance and the negative feedback loop, where poor past performance induces fear of future failure and negative evaluation. Previous research has documented EPA not only during sexual encounters, but also at times when not engaging in sexual activity (Althof & Wieder, 2004; Slowinski, 2007).

The neural mechanism through which EPA affects erectile performance begins with one's negative perception of the sexual experience. The neural output transmission of cognitive stimuli (fears of failing, negative evaluation) to the sacral spinal cord acts to dampen reflex erectile response. The excess sympathetic activation may counteract the necessary relaxation of the penile tissue in times of stress or anxiety leading to diminished erectile response (Farre et al., 2004; Levine & Althof, 1991). Bancroft and colleagues (2005) found that sexual inhibition due to EPA significantly predicted ED even after controlling for age.

1.5.1 Cognitive Factors Implicated in EPA

Causal attributions and perceptions play a crucial role in EPA. In a study examining responses to hypothetical sexual events, men with ED attributed internal (e.g., self-focused) and stable (e.g., continuity of situation) causes for negative sexual events more often than sexually functional men (Scepkowski et al., 2004). These men also rated the negative sexual events as more important than the healthy controls (Scepkowski et al., 2004). It has been suggested that these causal attributions govern EPA and subsequently lead to ED (Rosen, 2001).

Cognitions during sexual activity are markedly different between men with and without ED. Nobre and Gouveia (2000) surveyed 131 men recruited from a urology clinic and from the community on sexual attitudes and their usual cognitive and affective responses during sexual activity. They found that men generally reported having erotic and non-erotic thoughts during partnered sexual activity, however men with ED reported significantly fewer erotic thoughts and a significantly higher frequency of non-erotic thoughts. Moreover, unlike sexually functional men, men with ED describe their non-erotic thoughts to be dominated by thoughts of high sexual performance demands and consequences of erectile failure accompanied by negative emotional reactions (Nobre & Gouveia, 2000).

1.5.2 Cultural Factors Implicated in EPA

From a societal perspective, successful erectile performance is highly valued in Western cultures placing a greater importance on one's sexual performance (Levine &

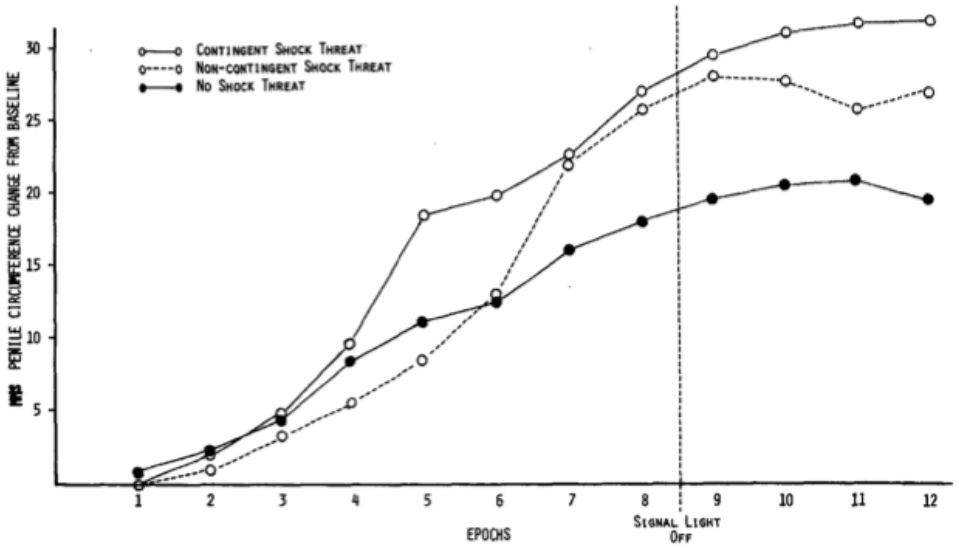
Althof, 1991). Other cultures show similar values and importance of erectile performance. Some Middle Eastern cultures are shown to have high occurrences of *honeymoon impotence*, or the inability to attain an erection sufficient for intercourse with their new marital partners. A survey of Middle Eastern men seeking treatment for honeymoon ED at urology clinics revealed that the majority presented with psychogenic ED and reported both general anxiety and EPA (Usta et al., 2001).

1.5.3 Experimental Studies of Sexual Performance Demand and EPA

Experimental laboratory studies provide substantial evidence for the impact of EPA on ED. One of the earliest studies on performance anxiety and erectile response was conducted using a shock threat paradigm. Barlow and colleagues (1983) recruited 12 sexually functional young men to examine performance demand on erectile response. Participants' shock tolerance (most intense shock tolerated) was measured and used to convince the participants of the possibility that they may be shocked during the experiment. Participants underwent three conditions in a random order. In each condition they viewed an erotic film during which their physiological sexual arousal, specifically penile tumescence, was measured with a penile strain gauge. The conditions corresponded with differing instructions of the function of three signal lights displayed near the erotic film presentation screen. Participants received the following signal light descriptions. The no shock threat condition indicated no shock when a signal light was on. The second signal light indicated a 60% possibility of shock when the light was on (non-contingent shock threat). The third signal light indicated a 60% possibility of shock

if erectile response did not achieve at least the average penile circumference change recorded for previous individuals viewing the same film (contingent shock threat). All signal light descriptions were a deception in that no shock was to be administered even if the lights were on. Compared to the no shock condition, erectile response in both shock threat conditions was significantly greater (Barlow, Sakheim, & Beck, 1983). The contingent shock threat condition, with the performance demand component, yielded the greatest erectile response, but was not significantly greater than the non-contingent condition (Barlow, Sakheim, & Beck, 1983). These results support that anxiety, specifically the fear of shock, acted as a facilitator for erectile response in sexually functional men regardless of the type of anxiety, general or erectile performance anxiety.

Figure 1. Erectile Performance under Shock Threat



Note. Epochs represent 15 sec intervals. Figure excerpt from Barlow, Sakheim, & Beck (1983).

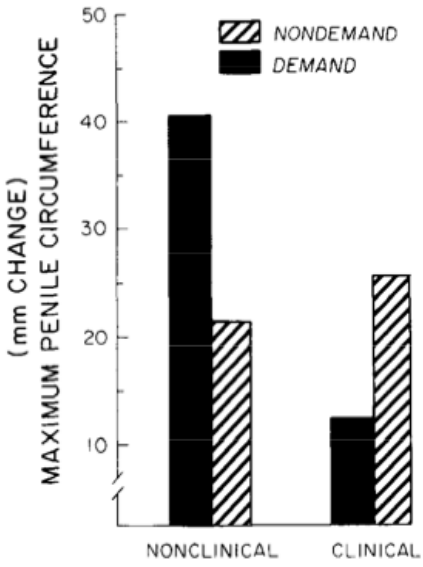
Beck & Barlow (Beck & Barlow, 1986a, 1986b) expanded upon the original 1983 study with a series of studies utilizing the shock threat paradigm among a sample of sexually and dysfunctional men. The first study consisted of 24 sexual functional and dysfunctional participants recruited from urology clinics. The sexually dysfunctional sample (n = 12) reported psychogenic erectile dysfunction assessed via physical examination and Doppler waveform analysis. Sexually functional participants (n = 12) were seeking routine examinations at the urology clinics. All participants underwent two conditions in which they viewed an erotic film while their erectile response was measured with a penile strain gauge. The contingent shock condition consisted of a light signaling a 60% possibility of shock if the average penile tumescence, based on previous individuals' strain gauge data, was not achieved. A no shock condition in which a second light turned on but did not indicate a possibility of shock served as the control condition. Results revealed that sexually functional men experienced diminished erectile response when threatened with the possibility of electric shock compared to the no shock condition. Men with ED did not experience a significant difference in their erectile response between the two conditions (Beck & Barlow, 1986a).

The authors speculated that the evidence contradicting the 1983 study that anxiety facilitates erectile response, may be due to the sample characteristics and history of sexual experience. The sample was considerably older than the earlier study, ranging from 22 to 60 years with a mean age of 43 versus mean age of 26 and the oldest participant in the earlier study was 30 years old. Given that the sample was older, these men may have experienced erectile difficulties at some point in their sexual histories.

With such experiences, a demand for above average erectile performance with a negative consequence for subpar performance could in fact produce erection-inhibiting autonomic anxiety, along with spectatoring behaviors, as described in Barlow's model of sexual dysfunction (1986). The sexually dysfunctional men may have been already engaging in spectatoring and experiencing EPA for both shock and non-shock conditions as evidenced by studies on cognitive distraction, spectatoring, and erectile performance (Beck & Barlow, 1986b).

Sexual performance demand studies using other methods have also provided support for the role of pill instructional scripts. For example, Heiman and Rowland (1983) tested 16 sexually functional men and 14 men with a range of sexual dysfunctions, nine of which presented with ED. Scripted instructions were provided prior to two presentations of audio-recorded sexual stimuli. The instructions suggested either a low performance or high performance demand: *This tape is designed to* a) *be a pleasurable experience* or b) *test how sexually aroused you can become*. The sexually dysfunctional men experienced greater penile tumescence during the low performance demand condition compared to their response during the high performance demand condition (See Figure 2). The sexually functional men responded in a reverse pattern, a greater response during the high performance demand condition.

Figure 2. Change in Penile Circumference across Demand Conditions



Note. Figure excerpt from Heiman & Rowland (1983).

An animal model of performance demand and EPA proved successful in establishing the causal relationship between EPA and erectile response (Brien, Smallegange, Gofton, Heaton, & Adams, 2002). Rats were given apomorphine injections to produce chemically induced erections and baseline sexual behaviors were recorded during a 30-minute period. After a recovery period, the rats were subjected to one of two EPA conditions. Observation-induced anxiety (condition 1) was produced by exposing the rat to four cages containing larger, older male rats and physiological anxiety was induced by hyperadrenergic stimulation with methoxamine without exposure to other rats (condition 2). Both experimental groups resulted in significantly weaker erections compared to the control group; the methoxamine condition elicited fewer erections than the psychological anxiety condition (Brien et al., 2002).

1.6 Pill Attribution

Kelley's (1967) attribution theory states that an individual may attribute an outcome to an internal (self) or an external cause as inferred by information in the environment. Several studies examining pill attributions to behavior have been conducted. Two insomnia studies examined the effects of a physiologically arousing pill instruction set for a placebo pill on sleep onset. Insomnia patients who received an instruction set that the pill causes physiological arousal fell asleep faster than patients who were told that the pill would induce muscle relaxation. The authors concluded that an attribution of one's arousal symptoms to an external cause, the arousing pill, resulted in a faster sleep onset (Lowery, Denney, & Storms, 1979; Storms & Nisbett, 1970). Another study applied the same design with a sample of smokers. The smokers ingested a pill expected to induce irritability and refrained from one day of smoking. As a result, the smokers reported less irritability and experienced other withdrawal symptoms to a lesser extent when attributing their symptoms externally to the pill (Barefoot & Girodo, 1972). Weiner and Samuel (1975) also found similar effects among a sample of undergraduates with test anxiety. Those who had ingested a pill believed to be physiologically arousing outperformed the pill-free undergraduates on a battery of reasoning and logic tests. Better performance occurs when unwanted arousal symptoms are misattributed to an external cause such as a pill rather than an internal attribution e.g., lack of ability.

The previously mentioned studies address pill attribution of physiological arousal symptoms that can interfere with an individual's performance. More recent studies have

examined the effects of pill attribution that mimic prescription medication on individual performance. For example, Powers and colleagues (2008) examined the effects of a pill attribution manipulation on the subsequent return of fear among a phobic sample undergoing exposure treatment for claustrophobia. Participants who were led to believe that their reduction in fear was due to ingesting a relaxing herb (analog to anxiolytics) attributed their fear response internally and experienced greater anxiety at the follow-up assessment. Those who ingested a pill for which they believed had physiologically arousing properties did not experience a return of fear at follow-up.

Men's erectile response has also been shown to be influenced by pill expectancies in a similar way. Specifically, sexually functional individuals experienced increased physiological erectile response after ingesting a placebo pill thought to enhance erections compared to their baseline erectile response (Cranston-Cuebas, Barlow, Mitchell, & Athanasiou, 1993). The findings on erection-enhancing pill instruction sets and sexual arousal response point to a change in performance expectations and the development of external attributions. Healthy men who *actively* seek the recreational use of PDE5 inhibitors may be affected by pill attributions to a greater extent (i.e., they expect enhanced erectile performance and attribute their performance to the pill). Upon receiving feedback of satisfactory erectile performance, recreational users may misattribute their successful performance to the use of the pill (external attribution) rather than their own abilities (internal attribution). This shift in causal attribution for successful performance may lead to the faulty belief that the PDE5 inhibitor is needed to insure

continued optimal erectile performance in the future. The need to have access to a PDE5 inhibitor can be conceptualized as a safety-seeking behavior.

1.6.1 Role of Safety Behaviors in Pathological Fear

Avoidance and safety-seeking behaviors are described as unnecessary actions taken to prevent, escape from, or reduce the severity of a perceived threat (Telch & Lancaster, 2012). Perceived threats can be internally focused (i.e., embarrassment in social situations, potential heart attack due to caffeine ingestion) or external experiences (i.e., trapped in an elevator) (Helbig-Lang & Petermann, 2010). These strategies aimed at counteracting a perceived threat are present in expressions of pathological anxiety. Pathological anxiety differs from normal range anxiety in that the threat, an unwanted fear-inducing experience, is perceived as more dangerous or catastrophic than in actuality. This anxiety causes marked emotional distress or functional impairment, a key feature of anxiety disorders (APA, 2000). Social phobia, panic disorder, and health anxiety all have corresponding safety behaviors such as washing hands after contact with germ-contaminated surfaces, traveling with a companion in crowded places, and frequent unnecessary medical examinations.

Many noted behaviors, particularly taking medication, appear to be adaptive and appropriately address worrisome thoughts or concerns about a perceived threat. However, both adaptive and maladaptive safety behaviors have been implicated in the etiology and maintenance of pathological anxiety and of anxiety disorders as evidenced in empirical

studies (Dean & Maack, 2008; McManus, Sacadura, & Clark, 2008; Olatunji, Etzel, Tomarken, Ciesielski, & Deacon, 2011; Taylor & Alden, 2011).

Olatunji and colleagues (2011) conducted an experiment among a sample of college students without health anxiety. The students were randomized to either monitor or monitor and perform safety behaviors related to health fears (e.g., avoiding touching public door handles, monitoring pulse rate, and using hand sanitizer). At follow-up, those in the safety behavior condition reported greater health anxiety and increased perception that they will become sick. Safety behaviors even among non-anxious individuals may play a causal role in pathological anxiety.

To this effect, having access to PDE5 inhibitors even if not ingested could be conceptualized as a safety behavior, thus maintaining the fear of erectile failure or subpar erectile performance. Safety behaviors may serve to promote anxiety through self-efficacy. Self-efficacy as described in Bandura's (1986) social learning theory posits that one's accomplishments feed into his or her perceived ability to cope effectively. Lowered self-efficacy, or feeling decreased control over one's performance, is followed by self-doubt and anxiety about future performance, specifically EPA for PDE5 inhibitor use. After experiencing the effects of a PDE5 inhibitor, the individual may attribute his successful erectile performance to the medication potentially leaving him to evaluate his usual performance without a pill and experience anxiety, or future fear of erectile failure. The present study is an experiment based on the premise that attribution of one's performance to an erection-enhancing pill may result in anticipatory anxiety for a future sexual event and decreased physiological sexual arousal in that sexual event.

CHAPTER 2 THE PRESENT STUDY

2.1 Overview

The current study aimed to examine the effects of an erection-enhancing pill misattribution on sexual performance anxiety and subsequent physiological and subjective sexual arousal including potential erectile difficulty. Given that PDE5 inhibitors do not exert a significant increase in erectile tumescence among sexually healthy males, it would be expected that the sexual enhancement from recreational use of such medications would be limited. In fact, a small but significant percentage of healthy young men are using PDE5 inhibitors without the supervision of a health care provider. Commonly reported reasons for PDE5 inhibitor use include: preventing potential erection failures due to anxiety even when such a failure has not occurred previously, in addition to preventing erectile loss during condom fitting and alcohol or substance use.

A successful sexual encounter with the aid of a PDE5 inhibitor, one in which the individual perceives that he has achieved adequate erectile performance, may induce an external misattribution of one's successful sexual performance to the pill. When feedback is neutral (i.e., average erectile performance) instead of positive, the individual may experience increased anxiety related to fear of future erectile failure due to decreased self-efficacy for erectile performance. Because normally functioning young men are unlikely to experience enhanced erectile performance with the use of a PDE5 inhibitors (Mondaini et al., 2003), they may misinterpret the absence of enhanced performance via an erection enhancer as a *performance failure* and thus may experience increased

performance anxiety upon subsequent sexual encounters. This study was designed to recreate the scenario of a sexual performance demand in a subsequent sexual event after having using an erection enhancer in an earlier event that provided "average" erectile tumescence.

2.2 Research Study Design

To examine the effects of an erection-enhancing pill misattribution on sexual performance anxiety, the proposed study consisted of a 3 x 2 repeated measures design with instructional set (erection-enhancing pill instructions, memory-enhancing pill instructions, and no pill control) serving as the between-subjects factor and time (pre-manipulation assessment vs. post-manipulation assessment) serving as the within-subjects factor.

The proposed number of total participants was 90, with participants randomly assigned to one of two conditions: memory-enhancing pill (n =60) or no pill condition (n = 30). Each participant completed one session, which included a pre-manipulation assessment (memory-enhancing pill's testing purpose instructions) and an experimental manipulation assessment (memory-enhancing pill effects instructions or erection-enhancing pill effects instructions) of subjective and physiological arousal response. To separate the effects of expecting enhanced sexual response from a pill and attributing one's performance to a pill, the erection-enhancing pill description was disclosed after the pre-manipulation assessment. Specifically, participants in the pill conditions were given instructions that the pill was a memory-enhancer being tested for memory for

emotionally laden audiovisual content before to the pre-manipulation assessment. After the pre-manipulation assessment, half of the memory-enhancing pill group (n = 30) was further randomized to the erection-enhancing pill misattribution condition where they were given instructions that the memory-enhancing pill was actually designed for erection-enhancement.

2.3 Review of Pilot Data

Prior to data collection for the proposed study, a pilot study of 27 male participants was conducted using the proposed study's protocol. The purpose of the pilot study was to assess procedural limitations and to ensure that the experimental manipulation for the induction of sexual performance anxiety was effective. The analysis revealed that the experimental manipulation was effective in that the effect sizes for session x pill condition were substantial (see Table 2). Repeated-measures ANOVA revealed only one significant difference, mean penile tumescence differed across film types, but not across condition. As the pilot sample was small, there was difficulty in detecting more subtle differences in the tumescence means.

Table 1. Pilot Study Strain Gauge Means

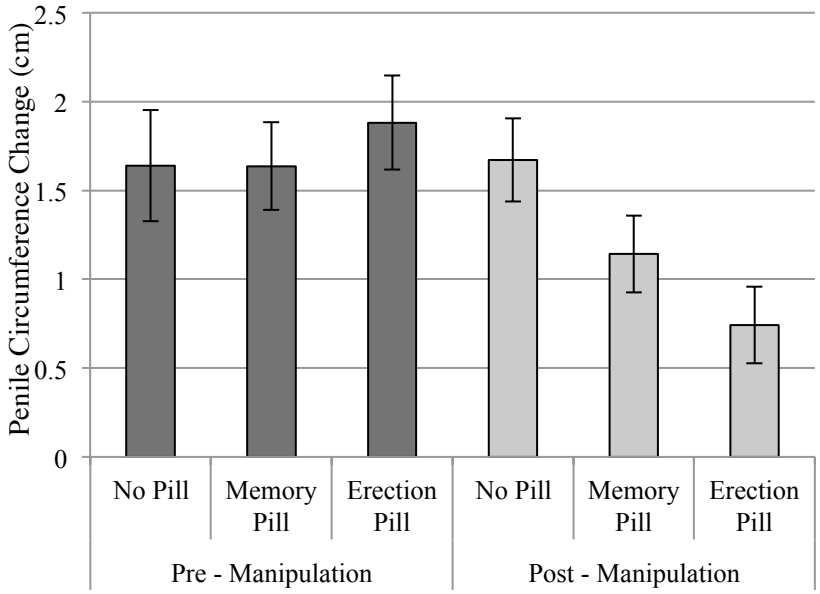
	Condition	Mean	Std. Deviation
Film A	No Pill	10.73	1.88
Neutral Segment	Memory-enhancing Pill	10.66	1.30
	Erection-enhancing Pill	10.47	1.26
Erotic Segment	No Pill	12.37	1.49
	Memory-enhancing Pill	11.86	1.30
	Erection-enhancing Pill	12.35	2.30
Film B	No Pill	10.59	1.60
Neutral Segment	Memory-enhancing Pill	10.66	1.26
	Erection-enhancing Pill	10.46	1.24
Erotic Segment	No Pill	12.27	1.41
	Memory-enhancing Pill	12.06	1.21
	Erection-enhancing Pill	11.62	1.75

Table 2. Statistical Findings from Pilot Study

	F	*p*	η^2
Session	1.389[a]	.25	.06
Session * Pill Condition	1.637[a]	.22	.12
Film Type	111.830[a]	.000	.82
Pre/Post Film * Pill Condition	.525[a]	.60	.04
Session * Film Type	.622[a]	.44	.03
Session * Film Type * Pill Condition	2.139[a]	.14	.15

Note. Session = comparison between pre-manipulation and post-manipulation assessments. Film Type = within-subjects comparison between neutral and erotic film segments. Pill condition = comparison between erection-enhancing, memory-enhancing, and no pill conditions
Small effect size = .01, Medium effect size = .06, large effect size = .14

Figure 3. Anticipated Results



Note. Penile Circumference Change is calculated by subtracting the neutral film average penile circumference measurement from the erotic film.

2.4 Aims and Hypotheses

The proposed study aimed to examine the effects of an erection-enhancing pill misattribution on anticipatory anxiety, penile tumescence and other measures of sexual response to an audiovisual erotic stimulus. Considering the rates of recreational use of sildenafil citrate and other erection-enhancers particularly among the younger population and gay male communities (Bechara et al., 2010; Harte & Meston, 2011; Korkes et al., 2008; Musacchio et al., 2006; Nettles, Benotsch & Uban, 2009), investigation of the cognitive-emotional consequences of unnecessary ingestion of erectile performance

"enhancers" is worthwhile as such actions may lead to heightened erectile performance anxiety (Barlow, 1986; Rosen, 2001; Scepkowski et al., 2004).

The following hypotheses were developed based on Barlow's sexual dysfunction model (1986) of increased focus on negative cognitions and potential consequences of one's performance leads to heightened anxiety, thus interrupting the physiological arousal process. The first hypothesis (H1) posited that participants in the erection-enhancing pill group would show greater anticipatory anxiety and poorer erectile response to a subsequent erotic film compared to the memory-enhancing pill and the no pill control groups. This effect is hypothesized to be influenced by the undermining of self-efficacy due to the external attribution of one's erectile performance (i.e., the pill helped more than my own ability). It was also hypothesized (H2) that participants who report heightened erectile performance anxiety prior to the experimental manipulation will show a significant dampening of their physiological sexual arousal and greater anticipatory anxiety in response to a subsequent pill-free film assessment relative to participants reporting less erectile performance anxiety.

2.5 Methods

2.5.1 Participants

2.5.1.1 Recruitment

All participants were recruited through the Psychology 301 subject pool at The University of Texas at Austin. Specifically, participants were recruited for the proposed

study through a static advertisement posting in the online subject pool management system known as OPERA. This procedure allowed UT students enrolled in introductory psychology classes to obtain course credit through participation in research as participants. As an alternative to participating in research studies, students were given the option to complete a research paper that involved a similar amount of time and effort.

2.5.1.2 Screening

A two-stage process was used to select participants who contacted the principal investigator via the OPERA online system. First, all potential participants completed the Brief Fear of Negative Evaluation measure (Appendix F). Participants with low, moderate, and high anxiety (BFNE scores of 12 – 27, 28 – 43, and 44 – 60 respectively) were distributed evenly across conditions. The purpose was to create relatively consistent distribution of socially anxious versus non-socially anxious individuals. In preliminary data analysis of a previous study (Pujols & Telch, in preparation), general anxiety was associated with sexual performance anxiety and enrolled participants were stratified across conditions to prevent systematic differences.

2.5.1.3 Inclusion and Exclusion Criteria

Inclusion criteria for the study are as follows:

(1) *Men between the ages of 18-30.* This criterion is based on research indicating that this age group experiences the highest rates of performance anxiety and

the lowest rates of organic erectile dysfunction (Laumann et al., 1999; Latini 2006).

(2) *Fluent in English*. Participants must be fluent in English in order to be enrolled in the study because most of the instruments that will be used have not been translated and validated in Spanish, and there are no appropriate alternative instruments that meet this criterion. Prior cross-lingual and cross-cultural validation of all study instruments would be necessary prior to conducting a study with Spanish-speaking participants.

Exclusion criteria:

(1) Self-report of an untreated or unstable mental disorder, including: organic mental syndromes and disorders, delusional or psychotic disorders, panic disorder, depression, or a history of significant substance abuse within six months before the start of the study.

2.6 Materials

2.6.1 Penile Plethysmography

Penile plethysmography was measured via the penile strain gauge. The strain gauge is a device that measures penile vasocongestion, or blood flow, by calculating penis shaft circumference size via a mercury-filled rubber tube attached to copper lead wires. The output signal was recorded at a rate of 80 samples/second, commencing at the start of the neutral film; it is low-pass filtered to 0.5 Hz and digitized to 40 Hz. The

sampled data was transformed using AcqKnowledge III, Version 3.73 (BIOPAC Systems, Inc., Santa Barbara, CA) and a Model MP100WS data acquisition unit (BIOPAC Systems, Inc.). Ten strain gauges differing in rubber tube size from 7.5 cm in diameter, increasing in 0.5 cm steps to 12 mm. Each strain gauge was marked alphabetically, instead of labeling by size (e.g., 8.0 cm = Z, 8.5 cm = B) to ensure uninfluenced strain gauge selection by participants.

The penile strain gauge undergoes a comprehensive sterilization process. After participant use, it was washed thoroughly for three minutes under warm water with antimicrobial soap, then toweled dry. The strain gauge was inserted into the Johnson & Johnson Cidex Plus activated dialdehyde solution (3.4% glutaraldehyde) for 10 minutes. The strain gauge was removed from the solution and rinsed for 4 minutes from the rubber tube downward. A sterilized cloth was used to dry the strain gauge and place it into a sterile bag. The remaining wire was wiped with an alcohol pad before it is placed into a larger plastic bag for storage.

2.6.2 Erotic Stimuli

The heterosexual erotic stimuli consisted of two films presenting a heterosexual couple engaging in foreplay and intercourse (See Figure 1). The erotic films were counterbalanced across participants and matched on number and type of sexual activities. They have been previously shown to be sexually arousing to men (e.g., Harte & Meston, 2008). Both films will be preceded by a 1 min presentation of the word “relax”, and a 3

min presentation of an informational documentary. The two films were counterbalanced across participants and the experimenter operated the film player from an adjacent room.

The homosexual erotic films were selected for the purpose of presenting relevant audiovisual stimuli to non-straight participants who endorsed a preference to view male-male sexual footage. Several films covering five homosexual erotic genres were selected and spliced into two complementary videos with similar segments for each genre. As with the heterosexual erotic films, all homosexual erotic films were preceded by a 1 min presentation of the word "relax", and a 3 min presentation of the same informational documentaries.

Figure 4. Heterosexual Film Chronology

Film A:												
Segment:	Neutral				Erotic							
Content:	Relax	Documentary of Russia			Kiss	Kiss	Petting	Clothes	Oral sex	Oral sex Intercourse	Intercourse	Intercourse
Minute:	1	2	3	4	5	6	7	8	9	10	11	12

Film B:												
Segment:	Neutral				Erotic							
Content:	Relax	Documentary of Lewis and Clark Expedition			Kiss	Kiss	Petting	Clothes	Oral sex	Oral sex Intercourse	Intercourse	Intercourse
Minute:	1	2	3	4	5	6	7	8	9	10	11	12

2.7 Assessments

2.7.1 Sexual Arousal Response Assessments

2.7.1.1 Penile Strain Gauge

The penile strain gauge recorded penile shaft circumference changes during the film presentation, from the start ("relax" segment) to the end of the film. The data acquisition software allows for placement of time markers throughout the recording of the strain gauge. Such markers were placed at the start of the neutral segment and the erotic segment for data reduction. The data reduction process consists of capturing the mean circumference in cm across back-to-back 1 sec samples. Artifacts in the recorded signal larger than 0.5 cm were removed from the sample collection. The circumference means were transferred into text data. Time markers were used to separate the means into neutral and erotic segments. The mean during the neutral segment will be averaged and used to represent the participants' pre-manipulation penile circumference, or pre-manipulation erectile response.

2.7.1.2 Continuous Subjective Arousal measurement

The continuous subjective arousal device consists of a computer mouse mounted on a sliding wooden track with equally spaced intervals, from -1 to 7. The device is utilized to assess the degree of subjective sexual arousal to the erotic stimuli. In the proposed study, the intervals range from -1, negative affect associated with sexual arousal

such as *mentally sexually disgusted* or *sexually "turned off"*, 0, *neutral,* to 7, *very mentally aroused.* As the mouse device moves along the track, the dedicated software records the movement of the curser along a y-axis across time on the data collection computer.

2.7.1.3 Expected and Actual Erection Strength Rating

Two questions were developed to assess the integrity of the instruction set manipulation (i.e. pill explanation scripts). Participants rated their expected strength of erection to the erotic film just prior to viewing. After viewing the film, participants rated their actual erection strength on a Likert scale ranging from 0 - *no erection* and 6 - *strong erection*. Other anchor points include *weak erection* (at 2) and *moderate erection* (at 4).

2.7.1.4 Subjective Ratings Scale

Subjective sexual response was indexed by the Subjective Ratings Scale developed by Heiman and Rowland (1983). This 41-item scale assesses self-reported physical (five items; e.g., genital warmth, throbbing, lubrication), psychological (five items; e.g., mental sexual arousal, sexual desire, reverse score of sexually turned off), autonomic arousal (five items; e.g., faster heart rate, faster breathing), and affect (21 items) to erotic audiovisual stimuli. Each item is rated using a Likert scale range from 1, *not at all,* from 7, *intensely*. Higher domain scores (physical, psychological, autonomic) indicate a greater degree of arousal experienced during the erotic portion of the film.

2.7.2 Self-Report Measures of Sexual Orientation and Sexual Functioning

2.7.2.1 Kinsey Sexual Orientation Scale

The Kinsey Sexual Orientation Scale is a single item measure that assesses the degree to which an individual identifies with a particular sexual orientation (Kinsey, Pomeroy, & Martin, 1948). The item response choices are listed along a bi-dimensional axis with opposing anchor points of heterosexual and homosexual orientation. Although the measure excludes other sexual orientations (e.g., pansexuality, polysexuality), the purpose of this measure in the proposed study is to identify individuals who may not become sexually aroused to the erotic stimuli of a heterosexual couple engaging in sexual activity.

2.7.2.2 Derogatis Sexual Functioning Index

The Derogatis Sexual Functioning Index (DSFI) (Derogatis & Melisaratos, 1979) is designed to measure the major components of sexual behavior covering 10 domains. Two domains were selected for the current study: experience and attitudes. The experience domain contains 24 items pertaining to varying sexual activities with a dichotomous (yes or no) response choice and four items pertaining to sexual activity frequency, ranging from daily to yearly occurrences. The attitudes subscale consists of 30 items varying from sexually conservative to sexually liberal attitudinal statements about sexual behavior. The response choices are presented as a Likert scale where -2 indicates strong disagreement and +2 indicates strong agreement with the statement. Good internal

consistency reliability was evidenced with coefficients ranging from .56 to .97. At a 2-week interval, test-retest reliability was generally good with coefficients ranging from .58 to .96 (Derogatis & Melisaratos, 1979). These two subscales will serve as potential moderators variables.

2.7.2.3 International Index of Erectile Function

The International Index of Erectile Functioning (IIEF) (Rosen et al., 1997) is a 15-item scale that assesses five domains of male sexual functioning. Respondents are instructed to rate each domain (erectile function, orgasmic function, sexual desire, intercourse satisfaction, and overall satisfaction) over the past four weeks using a five-point scale., Higher scores on these domains indicate higher levels of sexual functioning and satisfaction. High internal consistency was found for the IIEF (Cronbach's alpha = 0.91 for the total scale); test-retest correlation coefficients were highly significant at .82 (Rosen et al., 1997).

2.7.2.4 Erectile Performance Anxiety Index

The Erectile Performance Anxiety Index (EPAI) (Telch & Pujols, in press) was developed to address the need for an assessment instrument focused specifically on male erectile performance anxiety. The 13-item scale assesses three primary areas: (a) erectile performance anxiety in *anticipation* of a sexual performance situation; (b) erectile performance anxiety *during* a sexual performance situation; and (c) erectile performance anxiety-related avoidance and other safety behaviors. Higher scores on the subscales

indicate greater erectile performance anxiety and greater use of erection-focused safety behaviors. The EPAI was found to be both highly internally consistent (Cronbach's alpha = .94) and moderately reliable (test-retest coefficient = .63).

2.7.3 Self-Report Measures of Mood and Anxiety

2.7.3.1 Center for Epidemiologic Studies Depression Scale

The short form of the Center for Epidemiologic Studies Depression Scale (CES-D-10 Short Form; (Kohout, Berkman, Evans, & Cornoni-Huntley, 1993) contains 10 items that measure primarily affective depressive symptoms (e.g., "I felt depressed", "I felt that everything I did was an effort") in the past week. Respondents rate each symptom on a 4-point scale ranging from 0 = *rarely or none of the time (less than 1 day)* to 3 = *All of the time (5-7 days)*. Summing the responses from each item derived a total score. The CES-D-10 has yielded high internal consistency (Cronbach's alpha = .81) and high reliability, r = .80 (Kohout et al., 1993).

2.7.3.2 State Anxiety

The short form of the state anxiety subscale of the State-Trait Anxiety Inventory; (STAI; Marteau & Bekker, 1992) is a 6-item measure that assesses state anxiety (e.g., "I am tense") with a 4-point Likert response scale from 1 = *not at all* to 4 = *very much.* The score is the sum of all 6 items after reverse-scoring 3 items; higher scores indicate greater state anxiety. The state anxiety subscale has yielded high internal consistency, Cronbach's alpha = .85, and high reliability, r = .82 (Marteau & Bekker, 1992).

2.7.3.3 Appraisal of Social Concern

The Appraisal of Social Concern scale assesses the degree of concern with a variety of perceived threats that socially anxious individuals commonly encounter (Schultz et al., 2006; Michael J Telch et al., 2004; M J Telch et al., 2004). The 20-item measure contains three subscales, negative evaluation (e.g., appearing weird, people laughing at you), observable symptoms (e.g., trembling, being tense), and social helplessness (e.g., people ignoring you, losing control). Participants select a number from 0 = *not at all concerned* to 100 = *extremely concerned* to endorse the degree of concern for the threat. The total score is the mean of all items. Based on data from a nonclinical sample (Telch et al., 2004), the full-scale coefficient alpha was .94 and the 1-week reliability was .82.

2.7.3.4 Positive and Negative Affect Schedule

The Positive and Negative Affect Schedule (PANAS) (Crawford & Henry, 2004) is a 20-item measure that assesses the dispositional dimensions of positive and negative affect independently. The positive subscale contains items such as interested, alert, attentive, excited, and determined. The negative subscale includes items such as distressed, upset, guilty, nervous, and jittery. Each item is rated on a 5-point scale where 1 = "*very slightly or not at all"* to 5 = "*very much"*. The total score for each subscale is calculated by summing the items. The PANAS has demonstrated good internal consistency (Cronbach's α = .85 - .95) within normative non-clinical population (Crawford & Henry, 2004).

2.7.4 Other Self-Report Measure

2.7.4.1 Demographic Information

The initial questionnaire battery that participants completed prior to the sexual arousal assessment contained demographic information such as age, education, ethnicity, parental income, relationship status, and information on cigarette use, antidepressant medication use, and PDE5 inhibitor use.

2.7.4.2 Erotic Film Segment Attention Assessment

The Erotic Film Segment Attention Assessment was developed to evaluate participants' attention to the erotic content of the film. In addition to its function as an index of attention to the film, its inclusion aimed to increase the perceived credibility of the memory-enhancing pill rationale (i.e., the study is an efficacy trial for an memory-enhancing herbal substance). It was expected that the participants' sexual response would be a result of the erotic stimulus and thus confirmation of participant attention to the film ensuring consistency across conditions. Item content included questions about the characters' clothing, hair color, sexual activity, and the staged scenery in the film.

2.7.4.3 Pill Efficacy Rating

The Pill Efficacy Rating question was designed to assess the effect of the pill on erectile tumescence during the erotic portion of the film. Participants were instructed to rate the degree to which the pill influenced their erectile performance, a 3 indicates *strong positive effect,* 0 indicates *neither positive nor negative effect,* and -3 indicates

strong negative effect. The memory-enhancing and the erection-enhancing pill conditions completed this measure at the end of each film.

2.7.4.4 Debriefing Questionnaire

The End of Study Questionnaire assessed the strength of belief in the study rationale and pill descriptions, such as testing an herbal substance, pill enhancing one's memory, pill enhancing one's erectile performance, and the fast-acting nature of the pill. An additional section was provided for commenting on the study.

2.8 Procedures

2.8.1 Procedure Overview

One hundred and twenty eight male participants were recruited from the introductory psychology participant pool. They took part in one 2-hour session in the Sexual Psychophysiological Laboratory in the Seay building at the University of Texas at Austin. A researcher guided the participant through his assigned experimental protocol. Participants received two hours of experiment participation credit upon completion.

2.8.2 Proposed Study Protocol

Prior to arriving to the Sexual Psychophysiological Laboratory (SEA 3.318), the participant was contacted via email registering for the experiment session on the OPERA management system. An advanced researcher scheduled the participant for a 2-hour time slot.

Upon the participant's arrival to the laboratory, a researcher showed the participants the laboratory and the private, internally locked room where they remained for the entire session. The room contains a reclining chair, a television monitor and an intercom for communication with the researcher. The researcher presented an introduction film describing the study protocol, which included information on the pill and the purpose of ingesting the pill (for pill conditions only; Appendix O), questionnaires, ECG wires and electrode pads, penile photoplethysmograph, the continuous subjective arousal meter, and the films.

After the introduction film and answering the participant's questions, the researcher asked the participant to sign an informed consent document stating their agreement to participate in the study. If the participant felt that he would be adversely affected by participating in the study for any reason, he was offered an alternative writing assignment that included reading a passage from the book, An Unquiet Mind by Kay Redfield Jamison, and writing about the psychological conflict that the character faces.

The participant was then asked a series of questions to ascertain his eligibility to participate in the study (Appendix P). The purpose of the additional screening question (Item 5) was to record any diagnosed mental disorders as part of the participant's psychological history and to assess if the participant was experiencing significantly distressing symptoms, but having a mental disorder was not an exclusion criterion. Participants who experience clinically significant psychological symptoms were referred to the University of Texas at Austin Counseling and Mental Health Center for support. If this question was included in the initial questionnaire battery in an open-ended question

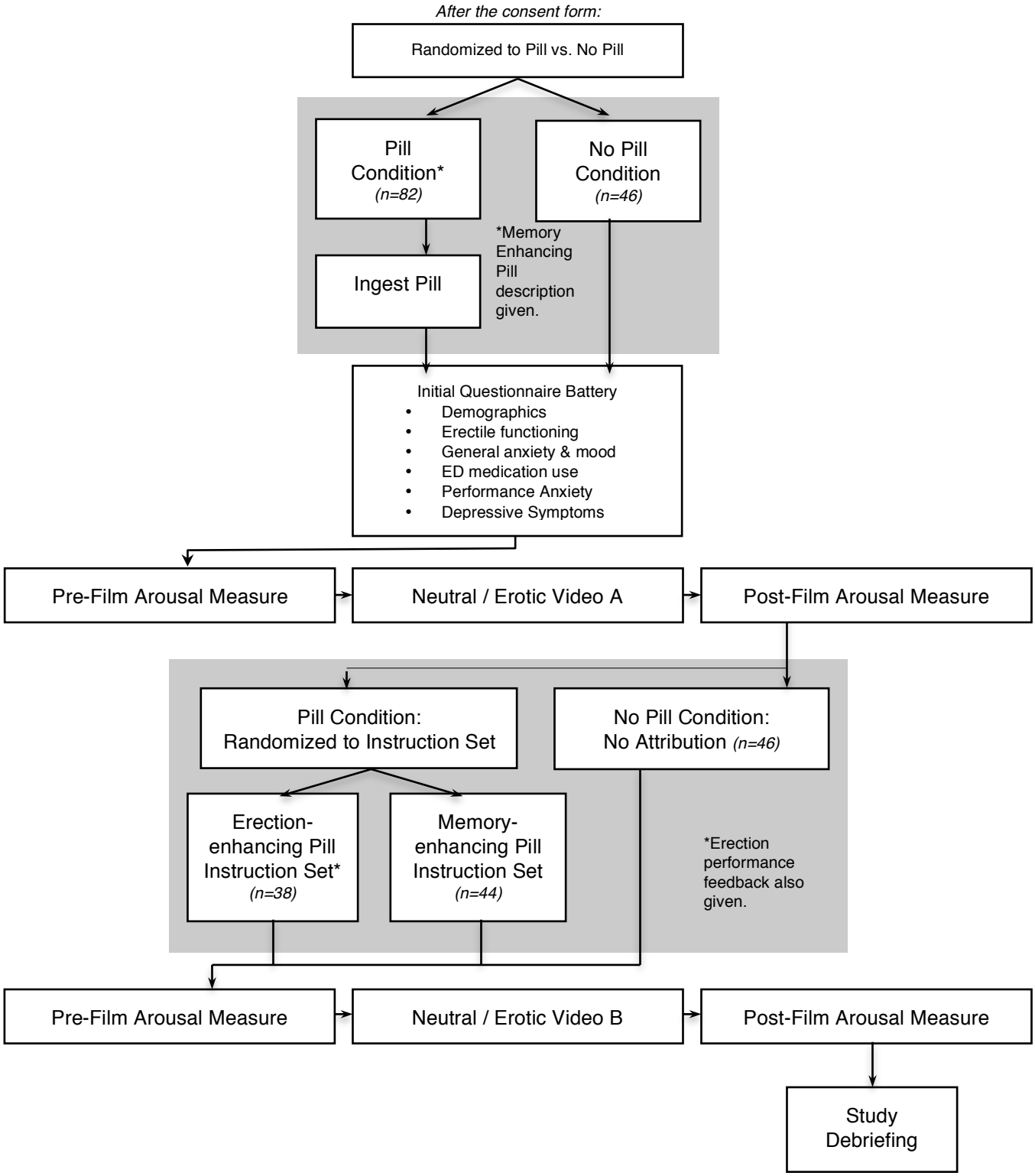
format, there may have been the risk of gathering inadequate information as to the extent that the disorder is affecting the participant. If the participant was not primarily heterosexual, he would have been given the option to view one of the homosexual erotic videos.

After the screening, the researcher measured the participant's blood pressure using an Omron HEM-780 Automatic Blood Pressure Monitor with ComFit Arm Cuff, as this variable may moderate erectile response during the erotic segment of the film. The researcher asked the participant to ingest the pill (empty pharmacy-grade capsule) if he was assigned to one of the pill-ingesting conditions. Then the researcher left the room and communicated only through the intercom until the end of the session. After the researcher obtained consent and left the room, the participant completed the initial questionnaire battery. Then the participant was instructed to practice using the computer mouse arousal meter, which continuously record subjective arousal during the films. After practicing with the continuous subjective arousal device, the participant was instructed to place electrode clamps onto the three electrode pads (at collar bone, rib cage, and ankle) according to the diagram poster and to fit the penile strain gauge around his penis. Next, he completed the pre-film questionnaire. Before the start of the film, the participant was reminded to focus on the film and use the arousal meter. In addition, the participant was instructed to sit as still as possible during the film without the use of manual stimulation.

At the end of the film, the participant was asked to fill out the post-film questionnaire, which is similar to the pre-film questionnaire. At that time, the researcher

provided the instruction set for erectile performance feedback and explained the actual effects of the ingested pill (for pill conditions only) using a prepared script via the intercom (Appendix O). Then the participant completed the pre-film questionnaire, watched the second film, and completed the post-film questionnaire. Afterward, the participant removed the photoplethysmograph and electrode pads and wires. The researcher played a debriefing film for the participant, concluding the end of the session. At the end of the session, participants received two hours of experiment credit for completion of all study procedures.

Figure 5. Study Participant Flow



CHAPTER 3 STATISTICAL ANALYSIS STRATEGY

3.1 Statistical Power Analysis

A post-hoc power analysis using G*Power software (Version 3.0.8) was conducted using the proposed study's pilot data. The partial eta squared effect size for the within-between interaction, .15, was converted into its Cohen's *d* equivalent of 0.84 and entered into the power analysis software. The post-hoc power for the repeated measures ANOVA was 1.0, indicating very high power.

For the proposed study, an a priori analysis for power was conducted using a Cohen's *f* of .42 for three conditions. A total sample size of 78 was required to achieve power of 0.96. A conservative estimate at $f = .39$ with 90 participants, would result in 95% power. The current study was expected to enroll 90 participants, 30 per condition to take into account study drop-outs and equipment failure. A final total of 128 participants completed the study, surpassing the conservatively estimated sample size.

3.2 Data Reduction

Data for the study were collected in several formats: paper and pencil self-report measures, physiological sexual arousal via penile plethysmography, and a lever device for continuous sexual arousal. Self-report measures were reduced to single scores according to established calculation protocols. Physiological sexual arousal data required three steps for reduction. First, movement artifacts greater than 5 millimeters were

removed among a generally smooth line, as recommended by George and colleagues (2006). Second, the raw data were reduced to penile circumference averages, in centimeters, across 1-second epochs. Lastly, the 1-second epochs were calculated according to the specific variable.

Five physiological sexual arousal variables were developed for the study: raw penile tumescence, percent change in penile tumescence, percent change in maximum tumescence, latency to reach maximum tumescence, and rate of onset of maximum tumescence. Penile tumescence was operationalized as penile circumference, either as the average or maximum circumference depending on the variable. Raw penile tumescence change scores were calculated as the difference between average penile tumescence during the neutral film and the average penile tumescence during the erotic film. Percent change, from the neutral to the erotic film, was based on the raw change score. Percent change of maximum tumescence was based on the difference between the average penile tumescence during the neutral film and the 1-second epoch containing the maximum penile circumference during the erotic film. Latency to maximum penile tumescence was calculated as number of seconds from the start of the neutral film to the 1-second epoch containing the maximum circumference. Rate of onset of maximum penile tumescence was the calculated slope from the start of the erotic film to maximum circumference.

The continuous sexual arousal data were subjected to a reduction process resulting in averages across 1-second epochs, similar to the physiological sexual arousal data reduction. The epochs were reduced further into averages for the neutral film and for the erotic film.

3.3 Statistical Analyses

3.3.1 Missing Data

Participants who did not complete the main outcome measures (physiological and subjective sexual arousal, anticipatory anxiety, affect) or complete the entire study protocol were excluded from the hypotheses testing.

The continuous subjective arousal measure was reviewed for faulty data and participant misuse. Cases were excluded from analysis if the pre-manipulation assessment for neutral and erotic segments of the film were equal in score and both scores were zero. A total of 115 cases were included for analysis involving this variable.

After the pilot data were collected, the penile tumescence template files for each strain gauge size were updated as a result of newly acquired strain gauges' calibrations. With the creation of the new templates for use in the study, an overwriting feature was engaged unbeknownst to the researchers until the end of the data collection. The penile plethysmograph data captured during the pre-manipulation assessment were overwritten when the manipulation assessment's data were saved, despite having a new file title. Analyses with the penile tumescence variables are conducted with the subgroup with complete physiological sexual arousal data (n =42) and then with the entire sample (n = 115). See Appendix Q for further details.

3.3.2 Experimental Manipulation Check

Each erotic film presented in the experimental study had a corresponding seven-item questionnaire that asked participants about details (i.e., clothing, tattoos, furniture) to assess one's attention to the film. The sum of correct responses was to surpass 60%, a parametric approach to remove cases of random responding. Additionally, these questionnaires provided evidence to the participants for the presented deception that the study's purpose was testing a memory-enhancing herbal supplement.

A manipulation check was performed prior to the statistical analysis to evaluate that participants were (a) attending to the two films demonstrated by at least 60% correctly answered questions and (b) believed in the study rational by reported at least 50% belief.

3.3.3 Tests of Study Hypotheses

Prior to the study hypotheses tests, the demographic, medical, and psychological characteristics of the sample were subjected to one-way ANOVAs or nonparametric statistics to test for possible pre-experiment differences between the three pill conditions.

The experimental outcome data consisted of three classes of variables. The first class contained the physiological sexual arousal variables: raw change, percent change, percent maximum tumescence, latency to reach maximum tumescence, and rate of onset to maximum tumescence for the penile plethysmograph data. The second class contained the subjective sexual arousal variables that included the Subjective Rating Scale's self-reported mental arousal, genital arousal, and autonomic arousal subscales and the

continuous arousal meter (subjective sexual arousal over course of the erotic film). The third class consisted of affective state variables, anticipatory anxiety, positive and negative affect, measured by the Positive and Negative Affect Schedule and the Subjective Rating Scale. Data are presented in Tables 11 through 13.

Hypothesis 1. Separate ANCOVAs were conducted for the three classes of dependent variables for the manipulation assessment among the entire sample, and for the pre-manipulation and manipulation assessments among the 42 cases of complete penile plethysmograph data. Erectile performance anxiety, social anxiety concerns were added to the model to tease apart anxiety due to the pill description manipulation from anxiety specific to social evaluation and performance. The covariates confidence to maintain an erection, percent belief in the study purpose, sexual orientation, intercourse experience, and relationship status were included as appropriate in the analyses.

The belief in the study purpose represented a face valid assessment of the believability of the study deception, which the experimental manipulation required. High belief of the testing purpose would suggest that the pill attribution instructions manipulation would also achieve believability. Considering that almost half of the participants reported low belief in the testing purpose, this variable was added to the experimental data analyses to control for potential effects.

Self-efficacy, operationalized as confidence to maintain an erection, represents an individual difference that could account for one's performance attribution to an erection-enhancing pill. It is also important to note that confidence to maintain an erection was found to be significantly different across conditions in preliminary systematic analyses,

with the memory-enhancing pill condition reporting less confidence. Erectile function, based the IIEF subscale, was also considered as a similar variable to control for variation across the study sample. Accounting for one's degree of erectile functioning would allow the effect of the pill attribution instructional manipulation on penile tumescence to be more clearly evaluated in the statistical analysis. Erectile function and erectile confidence are overlapping constructs and to include both as predictors was not statistically sound. To ascertain whether to include confidence to maintain an erection or the IIEF's erectile function scores, a correlation analysis was conducted among the potential covariates (Table 14). As expected, erection function and confidence to maintain an erection were strongly correlated ($r = .46$, $p < .001$). Confidence to maintain an erection was selected as a control variable due to its relevance in the model, both as a systematic difference across conditions and as a marker of sexual self-efficacy. Furthermore, the erection function subscale measures frequency of successful erections during sexual activity, not self-confidence.

Salient, systematically different demographic variables of sexual orientation, relationship status, and intercourse experience were also added to the model. Upon initial analysis of demographic and sexuality variables, sexual orientation, being in a steady relationship, being sexually active, and having had intercourse yielded significant systematic differences across the pill conditions (See Tables 9 and 10). Particularly of note, is sexual orientation as participants had the option of choosing either heterosexual or homosexual erotic stimuli. Analysis of sexual orientation as a factor can speak to the differential effect of several aspects of the experimental study, such as viewing different

erotic stimuli and sociopsychological experience of erectile performance demand. Current sexual activity and intercourse experience are considered overlapping constructs and the latter was selected for inclusion in the regression analyses as it is activity-specific, whereas being sexually active may or may not include certain behaviors including intercourse. The three variables were dichotomized into straight or not straight, in a steady relationship or not, and have had intercourse or not.

Hypothesis 2. Separate linear regressions were conducted for the three classes of dependent variables to test for the predictive ability of erectile performance anxiety. Difference between the pre- and post-manipulation scores were calculated for each participant across all outcome variables (i.e., pre-manipulation score subtracted from post-manipulation score). Participants with complete penile plethysmograph data (n = 42) were included in the physiological sexual arousal regression models and the remaining regression analyses included the entire sample (n = 115).

CHAPTER 4 RESULTS

4.1 Sample Characteristics

One hundred twenty eight male undergraduate students from the introductory psychology subject pool were recruited and enrolled in the study. The sample's demographic, medical, and sexuality characteristics were compiled from the initial questionnaire battery completed at beginning of study. Visual inspection of the data as graphs yielded information on potential differences across conditions, particularly regarding variance ranges and skewness. All sample characteristics data were subjected to group distribution analyses, namely nonparametric tests for categorical variables and one-way ANOVAs. Table 6 displays characteristics across the three pill conditions.

4.1.1 Demographic Characteristics

The demographic variables collected and analyzed included age, educational year, self-reported ethnicity, parental income, and living arrangement. The age of the participants was expected to be consistent with the age of the younger undergraduate population as the subject pool is drawn from introductory psychology classes. Often, these individuals are in their first semesters of their college careers. The mean age was approximately 19 with a small variance (Table 3). A nonsignificant one-way ANOVA, pill condition x age, confirmed the lack of significant age difference across pill conditions. Considering the young age of the sample, it was not surprising that the largest

represented educational year was the freshman class at 58.3% and then the sophomore class, with 22% of the sample. No statistically significant differences in educational year were noted with a Kruskal-Wallis test.

The ethnic/racial distribution of the sample was found to be comparable to the University of Texas at Austin's 2011 distribution for all undergraduates. White students and Hispanics/Latino students were the largest ethnic groups represented at 43.2% and 28% respectively. University data reported 50.4% Whites and 20% Hispanics/Latinos across for the entire undergraduate student body (Office of Information Management & Analysis, 2011). Self-reported ethnicity/race was evenly distributed across the pill conditions. No statistically significant differences were noted with a Kruskal – Wallis test.

Socio-economic status is difficult to ascertain with a young undergraduate population. However two variables, parental income and living arrangement, may indirectly assess a student sample's socio-economic status. Visual inspection of the data (Table 6) revealed that the majority of participants come from household incomes greater than $50,000 (69.9%; a percentage calculated by combination of endorsed items *Between $50,000 to $100,000* and *Greater than $100,*000) with a considerable portion with parental incomes greater than $100,000 (38.6%). The distribution of parental income across the three pill conditions was similar and supported by a nonsignificant Kruskal-Wallis test.

With respect to living arrangement, the overwhelming majority of participants reported living with roommates (89.9%). Although the type of living arrangement could

be indicative of SES, there was little variation in these data across the pill conditions. Nonsignificant differences were evidenced by a Kruskal-Wallis test. Additionally, type of housing (e.g., house, apartment, or dormitory) may have been a better assessment for economic status, though living arrangement as assessed was not a salient variable for the present study.

4.1.2 Medical Characteristics

Four medically relevant variables were assessed: blood pressure at the start of the study, cigarette consumption, and current use of prescription antidepressant and erectile dysfunction medication (Table 7). Blood pressure reflects cardiovascular system health and cigarette-smoking, namely chronic heavy smoking, is associated with vascular constriction (Fagerstrom, 2002). Significant between-group variations could potentially confound the physiological measurement of penile tumescence in the study (Harte & Meston, 2008). The majority of the sample fell within the normal systolic-diastolic range (below 140/90) according to the American Heart Association (Pickering et al., 2005). Twenty-one participants' blood pressure readings were above normal, ranging from 140 to 156 on systolic measurements and from 91 to 108 on diastolic measurement. No differences across pill conditions were noted and supported by a nonsignificant one-way ANOVA.

The precaution of assessing both blood pressure and cigarette consumption was taken to ensure that penile tumescence is accurately reflecting sexual arousal without the influence of cardiovascular medical conditions. Along these lines, participants were

asked if they were prescribed erectile dysfunction medication. No participant reported current erectile medication use. Antidepressant use was assessed to guard against systematic differences across pill conditions as well as the possible effect that mood regulators can negatively alter erectile functioning (Rosen & Marin, 2003) and alleviate erectile performance anxiety. Of the entire sample only three participants reported a current regimen of antidepressants, two assigned to the no pill condition and one assigned to the memory-enhancing pill condition. The presence of such few active antidepressant consumers did not establish a significant difference across conditions. These cases were included in the analyses.

4.1.3 Mood Characteristics

Participants completed four mood-related measures at the beginning of the experimental study: depressive symptoms, anticipatory anxiety, and two measures of social anxiety. Mood measure means were similar across pill conditions and evidenced by nonsignificant one-way ANOVAs (Table 8). All but the Appraisal of Social Concerns were normally distributed. The ASC was skewed slightly to the left, indicating less concern with appearing anxious in front of others.

4.1.4 Relationship Characteristics

Participants' relationship status was assessed for the presence of a stable romantic partner. Being in a romantic relationship compared to being single may present a

differential response to the erectile performance demand. Only 32% of participants were partnered at the time of the study and none endorsed being currently married nor divorced. The reported relationship length ranged from one month to almost five years. Of the 87 single participants, 38 reported being in a stable romantic relationship at some point in the past 12 months. Relationship status distributions were consistent across conditions as supported by a nonsignificant Kruskal-Wallis test. Relationship data are presented in Table 9.

4.1.5 Sexuality Characteristics

Participants completed several sexuality assessments, some of which revealed significant systematic differences across groups and were noted as potential influential variables for hypotheses testing (Table 10). Sexual orientation preferences were evenly distributed across pill conditions and there were 17 non-straight participants in the sample. Additionally, fewer participants in the memory-enhancing pill condition reported having had penetrative intercourse than the other two conditions. Overall, 62% of the participants reported penetrative intercourse and fewer participants reported being currently sexually active (45%) at the time of the study. Reported sexual experiences (e.g., kissing, fantasies, petting) were evenly distributed across pill conditions as revealed in nonsignificant one-way ANOVAs and Kruskal-Wallis tests. However, masturbation frequency was significantly higher for the no pill condition though the impact of frequent

masturbation is questionable as weekly to daily masturbation does not broadly affect erectile response (Kockott, 1980).

Sexual functioning (IIEF) and erectile performance anxiety (EPAI) were skewed towards scores indicating greater functioning and less anxiety, though the patterns were consistent across the three conditions upon visual inspection (Table 11). The sample's average confidence to attain an erection was high at 90 percent likelihood, with similar averages across pill conditions. A one-way ANOVA revealed that confidence to *maintain* an erection was significantly less for the memory-enhancing pill condition than the other conditions. This condition contained a larger percentage of participants scoring in 40% to 70% range.

4.1.6 Summary

Overall, the study sample was representative of a typical southern undergraduate university population. Very few considerable systematic differences were found, as such only the following variables were incorporated into the experimental data analyses as potential confounds: intercourse experience, relationship status, and confidence to maintain an erection. Sexual orientation was also included in the data analyses as a covariate.

4.2 Experimental Study Results

4.2.1 Experimental Manipulation Check Analysis

The erotic films' memory recall data were calculated as the sum of correct responses. Each participant had two scores, one for each erotic film viewed. The average percentage of correct answers for the first presented film was 70.2% and the second presented film was 76% with no significant differences across sessions. These mean scores were above the predetermined cut-off of 60% correctly answered items.

After visually reviewing paper responses, it became evident that some participants were confused about the title of the film questionnaire, "Video 1" and "Video 2." Several participants mentioned that the questionnaire title did not correspond to the first film viewed in the study, as written in the comments section of the end-of-study questionnaire or verbally communicated to the researcher. In fact, the title of the questionnaire makes reference to the particular version of film and counterbalancing the films resulted in completing "Video 2" in the pre-manipulation session for approximately half the experiment protocols completed. Although, the noted increase in penile tumescence in response to the erotic films indicated that the participant was attending to and physiologically responding to the content of the film.

In conjunction with the erotic film memory recall assessment, one item completed at the end of the experiment assessed participant's degree of belief that the purpose of the study was to test an herbal substance for the pill conditions and to test new erotic films for the no pill condition (Table 16). Participants in the three conditions reported an

average of 51% belief of the study purpose. Excluding those participants who reported less than 50% belief in the study purpose as determined *a priori*, resulted in a substantial reduction of participant data. Only 28 participants (60.9%) of the no pill condition, 17 (38.6%) participants of the memory-enhancing pill condition, and 22 participants (57.9%) of the erection-enhancing pill condition remained. Additionally, the memory-enhancing pill subsample reported marginally significantly less belief, 40.9%, than the no pill and erection-enhancing pill conditions, 56.2% and 56.5% respectively ($F(2, 121) = 2.96$, $p < .06$).

The power analysis prior to data collection provided a conservatively estimated sample size of 90 participants. Removal of cases where believability was less than 50% would result in the inclusion of only 67 participants, less than sufficient to obtain adequate power. For the experimental outcome analysis, the percent belief in the study purpose, for all pill conditions, was utilized as a categorical variable with believer (reporting greater than 49%) and nonbeliever groups (reporting 49% or less). The memory-enhancing and erection-enhancing pill groups provided additional ratings for the associated pill descriptions; the mean pill instructional set belief percentages were low at 13% and 35% (Table 16).

4.2.2 Overview of Experimental Data Analysis

The main study hypothesis that the erection-enhancing pill instructional set would affect both anticipatory anxiety and penile tumescence was tested using ANCOVA analyses. Pill condition was entered as a between-subjects factor. EPA, social anxiety

concerns, belief in the study purpose, and confidence to maintain an erection were entered as covariates. Salient sample characteristics, sexual orientation, relationship status, and intercourse experience, were under control for confounding effects. Other outcome variables under analysis included self-reported mental, genital, and autonomic arousal, continuous subjective sexual arousal, and positive and negative affect.

The second hypothesis that the bogus erectile performance feedback would result in decreased subsequent penile tumescence and increased anticipatory anxiety among participants with greater erectile performance anxiety as compared to participants with less performance anxiety was tested using linear regression analysis. Pre- and post-manipulation difference scores were calculated for each participant on the physiological sexual arousal, subjective sexual arousal, anticipatory anxiety, and affect outcome variables. EPA was tested as a predictor for each outcome variable. Exploratory analysis incorporating other sample characteristics such as belief in study purpose and expected erectile strength was conducted after the main hypotheses tests.

4.2.3 Results of Study Hypothesis One among Subgroup with Complete Penile Plethysmograph Data

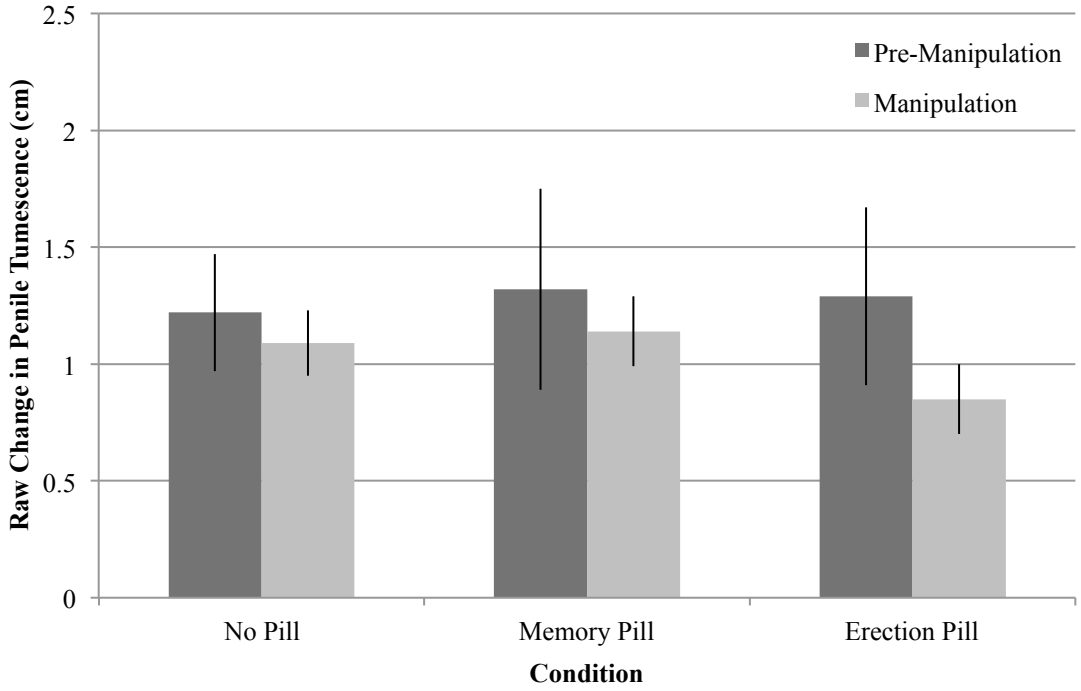
4.2.3.1 Analysis of Physiological Sexual Arousal

The first hypothesis posited that participants in the erection-enhancing pill group would show decreased penile tumescence and greater anticipatory anxiety than the

memory-enhancing pill group or the no pill control group to a subsequent erotic film after receiving bogus erectile performance feedback. A total of 42 cases were included in the following analyses with 15 in the no pill condition, 16 in the memory-enhancing pill condition, and 11 in the erection-enhancing pill condition. Covariates were erectile performance anxiety, social anxiety concern, percent belief in study purpose, and percent confidence to maintain an erection. Analyses of covariance revealed that there was no significant effect for raw change in penile tumescence across pill conditions ($F(2, 42) = 1.32$, $p = .31$, $\eta^2 = .23$; Figure 6) or for percent change in penile tumescence ($F(2, 42) = 1.53$, $p = .27$, $\eta^2 = .25$; Figure 7), thus not supporting the first hypothesis. Additional physiological sexual arousal variables were not significant: percent change in maximum penile tumescence ($F(2, 42) = 1.31$, $p = .32$, $\eta^2 = .23$; Figure 8), and rate of onset to reach maximum penile tumescence ($F(2, 42) = 2.96$, $p = .10$, $\eta^2 = .40$; Figure 9). Of all penile plethysmograph variables for the subgroup, latency to reach maximum penile tumescence obtained significance, ($F(2, 42) = 14.41$, $p = .002$, $\eta^2 = .76$; Figure 10). Specifically, the no pill condition's average latency during the manipulation assessment (after the pill instructions and bogus feedback) was significantly longer than the pre-manipulation assessment. Upon further analyses, the no pill condition's pre-manipulation latency to reach maximum tumescence mean was 346 seconds ($SD = 54.4$) and consisted of 42 cases. At the manipulation assessment, the latency mean was almost 2 minutes longer at 462 seconds with substantially greater variability ($SD = 122.1$). Four participants exhibited almost doubled latency after the manipulation, from 270 – 330 seconds to 615 –

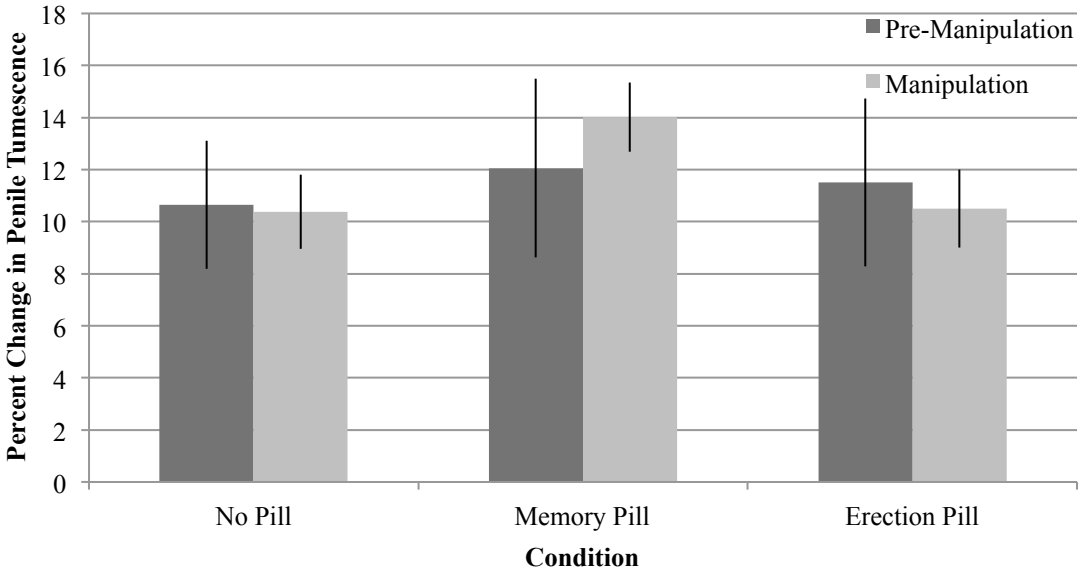
656 seconds. The other pill conditions were not significantly different across assessments.

Figure 6. Raw Change in Penile Tumescence for Subgroup with Complete Penile Plethysmograph Data



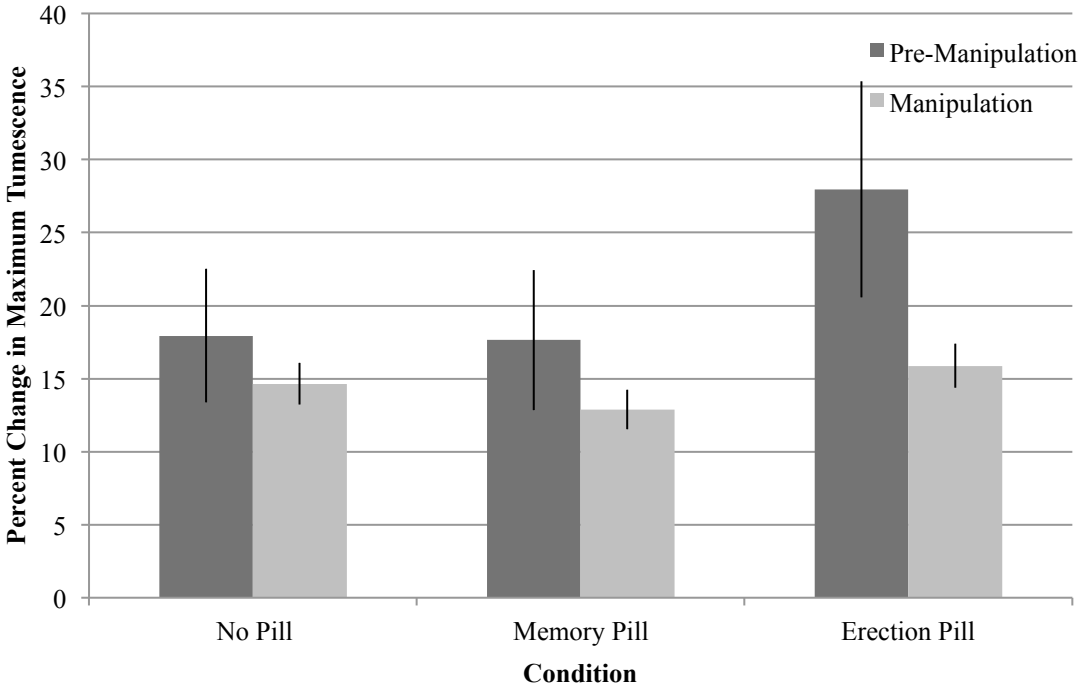
Note. Data based on 42 cases. Bars for each pill condition represent raw change in penile tumescence for pre-manipulation and post-manipulation assessments. Raw change was calculated as the difference in centimeters of average penile tumescence between the erotic and neutral films (average neutral film tumescence subtracted from average erotic film tumescence). Error bars represent standard error of the mean. Effect size (η^2) for raw tumescence change across pill conditions = .23.
Small effect size = .01, medium effect size = .06, large effect size = .14

Figure 7. Percent Change in Penile Tumescence for Subgroup with Complete Penile Plethysmograph Data



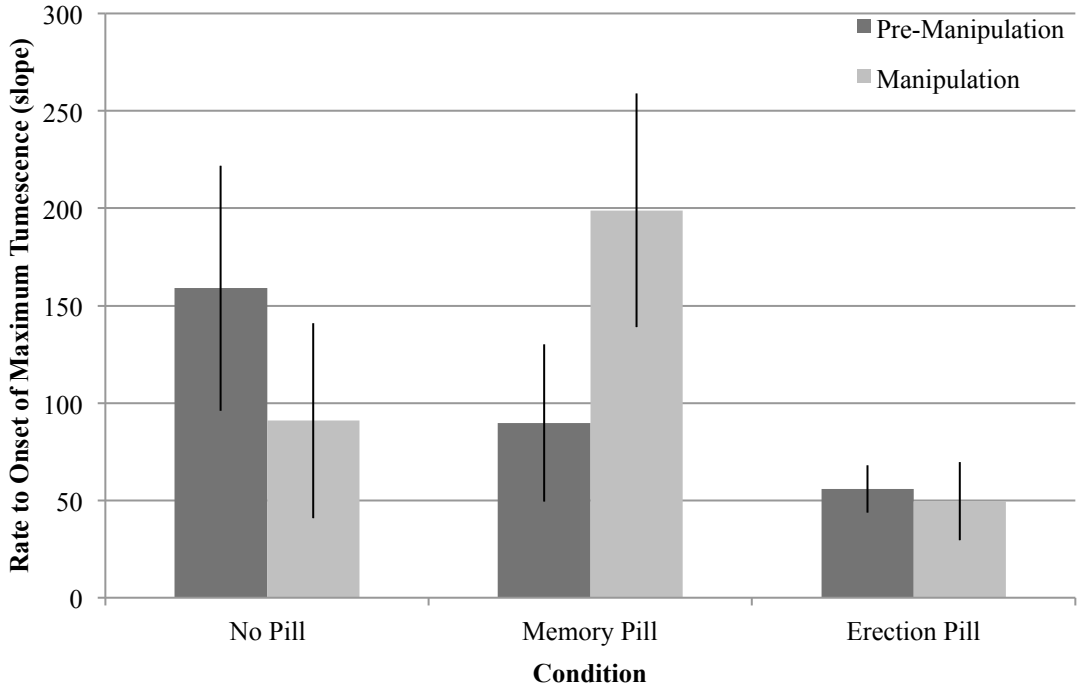
Note. Data based on 42 cases. Bars for each pill condition represent percent change in penile tumescence for pre-manipulation and post-manipulation assessments. Percent change was calculated as percentage increase from average penile tumescence during neutral film to average penile tumescence during erotic film. Error bars represent standard error of the mean. Effect size (η^2) for percent change in tumescence across pill conditions = .25.
Small effect size = .01, medium effect size = .06, large effect size = .14

Figure 8. Percent Change in Maximum Tumescence for Subgroup with Complete Penile Plethysmograph Data



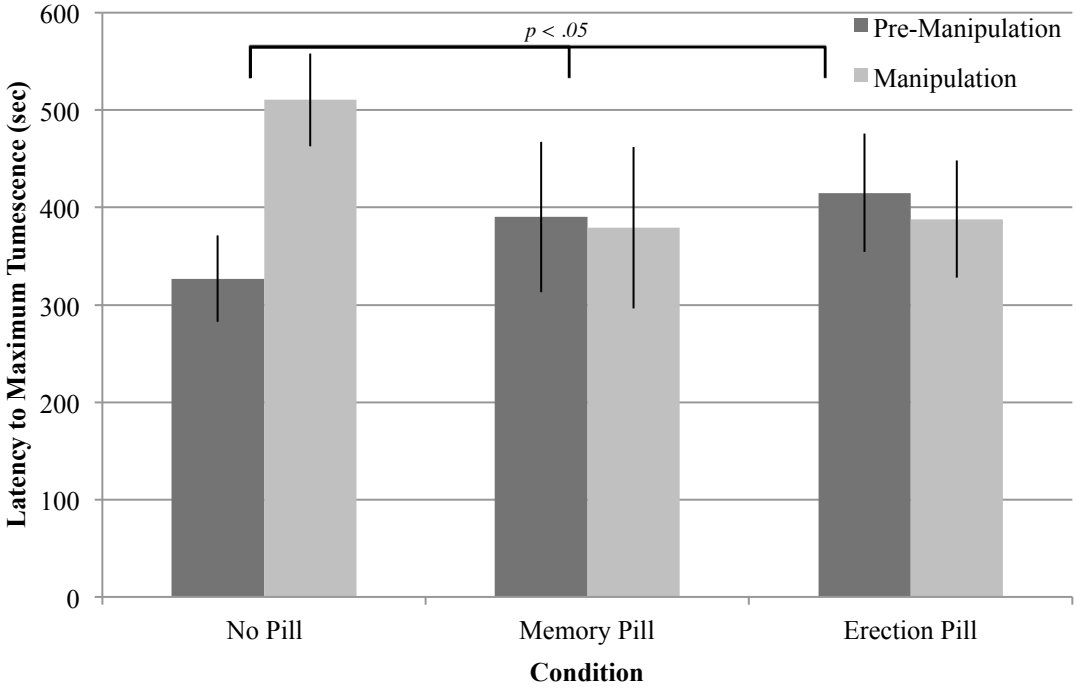
Note. Data based on 42 cases. Bars for each pill condition represent percent change in maximum penile tumescence for pre-manipulation and post-manipulation assessments. Percent change was calculated as percentage increase from average penile tumescence during neutral film to maximum penile tumescence during erotic film. Error bars represent standard error of the mean. Effect size (η^2) for percent change in maximum tumescence across pill conditions = .32.
Small effect size = .01, medium effect size = .06, large effect size = .14

Figure 9. Rate of Onset of Maximum Tumescence for Subgroup with Complete Penile Plethysmograph Data



Note. Data based on 42 cases. Bars for each pill condition represent rate of onset of maximum penile tumescence for pre-manipulation and post-manipulation assessments. Bars represent slope values to reach maximum penile tumescence from start of erotic film. Slope values were multiplied by 100- for readability. Error bars represent standard error of the mean. Effect size (η^2) for rate of onset of maximum tumescence across pill conditions = .40.
Small effect size = .01, medium effect size = .06, large effect size = .14

Figure 10. Latency to Maximum Tumescence for Subgroup with Complete Penile Plethysmograph Data



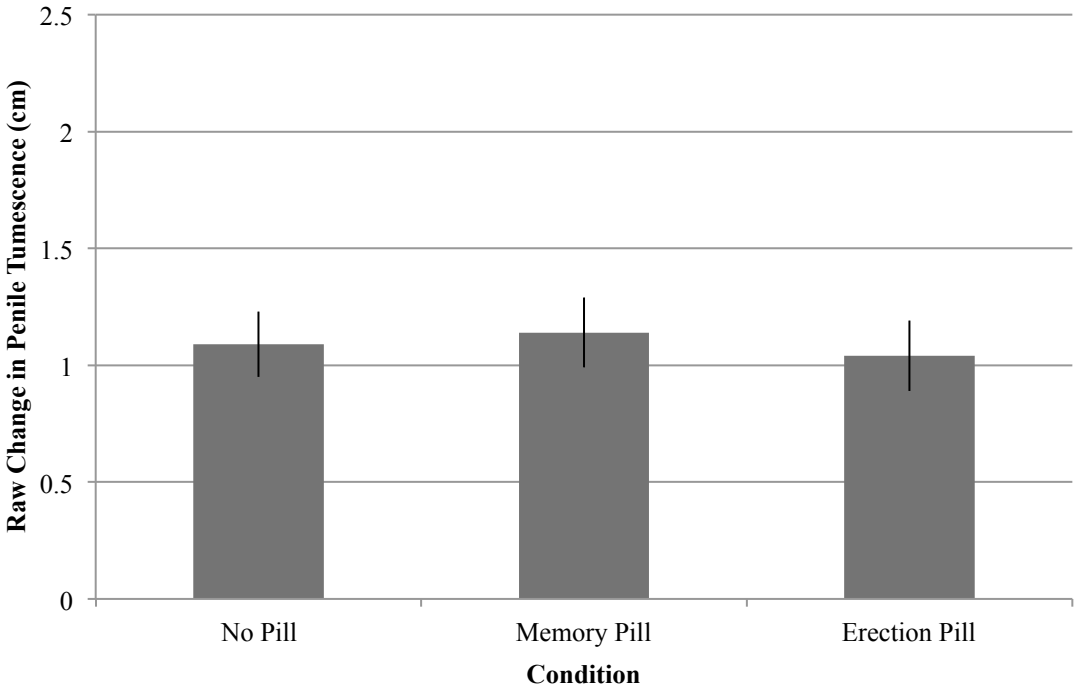
Note. Data based on 42 cases. Bars for each pill condition represent latency to reach maximum tumescence for pre-manipulation and post-manipulation assessments. Bars represent amount of time in seconds from start of neutral film to maximum penile tumescence. Error bars represent standard error of the mean. Effect size (η^2) for latency to maximum tumescence across pill conditions = .76.
Small effect size = .01, medium effect size = .06, large effect size = .14

4.2.4 Results of Study Hypothesis One among all Participants

4.2.4.1 Analysis of Physiological Sexual Arousal

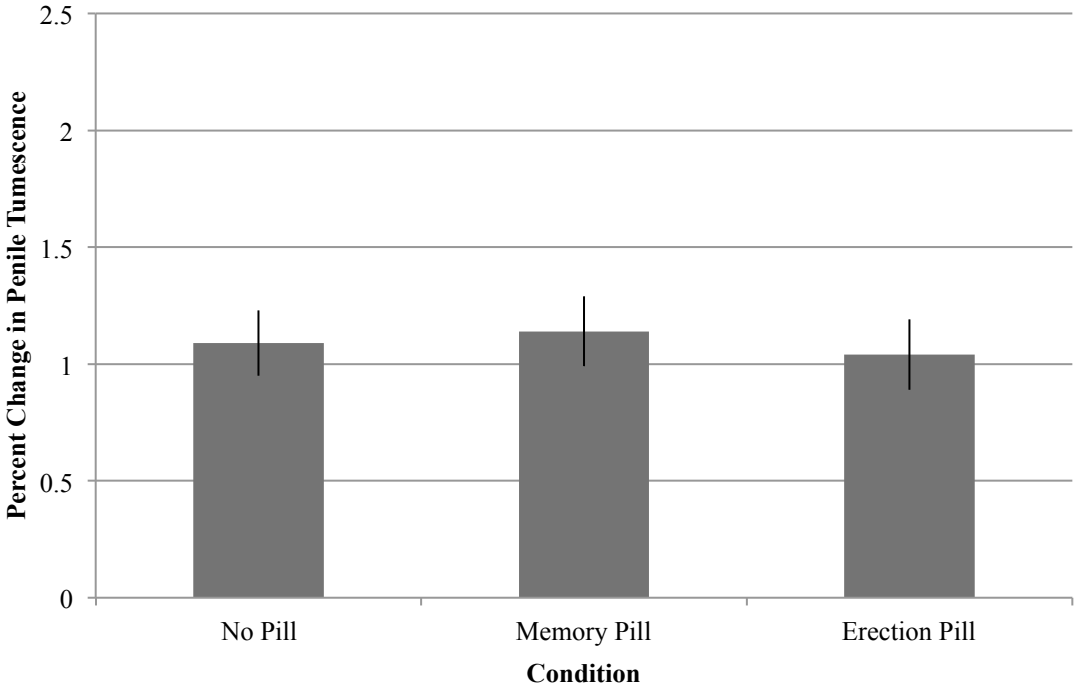
Penile plethysmograph data for seven participants were invalid due to equipment failure in the experimental study. ANCOVAs were conducted on the remaining 115 participants. Covariates in these analyses were erectile performance anxiety, social anxiety concern, percent belief in study purpose, and percent confidence to maintain an erection. Results revealed no significant effects for the physiological sexual arousal variables. Specifically, the following variables were similar across pill conditions for the post-pill instructional set manipulation assessment: raw change in penile tumescence ($F(6, 115) = 0.32$, $p = .80$, $\eta^2 = .01$; Figure 11), percent change in penile tumescence ($F(6, 115) = .15$, $p = .86$, $\eta^2 = .003$; Figure 12), percent change in maximum penile tumescence ($F(6, 115) = .30$, $p = .74$, $\eta^2 = .007$; Figure 13), latency to reach maximum penile tumescence ($F(6, 115) = .28$, $p = .76$, $\eta^2 = .006$; Figure 14), and rate of onset of maximum penile tumescence ($F(6, 115) = 1.06$, $p = .35$, $\eta^2 = .02$; Figure 15).

Figure 11. Raw Change in Penile Tumescence after Pill Instructional Set and Bogus Feedback



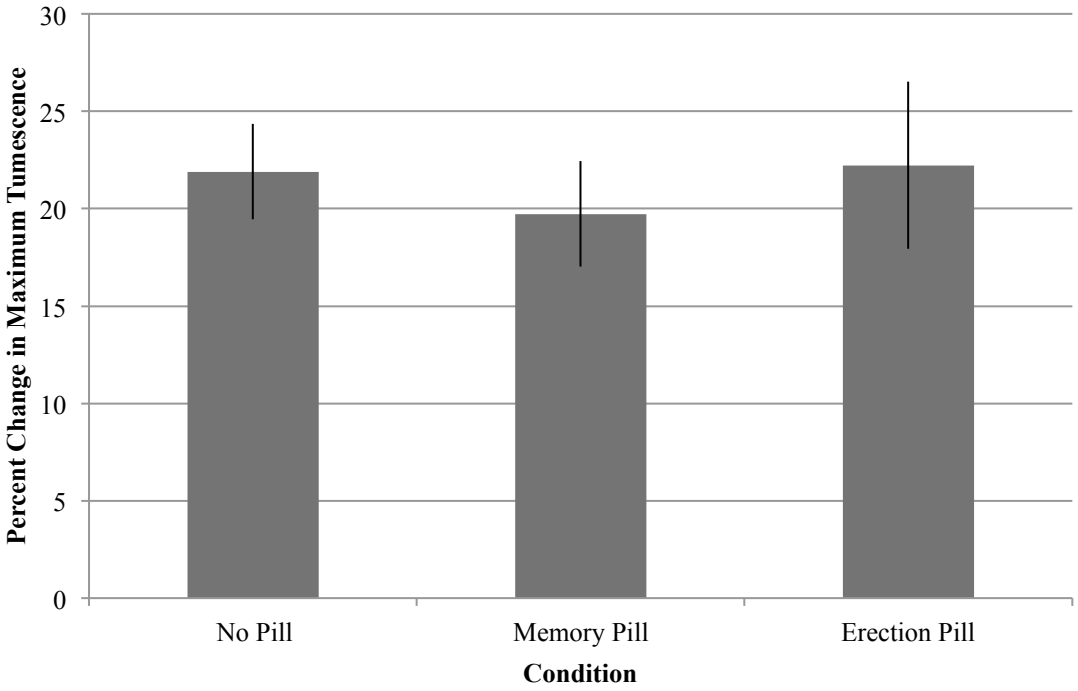
Note. Data based on 115 cases. Bars for each pill condition represent raw change in penile tumescence for the post-manipulation assessment only. Raw change was calculated as the difference in centimeters of average penile tumescence between the erotic and neutral films (average neutral film tumescence subtracted from average erotic film tumescence). Error bars represent standard error of the mean. Effect size (η^2) for raw tumescence change across pill conditions = .01.
Small effect size = .01, medium effect size = .06, large effect size = .14

Figure 12. Percent Change in Penile Tumescence after Pill Instructional Set and Bogus Feedback



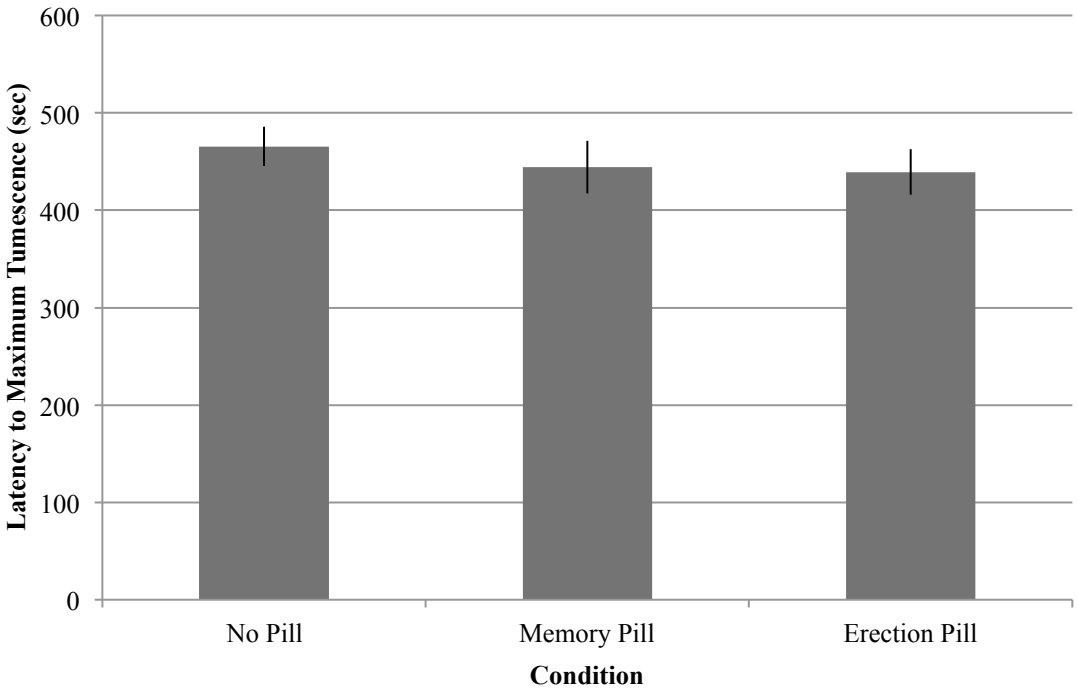
Note. Data based on 115 cases. Bars for each pill condition represent percent change in penile tumescence for the post-manipulation assessment only. Percent change was calculated as percentage increase from average penile tumescence during neutral film to average penile tumescence during erotic film. Error bars represent standard error of the mean. Effect size (η^2) for percent change in tumescence across pill conditions = .003.
Small effect size = .01, medium effect size = .06, large effect size = .14

Figure 13. Percent Change in Maximum Tumescence after Pill Instructional Set and Bogus Feedback



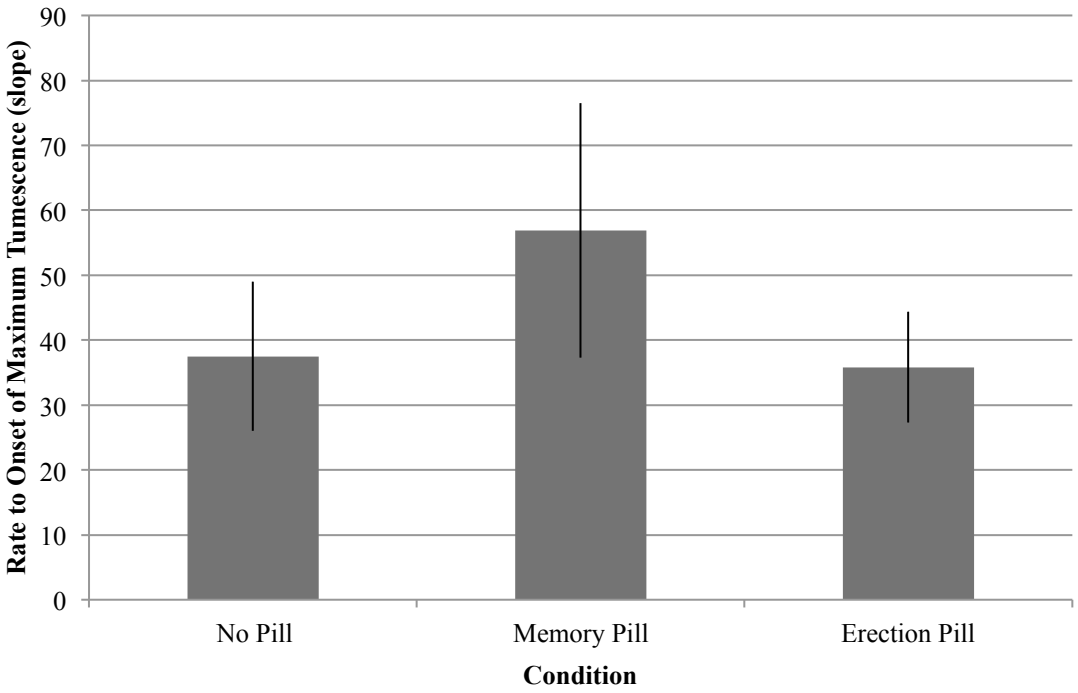
Note. Data based on 115 cases. Bars for each pill condition represent percent change in maximum penile tumescence for the post-manipulation assessment only. Percent change was calculated as percentage increase from average penile tumescence during neutral film to maximum penile tumescence during erotic film. Error bars represent standard error of the mean. Effect size (η^2) for percent change in maximum tumescence across pill conditions = .007.
Small effect size = .01, medium effect size = .06, large effect size = .14

Figure 14. Latency to Maximum Tumescence after Pill Instructional Set and Bogus Feedback



Note. Data based on 115 cases. Bars for each pill condition represent latency to reach maximum tumescence for the post-manipulation assessment only. Bars represent amount of time in seconds from start of neutral film to maximum penile tumescence. Error bars represent standard error of the mean. Effect size (η^2) for latency to maximum tumescence across pill conditions = .006.
Small effect size = .01, medium effect size = .06, large effect size = .14

Figure 15. Rate of Onset of Maximum Tumescence after Pill Instructional Set and Bogus Feedback



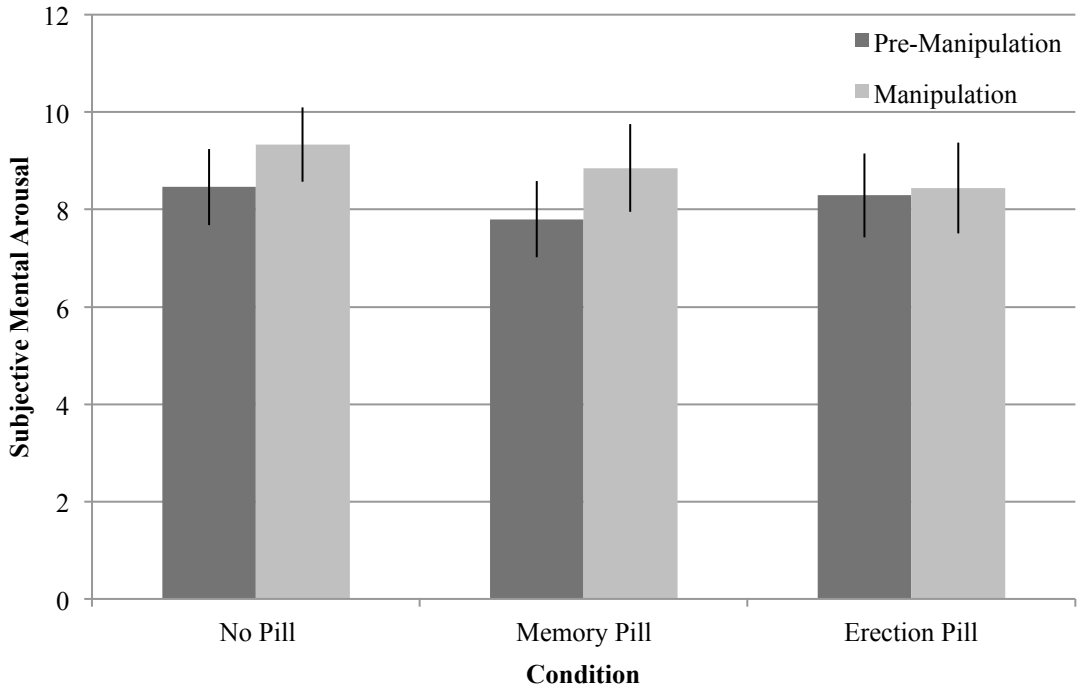
Note. Data based on 115 cases. Bars for each pill condition represent rate of onset of maximum penile tumescence for the post-manipulation assessment only. Bars represent slope values to reach maximum penile tumescence. Slope values were multiplied by 100 for readability. Error bars represent standard error of the mean. Effect size (η^2) for rate of onset of maximum tumescence across pill conditions = .02.
Small effect size = .01, medium effect size = .06, large effect size = .14

4.2.4.2 Analysis of Self-Reported Sexual Arousal

ANCOVAs were conducted for the self-reported sexual arousal measures which consisted of self-reported mental, genital, and autonomic arousal and the continuous sexual arousal measure. Continuous sexual arousal was assessed with a computer mouse

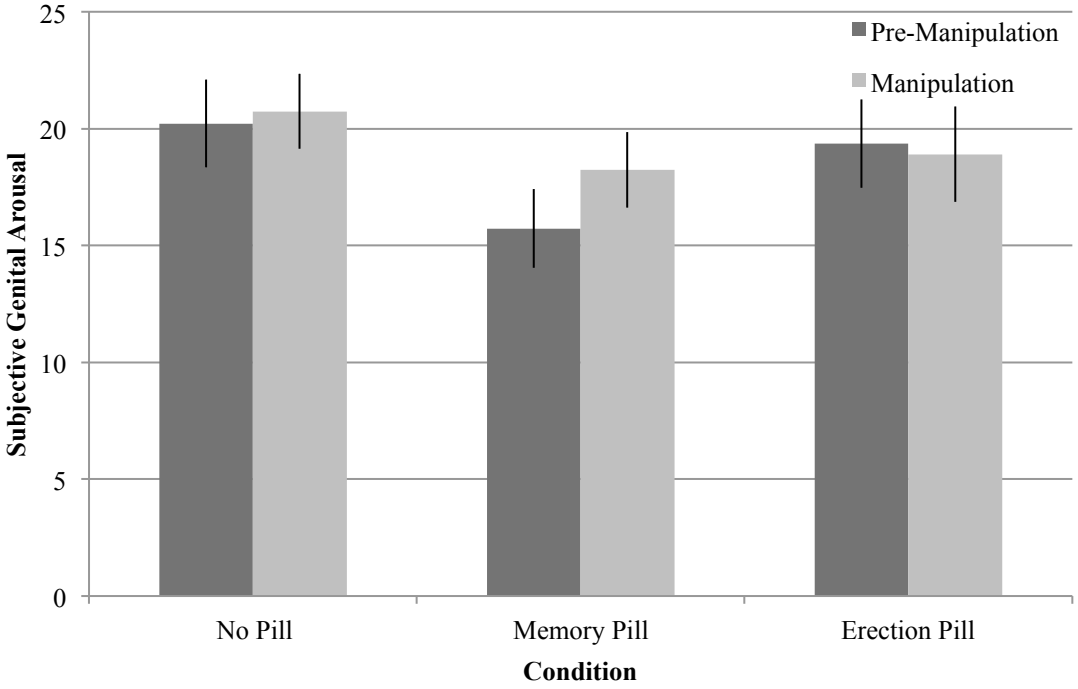
lever according to participants' level of arousal throughout the film presentations. Descriptive data are presented in Table 12. Covariates included in these analyses were erectile performance anxiety, social anxiety concerns, percent belief in the study purpose, and percent confidence to maintain an erection. No significant effects emerged across pill conditions for the manipulation assessment: subjective mental arousal ($F(2, 115) = .36$, $p = .70$, $\eta^2 = .006$; Figure 16), subjective genital arousal ($F(2, 115) = .84$, $p = .43$, $\eta^2 = .02$; Figure 17), subjective autonomic arousal ($F(2, 115) = 1.21$, $p = .30$, $\eta^2 = .02$; Figure 18), and continuous sexual arousal ($F(1, 115) = .10$, $p = .90$, $\eta^2 = .002$; Figure 19).

Figure 16. Change in Subjective Mental Arousal for all Participants across Manipulation Assessments



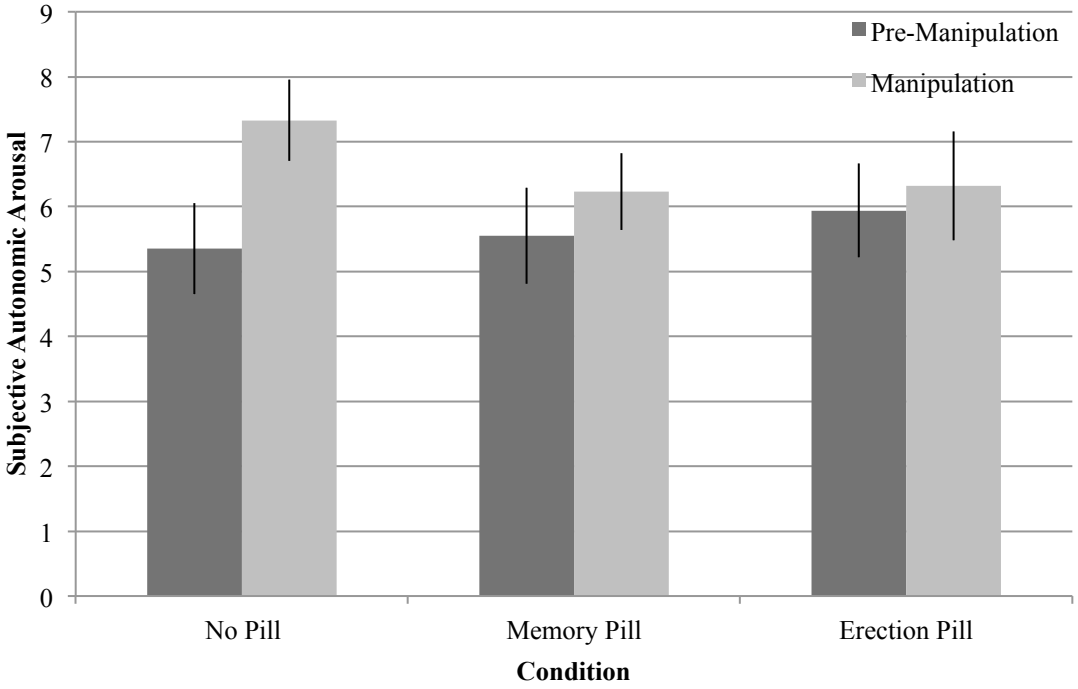
Note. Data based on 115 cases. Bars for each pill condition represent subjective mental arousal for pre-manipulation and post-manipulation assessments. Subjective mental arousal calculated as difference between baseline score prior to viewing the films and score in response to the erotic segment of the film (mean score before the film subtracted from mean score of erotic film). Subjective mental arousal assessed with Subjective Rating Scale measure. Error bars represent standard error of the mean. Effect size (η^2) for subjective mental arousal across pill conditions = .006.
Small effect size = .01, medium effect size = .06, large effect size = .14

Figure 17. Change in Subjective Genital Arousal for all Participants across Manipulation Assessments



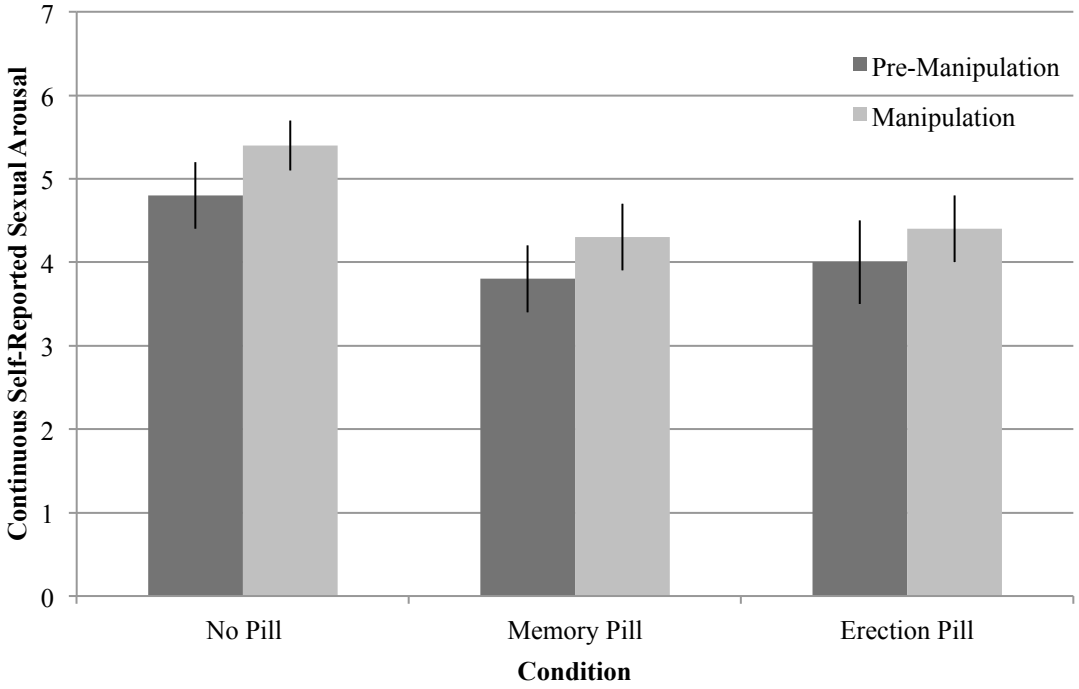
Note. Data based on 115 cases. Bars for each pill condition represent subjective genital arousal for pre-manipulation and post-manipulation assessments. Subjective genital arousal calculated as difference between baseline score prior to viewing the films and score in response to the erotic segment of the film (mean score before the film subtracted from mean score of erotic film). Subjective genital arousal assessed with Subjective Rating Scale measure. Error bars represent standard error of the mean. Effect size (η^2) for subjective genital arousal across pill conditions = .02.
Small effect size = .01, medium effect size = .06, large effect size = .14

Figure 18. Change in Subjective Autonomic Arousal for all Participants across Manipulation Assessments



Note. Data based on 115 cases. Bars for each pill condition represent subjective autonomic arousal for pre-manipulation and post-manipulation assessments. Subjective autonomic arousal calculated as difference between baseline score prior to viewing the film and score in response to the erotic segment of the film (mean score before the film subtracted from mean score of erotic film). Subjective genital arousal assessed with Subjective Rating Scale measure. Error bars represent standard error of the mean. Effect size (η^2) for subjective autonomic arousal across pill conditions = .02.
Small effect size = .01, medium effect size = .06, large effect size = .14

Figure 19. Change in Continuous Sexual Arousal for all Participants across Manipulation Assessments



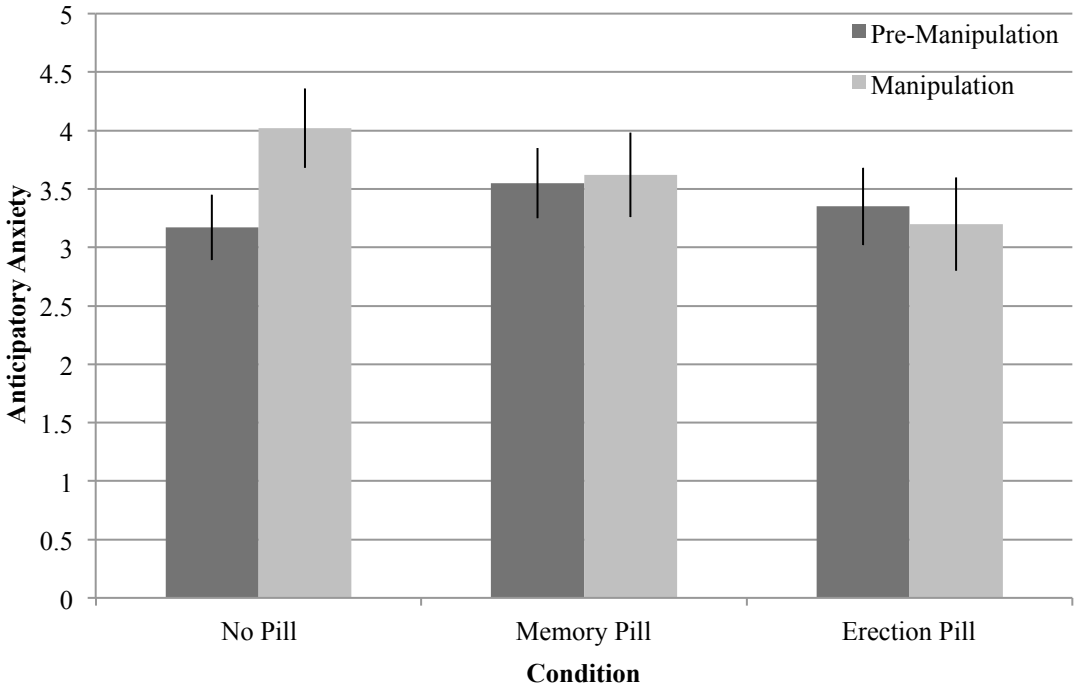
Note. Data based on 115 cases. Bars for each pill condition represent continuous sexual arousal for pre-manipulation and post-manipulation assessments. Continuous sexual arousal calculated as difference between average sexual arousal during erotic film and neutral film (average sexual arousal during neutral film subtracted from average sexual arousal during erotic film). Continuous sexual arousal measured with computer mouse lever. Error bars represent standard error of the mean. Effect size (η^2) for continuous sexual arousal across pill conditions = .002.
Small effect size = .01, medium effect size = .06, large effect size = .14

4.2.4.3 Analysis of Anticipatory Anxiety and Affect

Affective state was self-reported by participants for two time points, before the film presentation and during the erotic film. Affective state variables consisted of

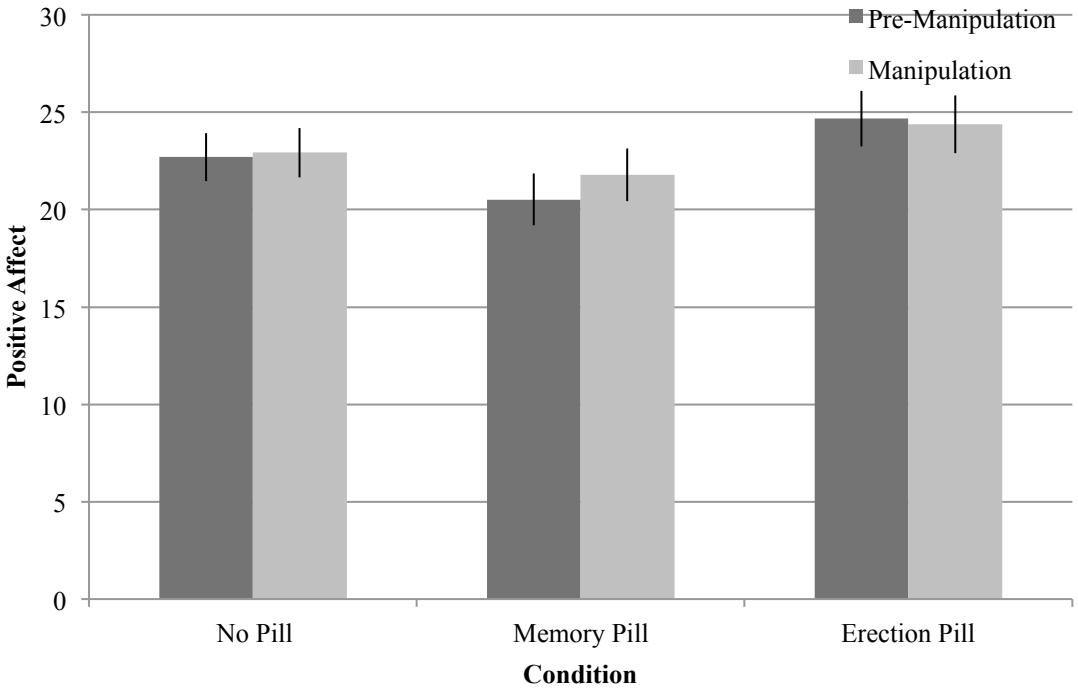
anticipatory anxiety, positive affect, and negative affect. ANCOVAs revealed no significant effect for anticipatory anxiety ($F(2, 115) = 2.04$, $p = .14$, $\eta^2 = .03$; Figure 20), thus not supporting the first hypothesis. Positive affect ($F(2, 115) = .62$, $p = .54$, $\eta^2 = .01$; Figure 21) and negative affect ($F(2, 115) = .09$, $p = .91$, $\eta^2 = .002$; Figure 22) did not yield significance. Specifically, the affective states at the pre-manipulation and manipulation assessments were not significantly different and no notable differences across pill conditions emerged.

Figure 20. Anticipatory Anxiety for all Participants across Manipulation Assessments



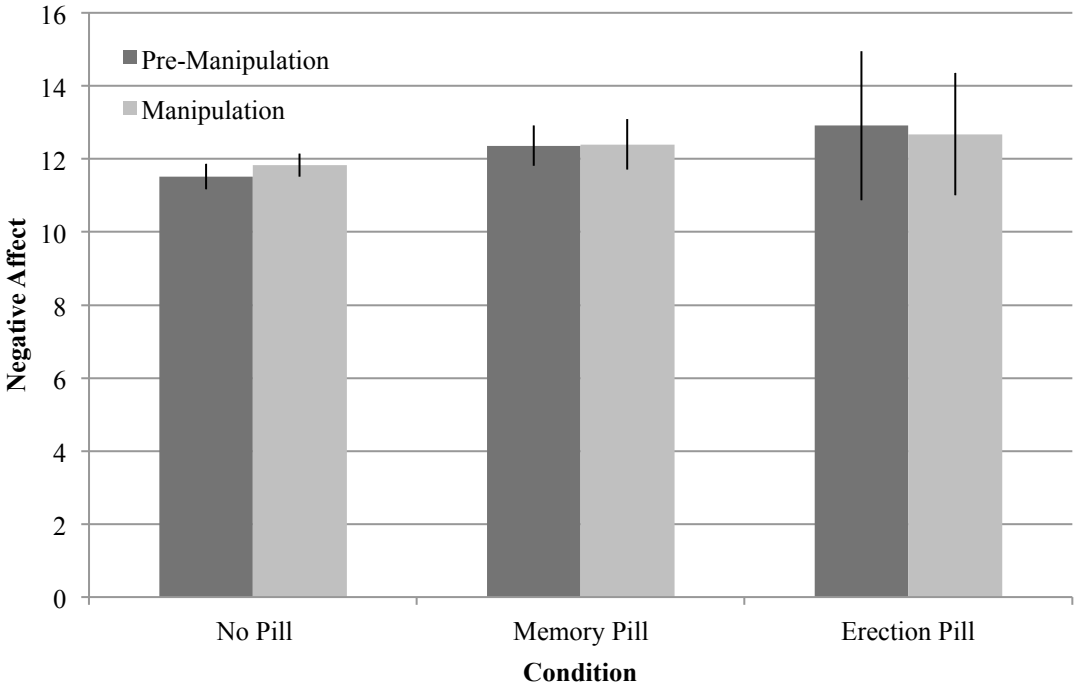
Note. Data based on 115 cases. Bars for each pill condition represent anticipatory anxiety for pre-manipulation and post-manipulation assessments. Bars represent mean anticipatory anxiety score prior to each film presentation and measured with Subjective Rating Scale. Error bars represent standard error of the mean. Effect size (η^2) for anticipatory anxiety across pill conditions = .03.
Small effect size = .01, medium effect size = .06, large effect size = .14

Figure 21. Positive Affect for all Participants across Manipulation Assessments



Note. Data based on 115 cases. Bars for each pill condition represent positive affect for pre-manipulation and post-manipulation assessments. Positive affect calculated as mean score during film presentation and measured with Positive and Negative Affect Schedule. Error bars represent standard error of the mean. Effect size (η^2) for positive affect across pill conditions = .01.
Small effect size = .01, medium effect size = .06, large effect size = .14

Figure 22. Negative Affect for all Participants across Manipulation Assessments



Note. Data based on 115 cases. Bars for each pill condition represent negative affect for pre-manipulation and post-manipulation assessments. Negative affect calculated as mean score during film presentation and measured with Positive and Negative Affect Schedule. Error bars represent standard error of the mean. Effect size (η^2) for negative affect across pill conditions = .002.
Small effect size = .01, medium effect size = .06, large effect size = .14

4.2.5 Results of Study Hypothesis Two regarding Erectile Performance Anxiety

4.2.5.1 Analysis of Physiological Sexual Arousal

The second hypothesis posited that participants who reported erectile performance anxiety (EPA) would report greater anticipatory anxiety and a significant dampening of their penile tumescence compared to participants reporting less EPA in response to a subsequent pill-free erotic film assessment. Linear regressions were conducted with EPA as the predictor variable for physiological sexual arousal, self-reported sexual arousal, anticipatory anxiety, and affect outcome variables. Each outcome variable was calculated as the difference between baseline and post-manipulation scores.

Results revealed that EPA was a significant predictor of three physiological sexual arousal variables (Table 3). Specifically, increased EPA was significantly associated with decreased difference scores for raw change in penile tumescence (β = -.48, $t(40)$ = -2.11, p = .05), and decreased difference scores for percent change in penile tumescence (β = -.52, $t(40)$ = -2.38, p = .03), and marginally associated with difference scores for latency to reach maximum penile tumescence (β = -.47, $t(40)$ = -2.07, p = .06). The remaining physiological sexual arousal variables were nonsignificant: percent change in maximum tumescence (β = -.26, $t(40)$ = -1.03, p = .32) and rate of onset to maximum tumescence difference scores (β = -.01, $t(40)$ = -.05, p = .96).

Table 3. Regression Analyses of Association Between EPA and Physiological Sexual Arousal

	β	Adj R^2	*t*	*p*
Physiological sexual arousal				
Raw change in penile tumescence	-.48	.18	-2.11	.05
Percent change in penile tumescence	-.52	.23	-2.38	.03
Percent change in maximum tumescence	-.26	.003	-1.03	.32
Latency to maximum tumescence	-.47	.17	-2.07	.06
Rate of onset of maximum tumescence	-.01	-.07	-.05	.96

Note. Analyses included 42 cases with complete penile plethysmograph data.

4.2.5.2 Analysis of Self-Reported Sexual Arousal

Linear regression analyses were conducted for the self-reported sexuality outcome measures which included self-reported mental, genital, and autonomic arousal and continuous sexual arousal (Table 4). Each outcome variable was calculated as the difference between baseline and post-manipulation scores. Results indicated no significant association between EPA and the self-reported sexuality variables: subjective mental arousal (β = -.02, $t(113) = -.27$, $p = .79$), subjective genital arousal (β = -.12, $t(113) = -1.32$, $p = .19$), subjective autonomic arousal (β = -.12, $t(113) = -1.32$, $p = .19$), and continuous sexual arousal (β = -.05, $t(113) = -.53$, $p = .60$).

Table 4. Regression Analyses of Association Between EPA and Subjective Sexual Arousal

	β	Adj R^2	*t*	*p*
Subjective sexual arousal				
Subjective mental arousal	-.02	-.01	-.27	.79
Subjective genital arousal	-.12	.01	-1.32	.19
Subjective autonomic arousal	-.12	.01	-1.32	.19
Continuous sexual arousal	-.05	-.01	-.53	.60

Note. Analyses included entire sample.

4.2.5.3 Analysis of Anticipatory Anxiety and Affect

Linear regressions were conducted for the anxiety and affect outcome variables (Table 5). Each outcome variable was calculated as the difference between baseline and post-manipulation scores. Results revealed no significant association between EPA and anticipatory anxiety (β = -.02, $t(113) = -.27$, $p = .79$), positive affect (β = -.12, $t(113) = -1.32$, $p = .19$), or negative affect (β = -.12, $t(113) = -1.32$, $p = .19$). EPA was significantly correlated with post-manipulation anticipatory anxiety ($r = .23$, $p = .009$), but not post-manipulation positive affect ($r = .03$, $p = .73$) or negative affect ($r = .06$, $p = .54$).

Table 5. Regression Analyses of Association Between EPA and Anticipatory Anxiety, Positive and Negative Affect

	β	Adj R^2	*t*	*p*
Anticipatory anxiety	.03	-.01	.31	.76
Positive affect	-.04	-.01	-.42	.68
Negative affect	.05	-.01	.59	.56

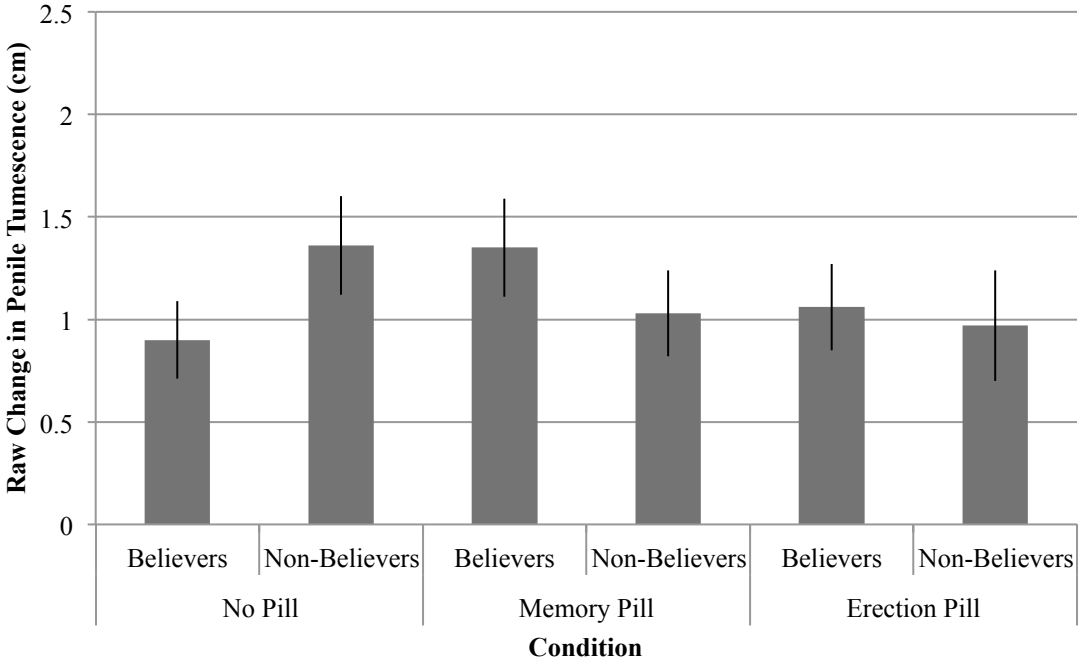
Note. Analyses included entire sample. Outcome variables represent difference scores between pre- and post-manipulation.

4.2.6 Exploratory Analysis of Belief in the Study Purpose

As previously mentioned, a considerable portion of the sample reported low belief in the initial study purpose of either 1) new erotic film testing for the no pill conditions or 2) herbal supplement testing for the pill conditions. An exploratory ANCOVA model was conducted to test for the effect of study purpose believability on the main outcome measures. Participants who reported greater than 49% belief in the study purpose were categorized as believers (n = 66) and those reported 49% or less were categorized as non-believers (n = 49). Across all outcome variables, there were no significant effects of belief group for the physiological and subjective sexual arousal variables: raw change in penile tumescence ($F(2, 115) = 1.42$, $p = .25$, $\eta^2 = .03$; Figure 23), percent change in penile tumescence ($F(2, 115) = 2.0$, $p = .14$, $\eta^2 = .04$; Figure 24), subjective mental arousal ($F(2, 115) = .65$, $p = .52$, $\eta^2 = .01$), subjective genital arousal ($F(2, 115) = .08$, $p = .92$, $\eta^2 = .01$), subjective autonomic arousal ($F(2, 115) = .23$, $p = .80$, $\eta^2 = .004$), and continuous sexual arousal ($F(2, 115) = 1.71$, $p = .19$, $\eta^2 = .03$).

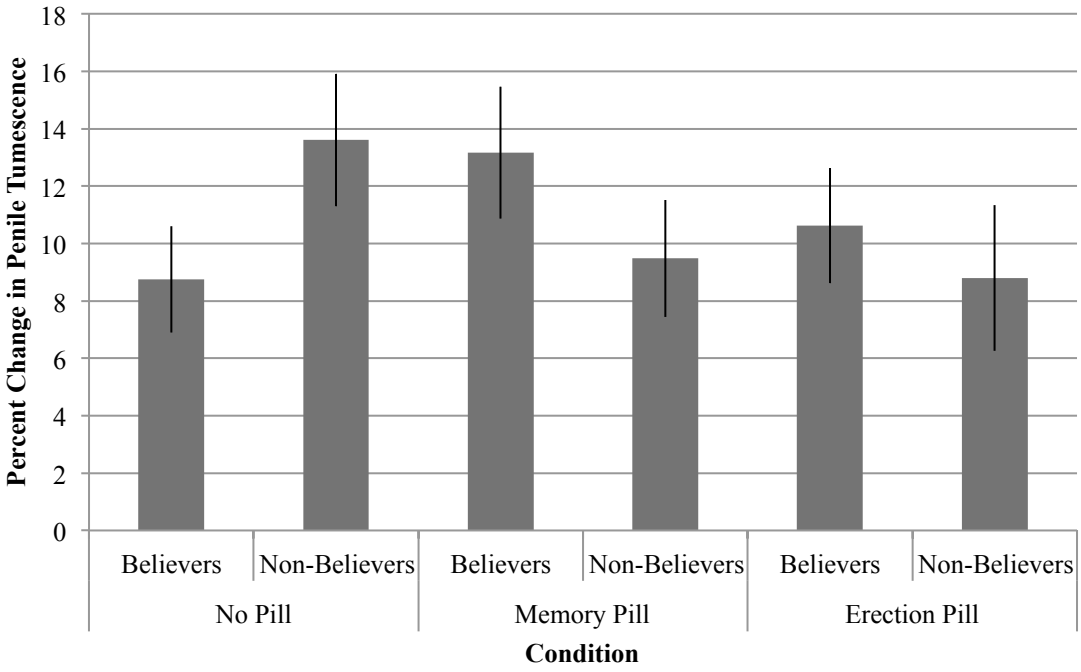
Anxiety and affective variables were also not significant: anticipatory anxiety, $F(2, 115) = 1.36$, $p = .26$, $\eta^2 = .024$ (Figure 25), positive affect, $F(2, 115) = .71$, $p = .50$, $\eta^2 = .012$, and negative affect, $F(2, 115) = .20$, $p = .82$, $\eta^2 = .004$.

Figure 23. Raw Change in Penile Tumescence across Believers and Non-Believers after Pill Instructional Set and Bogus Feedback



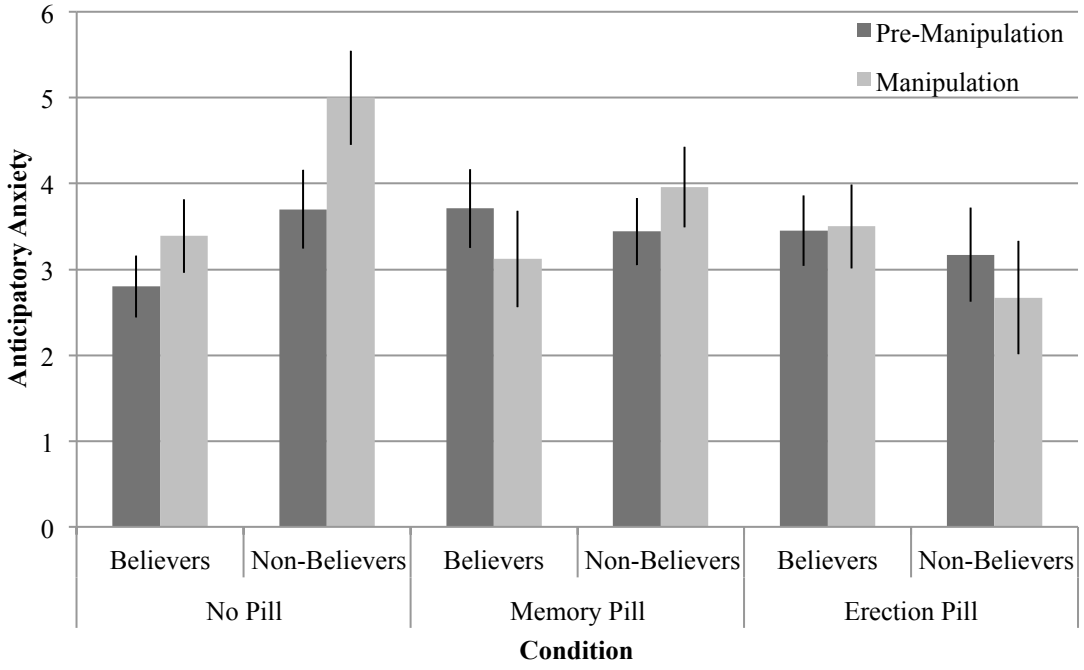
Note. Data based on 115 cases. Bars for each pill condition represent raw change in penile tumescence by belief group for the post-manipulation assessment only. Raw change was calculated as the difference in centimeters of average penile tumescence between the erotic and neutral films (average neutral film tumescence subtracted from average erotic film tumescence). Error bars represent standard error of the mean. Effect size (η^2) for raw tumescence change = .03.
Small effect size = .01, medium effect size = .06, large effect size = .14

Figure 24. Percent Change in Penile Tumescence across Believers and Non-Believers after Pill Instructional Set and Bogus Feedback



Note. Data based on 115 cases. Bars for each pill condition represent percent change in penile tumescence by belief group for the post-manipulation assessment only. Percent change was calculated as percentage increase from average penile tumescence during neutral film to average penile tumescence during erotic film. Error bars represent standard error of the mean. Effect size (η^2) for percent change in tumescence = .04.
Small effect size = .01, medium effect size = .06, large effect size = .14

Figure 25. Anticipatory Anxiety across Believers and Non-Believers after Pill Instructional Set and Bogus Feedback



Note. Data based on 115 cases. Bars for each pill condition represent anticipatory anxiety by belief group for pre-manipulation and post-manipulation assessments. Bars represent mean anticipatory anxiety score prior to each film presentation and measured with Subjective Rating Scale. Error bars represent standard error of the mean. Effect size (η^2) for anticipatory anxiety = .01.
Small effect size = .01, medium effect size = .06, large effect size = .14

4.2.7 Exploratory Analysis of Pill Attribution Percentages

As previously mentioned, the testing purpose of the study was roughly 51% believable, ranging from 0% to 100%. It was for this reason that the belief variable was

included in the hypotheses analysis to address the issue that without believing in the study purpose, the secondary pill attribution instructional scripts (experimental manipulation) would be subject to disbelief. At the end of the study, all participants completed a short questionnaire assessing the believability of the other aspects of the manipulation (Table 12). The memory-enhancing pill and the erection-enhancing pill groups answered items about believability that the pill enhanced 1) one's memory during the first film and 2) one's erectile response during the first film. Specifically, the two pill groups reported their percentage of belief that the pill enhanced one's memory during the first film presentation (before bogus erectile performance feedback and instructional script). The memory-enhancing pill group reported a 13% belief in the memory-enhancing effects, which was significantly less than the erection-enhancing pill group's 31% belief ($t(77) = 2.67$, $p < .01$). The erection-enhancing pill group completed an additional item that assessed the erection-enhancing qualities of the pill to be 35% believable, on average.

4.2.8 Exploratory Analysis of Observed Erectile Strength

Erectile strength was assessed at four time points throughout the study: expected erectile strength prior to each film presentation and actual erectile strength after the films. The aim of the assessment was to provide an augment to the penile tumescence data such that the penile plethysmograph cannot capture one's expectation of erectile performance. In speculating possible patterns of expected and actual erectile strength at the pre-manipulation and the manipulation assessments, expected strength after receiving bogus

feedback may decrease compared to pre-manipulation expectations. Upon visual inspection of the group means (Table 13), erectile strength expectation averages followed the pattern of decrease where expectations were lower for the second film than the first. However, repeated measures ANOVAS indicated a lack of significant difference across groups on either expected or actual erection strength.

CHAPTER 5 DISCUSSION

5.1 Overview

Recreational use of PDE5 inhibitors has increased steadily since the advent of sildenafil citrate (brand name Viagra) in 1999. Users report a desire to enhance their sexual performance as well as prevent erectile failure with the medication despite often not experiencing clinically significant ED (Korkes et al., 2008; Musacchio et al., 2006). However, approximately 12.5%, self-report erectile difficulties though the onset of the difficulties is unclear (Harte & Meston, 2011). Safety-seeking behaviors such as the unreasonable use of a "rescue" medication to prevent a feared outcome, inadequate erectile response or even failure, has been shown to create and maintain pathological anxiety in healthy subjects (Olatunji et al., 2011). To this point, this study aimed to examine the effects of an erection-enhancing pill attribution on sexual performance and evaluate the role of erectile performance anxiety in pill attribution.

The presented experimental study specifically tested the effects of an erection-enhancing pill attribution manipulation on anticipatory anxiety and subsequent sexual arousal response. The study design consisted of a stratified, random distribution of participants across three pill instructional set conditions: no pill, memory-enhancing pill, and erection-enhancing pill conditions. Over the course of two sexual stimuli film presentations, participants' anticipatory anxiety, affect, and physiological and subjective sexual arousal were assessed at pre-manipulation (when under the impression that the

ingested pill was a memory-enhancer) and after the pill attribution manipulation and receiving bogus feedback of their "average" erectile performance.

Two hypotheses were tested with analysis of covariance and linear regression models. The first hypothesis stated that participants in the erection-enhancing pill group would respond with greater anticipatory anxiety and dampened penile tumescence to the subsequent film assessment when asked to sexually perform without the aid of the pill. Only one physiological sexual arousal variable, latency to reach maximum penile tumescence, was statistically significant across pill groups. The no pill group experienced increased latency to reach maximum tumescence compared to the other pill conditions. The remaining physiological sexual arousal, subjective sexual arousal, anticipatory anxiety, and affect variables did not achieve the statistical significance to support the hypothesized differential sexual or affective response to the pill instructional set manipulation. Apart from latency to reach maximum tumescence, individuals across pill conditions experienced similar physiological and subjective sexual arousal, and anticipatory anxiety during the first and second film presentations.

The second hypothesis proposed that individuals with greater erectile performance anxiety (EPA) would experience greater anticipatory anxiety and decreased penile tumescence after the bogus "average" erectile performance feedback than individuals with less erectile performance anxiety. Of all outcome measures, erectile performance anxiety significantly predicted two physiological sexual arousal variables: raw change in penile tumescence and percent change in penile tumescence. Specifically, increased EPA was associated with decreased difference between baseline and post-

manipulation penile tumescence such that individuals with greater EPA after the bogus feedback reported decreased tumescence regardless of pill condition.

5.2 Physiological Sexual Arousal and Pill Attribution

Based on the pilot study, penile tumescence was expected to decrease significantly after the pill attribution manipulation for the erection-enhancing pill condition. The penile plethysmograph data loss permitted only partial analysis of the sample, 42 cases. Penile tumescence change scores for the subsample were comparable to similar studies using penile plethysmography among college students, in the range of 1 to 3 cm of increase (Barlow et al., 1983; Cranston-Cuebas et al., 1993; Wolchik et al., 1980) Mean comparisons across pill conditions indicated a nonsignificant trend of decreased physiological sexual arousal for the erection-enhancing pill condition accompanied by large eta squared effect sizes (.23 - .40). Specifically, the participants receiving the erection-enhancing pill instructions exhibited decreased penile tumescence during the manipulation assessment compared to the baseline assessment among the following variables: raw change in penile tumescence, percent change in penile tumescence, and percent change in maximum tumescence. Notably for percent change in maximum tumescence, the erection-enhancing pill group experienced only 16% increase in tumescence at post-manipulation, down from 27% increase at baseline. The lack of statistical significance across these variables is most likely due to the small sample size resulting in low statistical power (Cohen, 1992)

A strength of the current study is that performance attribution effects are uniquely examined in the context of male sexual performance. Previous research has addressed the effects of performance demand expectancy, rather than attribution, on physiological sexual arousal assessment. Two experimental studies demonstrate the effects of performance demand via erectile arousal instructions on penile tumescence. In Heiman and Rowland's study (1983), 14 sexually dysfunctional men and 16 sexually functional men listened to erotic audio tapes and were asked to concurrently engage in sexual fantasy. Participants underwent two counterbalanced demand conditions: to focus on obtaining and maintaining an erection or to focus on relaxing and pleasurable enjoyment. In the performance demand condition, sexually functional men experienced significantly increased penile tumescence compared to their tumescence in the non-demand condition. Sexually dysfunctional men responded in an opposite fashion, greater tumescence in the non-demand condition than the demand condition. Cranston-Cuebas and colleagues (1993) replicated these findings utilizing erection-enhancing and erection-inhibiting pill instructions with a placebo pill control prior to an erotic film presentation. Sexually functional men experienced greater penile tumescence when presented with pill expectancy instructions for erection-inhibition than for the enhancing or placebo conditions.

A strength of the current study is that performance attribution effects are uniquely examined in the context of male sexual performance and contribute to the understanding of erection-enhancing pill attribution and erectile performance among sexually healthy men. Previous research has addressed the effects of performance demand *expectancy*,

rather than attribution, on physiological sexual arousal assessment. Two experimental studies demonstrate the effects of performance demand via erectile arousal instructions on penile tumescence. In Heiman and Rowland's study (1983), 14 sexually dysfunctional men and 16 sexually functional men listened to erotic audio tapes and were asked to concurrently engage in sexual fantasy. Participants underwent two counterbalanced demand conditions: to focus on obtaining and maintaining an erection or to focus on relaxing and pleasurable enjoyment. In the performance demand condition, sexually functional men experienced significantly increased penile tumescence compared to their tumescence in the non-demand condition. Sexually dysfunctional men responded in an opposite fashion, greater tumescence in the non-demand condition than the demand condition. Cranston-Cuebas and colleagues (1993) replicated these findings utilizing erection-enhancing and erection-inhibiting pill instructions with a placebo pill control prior to an erotic film presentation. Sexually functional men experienced greater penile tumescence when presented with a performance demand, erection-inhibition pill instructions, than for the erection-enhancing or placebo pill conditions.

Sexually healthy men in these studies have sexually outperformed their baseline erectile response in the face of an erectile performance demand. When the performance demand is accompanied by "average" performance feedback after use of an erection-enhancer, their erectile responding is considerably different. Powers et al. (2008) demonstrated that claustophobics who were told that the memory-enhancing pill they ingested prior to a fear assessment was "relaxing" after the assessment, experienced greater return of fear at a follow-up assessment compared to the stimulating pill or

placebo pill descriptions. Pill attribution effects for salient pill descriptions, e.g., when the pill has a desired effect such as to reduce anxiety or to enhance erections, may result in poorer performance.

5.3 Subjective Sexual Arousal and Pill Attribution

Subjective sexual arousal was expected to be congruent with the physiological sexual arousal outcomes in that previous research (Chivers, Seto, Lalumiere, Laan, & Grimbos, 2010) provides evidence for a close association between subjective and physiological arousal for men. Meta-analytical results across 132 studies indicate that men experience greater congruence, r = .66, than women, r = .26 (Chivers et al., 2010) Research in this area propose that due to men's direct feedback on their degree of sexual arousal via visible erections, that their self-reports of sexual arousal tend to match, unlike subjective and physiological arousal for women.

While the correlation between subjective sexual arousal and objective measurements of physiological sexual arousal is robust among men, studies that examine subjective arousal *across experimental conditions* consistently yield no significant differences, particularly among the aforementioned performance demand and pill attribution studies. For example, the shock threat paradigm studies (Barlow et al., 1983; Beck, Barlow, Sakheim, & Abrahamson, 1987) utilized a lever to assess continuous subjective sexual arousal during the erotic film assessments and results indicated significant penile tumescence differences across conditions but no difference in subjective arousal. Cranston-Cuebas et al. (1993) and Heiman and Rowland (1983) also

assessed subjective sexual arousal with a continuously recording lever and found no significant differences, consistent with the shock threat studies. The current study incorporated the continuous subjective arousal lever (a computer mouse tracker) and further expanded by added additional self-report measures for mental arousal, genital arousal, and autonomic arousal. The two subjective arousal formats, written self-reports at various time points and continual measurement throughout the film presentation, yielded no significant differences across film sessions (within-subjects) or across pill conditions (between-subjects).

5.4 Anticipatory anxiety, Affect, and Pill Attribution

Anticipatory anxiety was one of two primary outcomes in the presented study. The theoretical underpinning for anticipatory anxiety as a variable of interest was based on Barlow's model of male sexual dysfunction (1986). According to the model, it is anticipatory anxiety about an upcoming sexual event that influences one's attentional resources either towards erotic cues or towards non-erotic cues, detracting from the physiological processes that promote erectile response (Barlow, 1986).

Anticipatory anxiety was measured before each film assessment and an anxiety-provoking performance demand was incorporated into the experimental manipulation. Specifically, each participant, regardless of pill condition, was asked to sexually perform to the best of his ability prior to the film assessments. Additionally in the manipulation, the participants in the pill-ingesting conditions received feedback that their erectile

response was “average”, thus as an attempt to increase anxiety systematically across conditions when having been told that they ingested an erection-enhancer.

There is substantial empirical evidence for the association between anxiety and erectile dysfunction (Althof, 2002; Beck & Barlow, 1986; Gralla et al., 2008; Hale & Strassberg, 1990; Hedon, 2003; Rosen, 2001). In the present study, anticipatory anxiety was not significantly different across pill conditions, nor was positive or negative affect. In previous studies utilizing a performance demand instructional set, researchers administered anxiety and affect measures to examine potential differences across experimental conditions (Beck & Barlow, 1986b; Beck et al., 1987; Heiman & Rowland, 1983). Beck and colleagues (1986b, 1987) did not run statistical tests for self-reported anxiety, but reported that anxiety increased and sense of calm decreased as shock intensity increased across four shock levels, no shock, half tolerance shock, tolerance shock, twice tolerance shock. Individual tolerance levels for shock were measured before the start of the session. They additionally reported that positive affect remained consistent across shock conditions. Heiman and Rowland (1983) found no effect for anxiety across demand conditions and attributed the lack of effect to the significant correlation between anxiety scores and other affective states such as excitement and pleasure as well as expected correlations with worry and inhibition. The authors speculated that the term *anxiety* may be too vague or unspecific to capture anxiety in response to the performance demand manipulation.

Another possible explanation for the manipulation’s lack of impact on anxiety may be the bogus feedback of “average” erectile performance. Typically, for erection-

enhancers and PDE5 inhibitors, the consumer expects to have an above-average erectile response as these medications indicate. In designing the present study, much consideration was given to the bogus feedback script. The "average" erectile performance feedback provided by a female researcher (a male researcher for nonstraight participants) was incorporated to overtly provoke anxiety to increase erectile performance evaluation concerns.

Alternatively, feedback that erectile response is "above average" would better resemble the expectations for an erection-enhancing pill, though erectile dysfunction medication such as PDE5 inhibitors do not substantially increase penile tumescence among sexually healthy men as empirically evidenced by Mondaini and colleagues (2008). A sexually healthy man is likely not to experience effects beyond a shorter refractory period (Mondaini et al., 2008). A stronger manipulation design would be to have varying feedback conditions as in previous studies (e.g., Cranston-Cuebas et al., 1993; Powers et al., 2008).

Another factor that may have buffered the effect of anxiety-provoking feedback on anticipatory anxiety and affective state, is the high erectile confidence of the sample. Perhaps the average feedback may have been interpreted as a lack of effectiveness of the herbal supplement (i.e., I had average performance so the pill is not effective) rather than attributing one's performance to the pill (i.e., Even with the pill, I had average performance). High self-efficacy, operationalized as confidence in attaining and maintaining an erection, as well as having a visible erection may be robust to anxiety among the sexually healthy sample. Furthermore, sexually healthy men tend to

outperform sexual performance demands, particularly when the outcome for underperforming is negative (Barlow, Sakheim, & Beck; 1983; Beck & Barlow, 1986a, 1986b; Heiman & Rowland, 1983).

5.5 Erectile Performance Anxiety and Pill Attribution

Erectile performance anxiety (EPA) was measured with the Erectile Performance Anxiety Index (Telch & Pujols, in press), a 10-item self-report scale specifically designed to assess erectile performance anxiety. EPA scores were generally skewed towards less anxiety, though approximately half reported mild to moderately severe erectile performance anxiety. To examine the second hypothesis on the effects of EPA, linear regressions were conducted with EPA as the predictor variable for physiological sexual arousal, self-reported sexual arousal, anticipatory anxiety, and affect outcome variables. In support of the hypothesis for physiological sexual arousal, increased EPA was associated with significantly decreased raw change in penile tumescence. Specifically, individuals displaying greater EPA showed decreased penile tumescence after the bogus "average" erectile performance feedback, regardless of pill condition. There were no significant interactions between EPA and pill condition, throughout hypothesis testing. No significant results emerged for EPA as a predictor of subjective sexual arousal, anxiety, or affect pre- to post-manipulation difference scores. However, EPA was positively correlated with post-manipulation anticipatory anxiety.

The outcome of participants with EPA experiencing decreased penile tumescence after the pill attribution manipulation is consistent with Barlow's sexual dysfunction model and previous studies (Abrahamson, Barlow, Sakheim, Beck, & Athanasiou, 1985;

Barlow, 1986; Beck & Barlow, 1986a). Barlow's model (1986) theorizes that sexually functional men have greater attentional resources dedicated to erotic cues that elicit erectile response, similar to participants reporting less EPA. In the current study, EPA was found to be significantly associated with erectile functioning (r = -.58, p < .001) and with anticipatory anxiety (r = .23, p < .01), where greater EPA was correlated with poorer erectile functioning and increased anxiety after the manipulation. Under this theoretical model, those with EPA were expected to attend to performance-related worries, as they have self-reported, and thus potentially perceive "average" erectile performance feedback as confirmatory evidence for their erectile performance fears. Beck and Barlow (1986a) conducted an experimental study examining the effects shock threat simultaneously with attentional focus (genital versus pleasurable feelings) on penile tumescence. Twenty-four sexually functional and dysfunctional men participated in all conditions: shock threat demand for erectile performance, no shock threat, with genital focus or focus on general pleasurable feelings. Contrary to other shock threat paradigm studies, sexually functional men experienced significant decreased penile tumescence with shock threat compared to their responding in the no shock threat condition. Attentional focus did not produce significant differences across conditions. The authors speculated that age was a factor as the average age of the sample was 44 years old and older men are more likely to have experienced occasional erectile failure thus the threat of shock for "average" performance may be more salient.

A second study by Abrahamson and colleagues (1985) conducted an experiment to assess the effects of a distraction task during an erotic film presentation on penile

tumescence. Of the 20 participants, the sexually functional men experienced significantly decreased tumescence when having to listen to and remember an audio recording of a non-sexual passage compared to their baseline measurement without the audio recording. Sexually dysfunctional men performed similarly across the distraction conditions. This is positive evidence for the negative impact of cognitive distraction towards non-erotic cues on penile tumescence. For both experimental studies, erectile performance anxiety has proven to be a challenge to manipulate experimentally. For example, there may be other age-related factors that resulted in decreased tumescence for Beck and Barlow's (1986a) sample. The current study provided empirical evidence that individuals with greater EPA respond more negatively, compared to baseline, to anxiety-provoking feedback on their erectile performance such that they experience increased anticipatory anxiety and dampened penile tumescence.

5.6 Limitations

Several significant limitations of the study deserve comment. First, data collected on the believability of the pill instructional sets suggest that the perceived credibility of the experimental manipulation was less than optimal. Specifically, participants rated their percentage of belief at approximately 51%. The explanation given at the beginning of the study told pill group participants that the herbal supplement was available on the market, but was being tested for memory recall of emotionally laden content. One factor that may have contributed to the observed low believability ratings was the appearance of the

capsule. Coffield and Buckalew (1988) conducted a series of studies on pill characteristics and found that pills in shades of blue and red were preferred over the least favored black color. The current study presented participants with black opaque capsules of which the majority swallowed directly from a small clear plastic cup that contained the pill. Perhaps the inability to see the pill contents or to hold the capsule in one's hand hindered believability of the herbal supplement testing purpose. To further challenge the believability of the study rationale, the pill's description as an herbal memory enhancer may not be as credible to a student population often invested in improving memory retention for academic performance. Prescription stimulant medication for ADHD is a much greater target for use due to its robust ability to improve short-term memory and sustained attention, unlike slower-acting herbal agents. DeSantis and colleagues (2008) interviewed a large sample of undergraduates and found approximately 34% to have used such stimulants illegally at least one time. A less popular memory impairment remedy, the herb *Ginkgo biloba* (McKenna, Jones, & Hughes, 2001), has shown mixed results for cognitive functioning across several studies, and thus its effectiveness for improving memory is not robust (Mahadevan & Park, 2008). Individuals in the current study may have had greater difficulty believing in the initial aim of the study to test the effectiveness of a memory-enhancer. Perhaps an alertness-enhancing pill description, such as the testing of a new caffeine-like herbal blend, may have increased believability because of the availability of effective caffeine products in the consumer market.

Previous studies with the sedating/arousing pill paradigm targeted recruitment of participants with clinically significant symptoms (Barefoot & Girodo, 1972; Lowery et

al., 1979; Storms & Nisbett, 1970; Weiner & Samuel, 1975). The current sample was primarily sexually healthy and reported high confidence to attain and maintain an erection. Degree of confidence to attain an erection may be robust to outcome variables such as anticipatory anxiety or negative affect. Examining this relationship is a challenge due to a ceiling effect for percent confidence to attain erections (average of 90.2%), and study analyses revealed no interaction effects for pill condition. The sample's self-reports of high confidence to attain an erection provided supportive evidence for self-efficacy.

The study was additionally limited in that the sample was recruited from a younger collegiate population, the majority of which identified as straight males interested in women and a considerable portion were not sexually active. The issue of including participants without a history of intercourse is that the evaluative component of the pill attribution manipulation (female researcher providing "average" feedback) relies on having previous experience with sexual performance evaluation with a partner. The experimental performance demand may not be as salient with a sexually inexperienced population as these individuals may interpret the performance demand differently than those with intercourse experience. All but two participants reported sexual activity experience. Data on the two inexperienced participants were not included in the physiological or subjective sexual arousal analyses and intercourse experience was not a statistically significant factor for those analyses.

Studying erection-enhancing medication outcomes among gay populations may be more relevant as a substantially higher percentage of men report recreational use. More importantly, the context for which gay and straight populations use erection-

enhancers is with concurrent substance use such as alcohol, known to elicit erectile difficulties on occasion. Under such conditions, these individuals may experience temporary erectile failure thus supporting the inclusion of nonstraight participants in the current study.

5.7 Recommendations for Future Research

The limitations in the present study lead to specific recommendations for future research such as recruitment from populations with salient characteristics and the use of alternative research designs, particularly randomized prevention trials, and longitudinal risk studies. Sampling from different populations is a feasible recommendation with the present study design. The sample recruited for the study was conveniently sourced from an undergraduate population, and a portion of the sample reported a lack of intercourse experience. Although the sexually healthy sample established empirical evidence for the detrimental physiological effects of pill attribution, we would have greater confidence in the generalizability of the results among a sample experienced in partnered sex. Additionally, examination of recreational users may elucidate the relationship between erectile performance anxiety and PDE5 inhibitor use. Recreational use is also substantially higher among gay populations and users engage more often in risky sexual behavior, placing them at risk for sexually transmitted diseases (McCambridge et al., 2006; Nettles et al., 2009). Only 17 nonstraight men participated in the current study, although recruitment efforts were made to enroll a higher number. Gay recreational users may be at greater risk for EPA and subsequent erectile difficulty than their straight

counterparts, due to higher frequency of recreational PDE5 inhibitor use than straight men (Bechara et al., 2010; Benotsch et al., 2006; Nettles et al., 2009). From a public health perspective, a finding such as this may serve as a deterrent for recreational use.

The current study was conducted in an experimental laboratory with a generally healthy sample. Expansion upon this research using clinical populations and settings would allow for the possible dissemination and further generalization of the current findings. In a setting such as a urology clinic or general medical practice, an A-B-A treatment design (A = treatment, B = treatment withdrawal) may provide insight into the dynamic relationship of performance anxiety, erectile functioning, and self-efficacy with the hope of establishing causal evidence. Specifically, men with occasional or mild ED presenting for pharmacological treatment for the first time may be assigned to active treatment or placebo, then withdraw from the treatment temporarily - mimicking the current study design.

Longitudinal studies offer an opportunity to examine the course of ED symptoms, EPA, pill attribution, and treatment outcomes over time. Longitudinal studies offer an opportunity to examine the course of ED symptoms, EPA, pill attribution, and treatment outcomes over time. A prospective study would be ideal to address the question if recreational use of ED medications leads to the development of subsequent erectile dysfunction. Specifically, this study design would consist of collecting data over time on erectile function, EPA, and ED medication use among a cohort of sexually healthy men. Other known risk factors for ED such as diabetes or hypertension would be under control as well to conclude the causal effects of recreational use. A follow-up investigation

following urology patients undergoing treatment-as-usual for erectile dysfunction would provide the most realistic data on pill attribution among men experiencing a wider scope of erectile dysfunction. While the current study recruited younger, sexually healthy men, pill attribution effects extend to populations with clinically significant symptoms (e.g., Lowery, Denney, & Storms, 1979). Additionally, longitudinal analysis of EPA with the recently published Erectile Performance Anxiety Index would significantly add to this literature and provide clinicians with a relevant instrument correlated with ED (Telch & Pujols, in press).

5.8 Conclusion

The current study examined the subsequent effects of attributing one's erectile performance to an erection-enhancing placebo on anticipatory anxiety and penile tumescence. Results did not reach statistical significant, but large effect sizes for selected comparisons provided some support for the hypothesized differential physiological sexual response to a subsequent erotic film after receiving erection-enhancing pill description. Pill attribution in the context of erection-enhancing medications may in fact, lead to poorer erectile performance for future sexual events. In addition, the finding that erectile performance anxiety is predictive of decreased physiological sexual response is in support of the robust relationship between erectile dysfunction and anxiety.

Table 6. Demographic Characteristics of Study Sample (Percentages in Parentheses)

	No Pill Condition	Memory-enhancing Pill Condition	Erection-enhancing Pill Condition	All Conditions	
	n = 46	*n = 44*	*n =38*	*N* = 128	*p*
Age					*ns*[a]
Mean (*SD)*	19.3 (1.3)	19.2 (1.8)	19.1 (1.4)	19.2 (1.5)	
Range	18 – 22	17 – 26	18 - 24	17 - 43	
Educational Year					*ns*[b]
Freshman	24 (52.2)	25 (56.8)	27 (71.1)	76 (59.4)	
Sophomore	11 (23.9)	12 (27.3)	5 (13.2)	28 (21.9)	
Junior	4 (8.7)	3 (6.8)	3 (7.9)	10 (7.8)	
Senior	7 (15.2)	4 (9.1)	3 (7.9)	14 (10.9)	
Self-Reported Ethnicity					*ns*[b]
White	22 (47.8)	20 (45.5)	12 (31.6)	54 (42.2)	
Hispanic/Latino	10 (21.7)	13 (29.5)	14 (36.8)	37 (28.9)	
Asian	10 (21.7)	5 (11.4)	8 (21.1)	23 (18.0)	
Black/African-American	2 (4.3)	6 (13.6)	3 (7.9)	11 (8.6)	
Mixed, Black/White	1 (2.2)	0	1 (2.6)	0	
Mixed, White/Other	1 (2.2)	0	0	0	
Parental Income					*ns*[b]
Less than $25,000	6 (13.0)	7 (15.9)	4 (10.5)	17 (13.3)	
$25,001 and $50,000	4 (8.7)	7 (15.9)	8 (21.1)	19 (14.8)	
$50,001 and $100,000	15 (32.6)	15 (34.1)	10 (26.3)	40 (31.3)	
More than $100,001	21 (45.7)	15 (34.1)	15 (39.5)	51 (39.8)	
Data missing	-	-	1 (2.6)	1 (0.8)	
Living Arrangement					*ns*[b]
Alone	2 (4.3)	4 (9.1)	2 (5.3)	8 (6.3)	
With Roommate(s)	42 (91.3)	37 (84.1)	36 (94.7)	115 (89.8)	
With Family	1 (2.2)	2 (4.5)	0	3 (2.3)	
With Romantic Partner	1 (2.2)	0	0	1 (0.8)	
With Partner and roommate	0	1 (2.3)	0	1 (0.8)	

[a] = Kruskal-Wallis test, [b] = One-way ANOVA

Table 7. Medical Characteristics of Study Sample (Percentages in Parentheses)

	No Pill Condition	Memory-enhancing Pill Condition	Erection-enhancing Pill Condition	All Conditions	
	n = 46	*n = 44*	*n =38*	*N* = 128	*p*
Average blood pressure (*SD*)					*ns*[a]
Systolic	121.3 (*14.5*)	124.5 (*11.8*)	124.6 (*13.2*)	123.4 (*13.2*)	
Diastolic	74.1 (*10.0*)	77.1 (*9.6*)	74.4 (*9.0*)	75.1 (*9.6*)	
Cigarette consumption					
Active cigarette smokers	11	3	2	16	
Average per week	1.6 (5.7)	0.8 (3.4)	0.1 (0.5)	0.9 (4.0)	
Range	0 – 35	0 - 20	0 - 3	0 – 35	
Antidepressant medications					
Yes	2 (4.3)	1 (2.3)	0	3 (2.3)	
No	45 (95.7)	43 (97.7)	38 (100)	125 (97.7)	
Erectile dysfunction medications					
Yes	0	0	0	0	
No	46 (100)	44 (100)	38 (100)	128 (100)	

Note. No statistical analyses were conducted for cigarette and antidepressant consumption due to small sample.
[a] = One-way ANOVA

Table 8. Self-reported Mood and Anxiety Measures of Study Sample (Percentages in Parentheses)

	No Pill Condition	Memory-enhancing Pill Condition	Erection-enhancing Pill Condition	All Conditions	
	n = 46	*n = 44*	*n =38*	*N* = 128	*p*
Depressive symptoms (CES-D)	7.8 (4.1)	8.4 (5.2)	7.2 (4.3)	7.8 (4.6)	*ns*
State anxiety symptoms (STAI)	4.2 (2.6)	3.9 (3.2)	4.2 (2.6)	4.1 (2.8)	*ns*
Social anxiety concerns (ASC)	32.6 (21.5)	30.9 (20.6)	30.0 (21.4)	31.2 (21.0)	*ns*
Fear of negative evaluation (BFNE)	29.1 (7.0)	30.8 (5.9)	29.3 (6.8)	29.7 (6.6)	*ns*

Note. Differences across conditions tested with one-way ANOVA.

Table 9. Relationship Characteristics of Study Sample (Percentages in Parentheses)

	No Pill Condition	Memory-enhancing Pill Condition	Erection-enhancing Pill Condition	All Conditions	
	n = 46	*n = 44*	*n =38*	*N* = 128	*p*
Marital status					
Never married	46 (100)	44 (100)	38 (100)	128 (100)	
In current, steady relationship					*ns*[a]
Yes	14 (30.4)	15 (34.1)	12 (31.6)	41 (32.0)	
Length in months	1 – 57	2 - 46	1 – 36	1 – 57	
Average length (SD)	18.2 (17.3)	14.6 (14.3)	13.4 (11.4)	15.5 (14.5)	*ns*[b]
No	33 (70.2)	31 (67.4)	26 (66.7)	90 (68.2)	
In past, recent relationship					*ns*[a]
Yes	15 (46.9)	11 (34.5)	13 (50)	38 (43.7)	
No	17 (53.1)	19 (65.5)	13 (50)	49 (56.3)	

Note. Marital status includes only endorsed items. No participants reported they were married at time of study.
[a] = Kruskal-Wallis test
[b] = One-way ANOVA

Table 10. Descriptive Statistics for Sexuality Characteristics of Study Sample

	No Pill Condition	Memory-enhancing Pill Condition	Erection-enhancing Pill Condition	All Conditions	
	n = 46	*n = 44*	*n =89*	*N* = 128	*p*
Sexual orientation					*ns*[a]
Exclusively heterosexual	33 (71.7)	33 (72.7)	34 (89.5)	99 (77.3)	
Mostly heterosexual	3 (6.5)	3 (6.8)	3 (7.9)	9 (7.0)	
More hetero- than homosexual	2 (4.3)	0	1 (2.6)	3 (2.3)	
Equally hetero- and homosexual	1 (2.2)	2 (4.5)	0	3 (2.3)	
More homo- than heterosexual	1 (2.2)	0	0	1 (0.8)	
Mostly homosexual	2 (4.3)	3 (6.8)	0	5 (3.9)	
Exclusively homosexual	4 (8.7)	4 (9.1)	0	8 (6.3)	
Engaged in penile-vagina intercourse					
Yes	30 (65.2)	21 (47.7)	28 (73.7)	79 (61.7)	< .05[a]
No	16 (34.8)	23 (52.3)	10 (26.3)	49 (38.3)	
Currently sexually active					*ns*[a]
Yes	23 (50.0)	19 (43.2)	15 (39.5)	57 (44.5)	
No	22 (47.8)	25 (56.8)	23 (60)	70 (54.7)	
Data missing	1 (2.2)	-	-	1 (0.8)	
Sexual Activity (DSFI)					
Age at first intercourse	16.4 (2.5)	17.1 (1.9)	17.3 (1.5)	16.9 (2.1)	*ns*[b]
Age at first sexual interest	13.0 (2.3)	13.0 (2.0)	13.7 (1.9)	13.2 (2.1)	*ns*[b]
Sexual experience	16.8 (6.4)	14.6 (7.2)	16.7 (5.9)	16.0 (6.6)	*ns*[b]
Attitudes about sexuality	0.5 (6.4)	1.9 (7.1)	3.1 (5.5)	1.71 (6.5)	*ns*[b]
Frequency of sexual activities					
Intercourse					*ns*[a]
Not at all	15 (32.6)	21 (47.7)	11 (28.9)	47 (36.7)	
Monthly or less	15 (32.6)	12 (27.3)	15 (39.5)	42 (32.8)	
Weekly	16 (34.8)	11 (25.0)	12 (31.6)	39 (30.5)	
Daily	0	0	0	0	
Fantasies					*ns*[a]
Not at all	2 (4.3)	4 (9.1)	1 (2.6)	7 (5.5)	
Monthly or less	7 (15.2)	5 (11.4)	12 (31.6)	24 (18.8)	
Weekly	19 (41.3)	16 (36.4)	10 (26.3)	45 (35.2)	

Daily	17 (37.0)	19 (43.2)	15 (39.5)	51 (39.8)	
Data Missing	1 (2.2)	-	-	1 (0.8)	
Kissing					*ns*[a]
Not at all	7 (15.2)	9 (20.5)	6 (15.8)	22 (17.2)	
Monthly or less	13 (28.3)	13 (29.5)	12 (31.6)	38 (29.7)	
Weekly	16 (34.8)	17 (38.6)	16 (42.1)	49 (38.3)	
Daily	10 (21.7)	5 (11.4)	4 (10.5)	19 (14.8)	
Masturbation					< .05[a]
Not at all	0	2 (4.5)	1 (2.6)	3 (2.3)	
Monthly or less	4 (8.7)	9 (20.5)	13 (34.2)	26 (20.3)	
Weekly	36 (78.3)	27 (61.4)	20 (52.6)	83 (64.8)	
Daily	6 (13.0)	6 (13.6)	4 (10.5)	16 (12.5)	
Number desired sex per week	3.8 (3.0)	3.5 (2.4)	3.1 (1.8)	3.5 (2.5)	*ns*[b]
Porn consumption frequency					*ns*[a]
Not at all	0	2 (4.5)	1 (2.6)	3 (2.3)	
Monthly or less	17 (37.0)	17 (36.4)	19 (50.0)	52 (40.6)	
Weekly	20 (43.5)	21 (45.5)	16 (42.1)	56 (43.8)	
Daily	9 (19.6)	6 (13.6)	2 (5.3)	17 (13.3)	
Penile circumference in cm	9.8 (1.1)	10.0 (1.1)	10.1 (1.0)	9.9 (1.0)	*ns*[b]
Penile circumcision					
Circumcised	34 (73.9)	32 (72.7)	23 (60.5)	89 (69.5)	
Uncircumcised	11 (23.9)	12 (27.3)	14 (36.8)	37 (28.9)	
Data missing	1 (2.2)	-	1 (2.6)	2 (1.6)	

Note. Measures of time frequency were reduced into none, monthly or less, weekly, or daily to condense content.
[a] = Kruskal-Wallis test
[b] = One-way ANOVA

Table 11. Descriptive Statistics for Self-reported Sexual Functioning

	No Pill Condition	Memory-enhancing Pill Condition	Erection-enhancing Pill Condition	All Conditions	
	n = 46	*n = 44*	*n =38*	*N* = 128	*p*
Sexual function					*ns*
Erectile function	22.5 (8.8)	18.8 (9.1)	22.4 (8.0)	21.2 (8.8)	
Orgasmic function	8.1 (2.8)	7.3 (3.2)	7.3 (3.0)	7.6 (3.0)	
Sexual desire	7.0 (1.6)	6.4 (1.9)	6.4 (1.6)	6.6 (1.7)	
Intercourse satisfaction	9.8 (6.2)	7.8 (6.7)	9.7 (5.7)	9.0 (6.3)	
Overall Satisfaction	5.3 (2.2)	5.3 (2.0)	6.0 (2.0)	5.5 (2.1)	
Overall	52.4 (19.0)	45.7 (19.0)	51.8 (17.3)	49.9 (18.7)	
Erectile Performance Anxiety	13.3 (4.9)	14.3 (4.9)	13.1 (3.8)	13.6 (4.6)	*ns*
Confidence to attain erection	91.5 (14.6)	88.0 (15.5)	91.1 (9.2)	90.2 (13.6)	*ns*
Confidence to maintain erection	88.5 (16.8)	81.1 (19.3)	90.3 (9.4)	86.5 (16.4)	.05

Note. Differences across conditions tested with one-way ANOVA. Sexual function was measured with the International Index of Erectile Function, Erectile performance anxiety was measured by the Erectile Performance Anxiety Index.

Table 12. Descriptive Statistics for Sexual Arousal Outcome Measures

	No Pill Condition	Memory-enhancing Pill Condition	Erection-enhancing Pill Condition	All Conditions
	n = 36	*n = 34*	*n =35*	*N* = 115
Penile Tumescence				
Manipulation				
Neutral film	10.3 (1.2)	10.5 (1.2)	10.4 (1.1)	10.4 (1.4)
Erotic film	11.8 (1.3)	11.9 (1.6)	11.7 (1.4)	11.8 (1.4)
Self-reported mental arousal				
Pre-manipulation				
Before first film	6.0 (3.7)	5.4 (3.2)	6.3 (3.9)	5.8 (3.6)
During first film	14.6 (5.7)	12.9 (5.2)	15.2 (4.1)	14.2 (5.2)
Manipulation				
Before second film	5.7 (3.8)	5.9 (4.1)	5.3 (3.3)	5.6 (3.8)
During second film	15.1 (5.4)	13.9 (5.3)	14.9 (3.9)	14.6 (5.0)
Self-reported genital arousal				
Pre-manipulation				
Before first film	10.6 (5.1)	10.8 (5.9)	12.2 (6.1)	11.1 (5.7)
During first film	30.9 (13.1)	26.5 (11.1)	33.3 (9.8)	30.1 (11.8)
Manipulation				
Before second film	10.8 (5.9)	12.0 (7.2)	12.6 (7.0)	11.7 (6.6)
During second film	31.7 (12.1)	29.4 (10.8)	34.2 (10.3)	31.6 (11.2)
Self-reported autonomic arousal				
Pre-manipulation				
Before first film	9.2 (5.0)	9.2 (4.1)	9.3 (4.5)	9.2 (4.5)
During first film	14.6 (5.7)	14.7 (6.6)	15.9 (4.9)	15.0 (5.8)
Manipulation				
Before second film	8.6 (3.4)	9.7 (4.7)	8.5 (3.9)	8.9 (4.0)
During second film	15.8 (6.0)	15.7 (6.0)	15.4 (4.8)	15.6 (5.6)
Continuous subjective arousal				
Pre-manipulation				
Neutral film	1.12 (.05)	1.13 (.05)	1.13 (.05)	1.13 (.05)
Erotic film	1.68 (.15)	1.58 (.16)	1.59 (.16)	1.62 (.16)
Manipulation				

Table 12. Con't.

Neutral film	1.12 (.09)	1.14 (.08)	1.15 (.09)	1.13 (.09)
Erotic film	1.69 (.15)	1.59 (.21)	1.60 (.15)	1.62 (.18)

Note. Penile Tumescence was recorded with penile strain gauges. Self-reported subjective arousal measured by the Subjective Rating Scale.

Table 13. Descriptive Statistics for Anticipatory Anxiety and Affect Outcome Measures

	No Pill Condition	Memory-enhancing Pill Condition	Erection-enhancing Pill Condition	All Conditions
	n = 36	*n = 34*	*n =35*	*N* = 115
Anticipatory anxiety				
Pre-manipulation				
Before first film	3.0 (1.7)	3.7 (2.5)	3.2 (1.5)	3.3 (1.9)
During first film	3.5 (2.5)	3.4 (2.6)	3.1 (1.6)	3.4 (2.3)
Manipulation				
Before second film	3.8 (2.3)	3.5 (2.3)	3.1 (1.5)	3.5 (2.1)
During second film	3.0 (1.8)	2.8 (1.8)	2.8 (1.2)	2.9 (1.6)
Positive affect				
Pre-manipulation				
Before first film	22.4 (10.1)	19.2 (5.7)	21.3 (7.7)	21.0 (8.2)
During first film	22.7 (8.0)	20.2 (7.7)	23.9 (8.8)	22.2 (8.2)
Manipulation				
Before second film	20.8 (7.8)	19.1 (6.6)	21.7 (8.2)	20.4 (7.5)
During second film	23.2 (8.6)	22.0 (8.0)	24.8 (9.9)	23.2 (8.8)
Negative affect				
Pre-manipulation				
Before first film	13.5 (8.9)	12.3 (2.9)	11.9 (1.9)	12.6 (5.8)
During first film	11.4 (2.6)	12.7 (4.1)	12.9 (7.6)	12.2 (4.9)
Manipulation				
Before second film	12.2 (3.2)	13.5 (5.3)	12.0 (3.1)	12.6 (4.0)
During second film	11.5 (2.2)	12.5 (5.0)	12.7 (7.8)	12.1 (5.2)

Note. State anxiety measured by the Subjective Rating Scale. Positive and negative affect measured by the Positive and Negative Affect Schedule.

Table 14. Pearson Correlations between Experimental Covariates

	Herb testing belief	Confidence to maintain erection	Erectile function[a]	mance anxiety[b]
Belief in study purpose	-	.20*	.12	-.14
Confidence to maintain erection	.20*	-	.46***	-.58***
Erectile function[a]	.12	.46***	-	-.33***
Erectile performance anxiety [b]	-.14	-.58***	-.33***	-

Note. [a] = International Index of Erectile Function; [b] = Erectile Performance Anxiety Index
* = $p < .05$
** = $p < .01$
*** = $p < .001$

Table 15. Regression Coefficients of Expected Erection Strength for Subsequent Erotic Film

	Post Manipulation Expected Erection Strength
Erection pill group	-
Memory pill group	-
Social anxiety concerns	-
Erectile performance anxiety	-
Confidence to maintain erection	-
Pre-manipulation	
Expected erection strength	.61*
Sexual orientation	-
Relationship status	-
Intercourse experience	-

Note. Pill groups were dummy-coded for analysis. Social anxiety concerns = ASC. Erectile performance anxiety = EPAI. Sexual orientation, relationship status, and intercourse experience were dichotomous variables where endorsing heterosexual orientation, being in a steady relationship, and having had intercourse experience were coded as either yes or no.
* = $p < .05$
** = $p < .01$
*** = $p < .001$

Table 16. Study Believability and Pill Attribution Percentages

	No Pill Condition	Memory-enhancing Pill Condition	Erection-enhancing Pill Condition	
	n = 46	*n = 44*	*n =38*	*p*
Belief in herb testing rationale	56.2 (32.6)	40.9 (35.7)	56.5 (31.8)	.06[a]
Belief that pill enhanced memory		13.0 (23.0)	31.2 (28.2)	.00[b]
Belief that pill enhanced erection			35.0 (34.8)	
Belief that pill effects wore off		24.8 (40.9)	46.5 (33.7)	.05[b]

Note. No pill condition did not complete the degree of pill attribution item because a pill was not ingested. Standard deviations contained within parentheses.
[A] = One-way ANOVA
[B] = Independent samples t-test

Table 17. Self-Reported Observed Erectile Strength by Percentage

	No Pill Condition	Memory-enhancing Pill Condition	Erection-enhancing Pill Condition	All Conditions	
	n = 46	*n = 44*	*n =38*	*N* = 128	*p*
Expected erectile strength					*ns*
Pre-manipulation	5.0 (1.5)	4.4 (1.6)	5.2 (1.4)	4.8 (1.6)	
Manipulation	4.7 (1.4)	4.3 (1.3)	5.2 (1.5)	4.7 (1.5)	
Actual erectile strength					*ns*
Pre-manipulation	4.5 (1.9)	4.1 (1.6)	5.0 (1.3)	4.5 (1.8)	
Manipulation	4.8 (1.7)	4.6 (1.6)	5.6 (1.3)	4.8 (1.6)	

Note. Differences across conditions tested with repeated measures ANOVA.

APPENDIX A

Expected and Actual Erection Strength Rating

1. Please rate your expected erection strength during the erotic segment of the film.

No erection		*Weak erection*		*Moderate erection*		*Strong erection*
0	1	2	3	4	5	6

2. Please rate your actual erection strength achieved during the erotic segment of the film.

No erection		*Weak erection*		*Moderate erection*		*Strong erection*
0	1	2	3	4	5	6

APPENDIX B

Subjective Ratings Scale

Please use the following scale to evaluate how you feel now (before watching the film/how you felt during the film). Please answer honestly and carefully. On the scale, circle the number which best describes how you feel now (how you feel before watching the film/how you felt during the film), from 1 (not at all) to 7 (intensely).

Before/During the film, I feel:

	Not at all						Intensely
1. Faster breathing_____	1	2	3	4	5	6	7
2. Faster heart beat_____	1	2	3	4	5	6	7
3. Perspiration _____	1	2	3	4	5	6	7
4. Feelings of warmth_____	1	2	3	4	5	6	7
5. Any physical reaction at all_____	1	2	3	4	5	6	7
6. Penile sensations_____	1	2	3	4	5	6	7
7. Warmth in genitals_____	1	2	3	4	5	6	7
8. Erection (Change in penis size)_____	1	2	3	4	5	6	7
9. Genital pulsing or throbbing_____	1	2	3	4	5	6	7
10. Genital tenseness or tightness_____	1	2	3	4	5	6	7
11. Any genital feeling_____	1	2	3	4	5	6	7
12. Sexually aroused_____	1	2	3	4	5	6	7
13. Sexual desire_____	1	2	3	4	5	6	7
14. Mental sexual arousal_____	1	2	3	4	5	6	7
15. Physical sexual arousal_____	1	2	3	4	5	6	7
16. Worried_____	1	2	3	4	5	6	7
17. Anxious_____	1	2	3	4	5	6	7
18. Angry_____	1	2	3	4	5	6	7

19. Disgusted_____	1	2	3	4	5	6	7
20. Embarrassed_____	1	2	3	4	5	6	7
21. Guilty_____	1	2	3	4	5	6	7
22. Horny_____	1	2	3	4	5	6	7
23. A desire to be close to someone____	1	2	3	4	5	6	7
24. Pleasure_____	1	2	3	4	5	6	7
25. Interested_____	1	2	3	4	5	6	7
26. Attracted_____	1	2	3	4	5	6	7
27. Excited_____	1	2	3	4	5	6	7
28. Sexy_____	1	2	3	4	5	6	7
29. Dirty_____	1	2	3	4	5	6	7
30. Loving_____	1	2	3	4	5	6	7
31. Sexually attractive_____	1	2	3	4	5	6	7
32. Inhibited_____	1	2	3	4	5	6	7
33. Easy to arouse_____	1	2	3	4	5	6	7
34. Incompetent_____	1	2	3	4	5	6	7
35. Sexually turned off_____	1	2	3	4	5	6	7
36. Offended_____	1	2	3	4	5	6	7
37. Bored_____	1	2	3	4	5	6	7
38. Feminine_____	1	2	3	4	5	6	7
39. Masculine_____	1	2	3	4	5	6	7
40. Aggressive_____	1	2	3	4	5	6	7
41. Relaxed_____	1	2	3	4	5	6	7

APPENDIX C

Kinsey Sexual Orientation Scale

11. Based on both psychological reactions and overt experience, rate yourself as one of the following:
    a. Exclusively heterosexual with no homosexual experiences
    b. Predominantly heterosexual, only incidentally homosexual
    c. Predominantly heterosexual, but more than incidentally homosexual
    d. Equally heterosexual and homosexual
    e. Predominantly homosexual, but more than incidentally heterosexual
    f. Predominantly homosexual, only incidentally heterosexual
    g. Exclusively homosexual

APPENDIX D

Derogatis Sexual Functioning Index

Experience Subscale

Below is a list of sexual experiences that people have. We would like to know which of these sexual behaviors you have experienced. Please indicate those experiences you have personally had by placing a check under the YES column for that experience. If you have not had the experience place your check under the NO column. In addition, if you have had the experience during the past two months please place an additional check under the column marked PAST 60 DAYS. Make your marks carefully and do not skip any items.

		YES	NO	PAST 60 DAYS
1.	Male lying prone on female (clothed)	[ ]	[ ]	[ ]
2.	Stroking and petting your sexual partner's genitals	[ ]	[ ]	[ ]
3.	Erotic embrace (clothed)	[ ]	[ ]	[ ]
4.	Intercourse-vaginal entry from rear	[ ]	[ ]	[ ]
5.	Having genitals caressed by your sexual partner	[ ]	[ ]	[ ]
6.	Mutual oral stimulation of genitals	[ ]	[ ]	[ ]
7.	Oral stimulation of your partner's genitals	[ ]	[ ]	[ ]
8.	Intercourse side-by-side	[ ]	[ ]	[ ]
9.	Kissing of sensitive (non-genital) areas of the body	[ ]	[ ]	[ ]
10.	Intercourse – sitting position	[ ]	[ ]	[ ]
11.	Masturbating alone	[ ]	[ ]	[ ]
12.	Male kissing female's nude breasts	[ ]	[ ]	[ ]
13.	Having your anal area caressed	[ ]	[ ]	[ ]
14.	Breast petting (clothed)	[ ]	[ ]	[ ]
15.	Caressing your partner's anal area	[ ]	[ ]	[ ]
16.	Intercourse – female superior position	[ ]	[ ]	[ ]
17.	Mutual petting of genitals to orgasm	[ ]	[ ]	[ ]
18.	Having your genitals orally stimulated	[ ]	[ ]	[ ]

19.	Mutual undressing of each other	[ ]	[ ]		[ ]
20.	Deep kissing	[ ]	[ ]		[ ]
21.	Intercourse – male superior position	[ ]	[ ]		[ ]
22.	Anal intercourse	[ ]	[ ]		[ ]
23.	Kissing on the lips	[ ]	[ ]		[ ]
24.	Breast petting (nude)	[ ]	[ ]		[ ]

Below we would like you to indicate the frequency with which you typically engage in certain sexual activities. Please indicate how often you experience each of the sexual activities below by checking the category that is closest to your personal frequency. Categories range from "NOT AT ALL" to "4 OR MORE TIMES A DAY". Please do not skip any items.

	Not at all	Less than 1/month	1-2 times /month	1 /week	2-3x /week	4-6x /week	1 /day	2-3x /day	4 + /day
1. Intercourse	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
2. Masturbation	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
3. Kissing and Petting	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
4. Sexual Fantasies	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

5. What would be your ideal frequency of sexual intercourse? [ ]/week
6. At what age did you first become interested in sexual activity? [ ]
7. At what age did you first have sexual intercourse? [ ]

Attitude Subscale

Below are a series of statements about various aspects of sexual behavior. We would like to know to what extent you agree or disagree with each one. Please indicate how much you agree or disagree with each one. Please indicate how much you agree or disagree with each statement by placing the appropriate number from the alternatives below in the space alongside the statement. Please do not skip any statements and work quickly.

-2	-1	0	1	2
Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree

1. [ ] Premarital intercourse is beneficial to later marital adjustment
2. [ ] Homosexuality is perverse and unhealthy
3. [ ] Sex is morally right only when it is intended to produce children
4. [ ] Oral sex can be as pleasurable as intercourse
5. [ ] It is unnatural for the female to be the initiator in sexual relations
6. [ ] Masturbation is a perfectly normal, healthy sexual behavior
7. [ ] Extramarital sex inevitably leads to serious problems and great difficulty in the marriage
8. [ ] Women should never be consciously seductive but should wait upon the attentions of the man
9. [ ] Viewing erotic films is enjoyable and stimulating behavior
10. [ ] Males and females should assume both assertive and passive roles during intercourse and foreplay
11. [ ] Most homosexuals are highly disturbed people and a danger to society
12. [ ] Any sexual behavior between two consenting adults should be viewed as normal
13. [ ] Morality should not be a consideration in sexual behavior
14. [ ] Dressing in various costumes to enhance sexual enjoyment should be viewed as creative sex
15. [ ] Books which contain passages explicitly describing sexual acts are usually just trash
16. [ ] Couples that have sex before marriage usually regret it later on
17. [ ] Wifeswapping is acceptable if all four partners agree
18. [ ] Males lose respect for females who allow them to have premarital intercourse
19. [ ] Mutual masturbation in a married couple is a poor substitute for intercourse
20. [ ] Prostitutes are immoral and degrading and have no place in society
21. [ ] Human genitals are somewhat disgusting to look at

22. [ ] Holding and touching my partner's body is exciting and thrilling
23. [ ] Group sex is a bizarre and disgusting idea
24. [ ] Extramarital sexual affairs can make people better marital partners
25. [ ] Couples should experiment with various positions of intercourse to enhance their sexual experiences
26. [ ] Masturbation fantasies are healthy forms of sexual release
27. [ ] Homosexuality is simply a question of sexual orientation and not good or bad, sick or healthy
28. [ ] Oral-genital sex is not within the range of normal sexuality
29. [ ] A picture of a nude woman can be a beautiful and exciting thing to look at
30. [ ] Pornography is perverse and disgusting in general and particularly harmful in the hands of young people

APPENDIX E

International Index of Erectile Function

Please answer the following questions as honestly and clearly as possible. Your responses will be kept completely confidential.

1. How often were you able to get an erection during sexual activity?
   __ (0) No Sexual Activity
   __ (1) Almost never/ never
   __ (2) A few times (much less than half the time)
   __ (3) Sometimes (about half the time)
   __ (4) Most times (much more than half the time)
   __ (5) Almost always/always

2. When you had erections with sexual stimulation, how often were your erections hard enough for penetration?
   __ (0) No Sexual Activity
   __ (1) Almost never/ never
   __ (2) A few times (much less than half the time)
   __ (3) Sometimes (about half the time)
   __ (4) Most times (much more than half the time)
   __ (5) Almost always/always

3. When you attempted sexual intercourse, how often were you able to penetrate (enter) your partner?
   __ (1) Did not attempt intercourse
   __ (2) A few times (much less than half the time)
   __ (3) Sometimes (about half the time)
   __ (4) Most times (much more than half the time)

__ (5) Almost always/always

4. During sexual intercourse, how often were you able to maintain your erection after you had penetrated (entered) your partner?
   __ (1) Did not attempt intercourse
   __ (2) A few times (much less than half the time)
   __ (3) Sometimes (about half the time)
   __ (4) Most times (much more than half the time)
   __ (5) Almost always/always

5. During sexual intercourse, how difficult was it to maintain your erection to completion of intercourse?
   __ (0) Did not attempt intercourse
   __ (1) Extremely difficult
   __ (2) Very difficult
   __ (3) Difficult
   __ (4) Slightly difficult
   __ (5) Not difficult

6. How many times have you attempted sexual intercourse?
   __ (0) No attempts
   __ (1) One to two attempts
   __ (2) Three to four attempts
   __ (3) Five to six attempts
   __ (4) Seven to ten attempts
   __ (5) Eleven+ attempts
7. When you attempted sexual intercourse, how often was it satisfactory for you?
   __ (0) No Sexual Activity

__ (1) Almost never/ never

__ (2) A few times (much less than half the time)

__ (3) Sometimes (about half the time)

__ (4) Most times (much more than half the time)

__ (5) Almost always/always

8. How much have you enjoyed sexual intercourse?

__ (0) No intercourse

__ (1) No enjoyment

__ (2) Not very enjoyable

__ (3) Fairly enjoyable

__ (4) Highly enjoyable

__ (5) Very highly enjoyable

9. When you had sexual stimulation or intercourse, how often did you ejaculate?

__ (0) No sexual stimulation/intercourse

__ (1) Almost never/never

__ (2) A few times (much less than half the time)

__ (3) Sometimes (about half the time)

__ (4) Most times (much more than half the time)

__ (5) Almost always/always

10. When you had sexual stimulation or intercourse, how often did you have the feeling of orgasm or climax?

__ (0) No sexual stimulation/intercourse

__ (1) Almost never/never

__ (2) A few times (much less than half the time)

__ (3) Sometimes (about half the time)

__ (4) Most times (much more than half the time)

__ (5) Almost always/always

11. How often have you felt sexual desire?

__ (0) No sexual stimulation/intercourse

__ (1) Almost never/never

__ (2) A few times (much less than half the time)

__ (3) Sometimes (about half the time)

__ (4) Most times (much more than half the time)

__ (5) Almost always/always

12. How would you rate your level of sexual desire?

__ (1) Very low/none at all

__ (2) Low

__ (3) Moderate

__ (4) High

__ (5) Very high

13. How satisfied have you been with your overall sex life?

__ (1) Very dissatisfied

__ (2) Moderately dissatisfied

__ (3) About equally satisfied and dissatisfied

__ (4) Moderately satisfied

__ (5) Very satisfied

14. How satisfied have you been with your sexual relationship with your partner?

__ (1) Very dissatisfied

__ (2) Moderately dissatisfied

__ (3) About equally satisfied and dissatisfied

__ (4) Moderately satisfied

__ (5) Very satisfied

15. How do you rate your confidence that you could get and keep an erection?

__ (1) Very low

__ (2) Low

__ (3) Moderate

__ (4) High

__ (5) Very high

16. How confident (percentage of confidence) are you that you can attain an erection in a sexual situation?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

17. Once obtaining an erection, how confident (percentage of confidence) are you that you can maintain that erection?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

APPENDIX F

Erectile Performance Anxiety Index

Listed below are statements designed to assess your anxiety about *getting* or *maintaining* an erection in a sexual situation with another person. Read each statement carefully and then select the number that best fits how true each statement is for you during the past week. If you have not been in a sexual situation during the past week, base your responses on how you imagine you would react.

1. When I find myself in a situation where sex is a possibility, I often worry or become apprehensive that I will have trouble *getting* or *keeping* an erection.

1	2	3	4	5
Not at all like me				Very much like me

2. I have frequent thoughts about not being able to get or keep an erection.

1	2	3	4	5
Not at all like me				Very much like me

3. I rarely worry that I will not be able to get or keep an erection.

1	2	3	4	5
Not at all like me				Very much like me

4. I find myself getting nervous when my sexual partner starts to talk about having sex.

1	2	3	4	5
Not at all like me				Very much like me

5. I sometimes use excuses (e.g., feeling tired, headache) to avoid sex.

1	2	3	4	5
Not at all like me				Very much like me

6. I sometimes feel like I have to take erection dysfunction (ED) medications or supplements in order to *get* or *keep* an erection.

1	2	3	4	5
Not at all like me				Very much like me

7. I often feel the need to drink alcohol or take other anti-anxiety medications *to help manage my fear* of not being able to *get* or *keep* an erection.

1	2	3	4	5
Not at all like me				Very much like me

8. I often use other aids such as creams, lotions, or pumps to help *get* or *keep* an erection.

1	2	3	4	5
Not at all like me				Very much like me

9. When in a sexual situation, I often check to see whether I am becoming aroused.

1	2	3	4	5
Not at all like me				Very much like me

10. I often keep erection dysfunction (ED) medications or supplements nearby as a backup in case I cannot *get* or *keep* an erection.

1	2	3	4	5
Not at all like me				Very much like me

11. I sometimes read books or articles on the Internet about ways to prevent erection problems.

1	2	3	4	5
Not at all like me				Very much like me

12. In the middle of having sex, I often find myself focusing on whether I will be able to maintain my erection.

1	2	3	4	5
Not at all like me				Very much like me

13. I feel tense or nervous in sexual situations even when I know the person well.

1	2	3	4	5
Not at all like me				Very much like me

APPENDIX G

Center for Epidemiologic Studies Depression Scale

Below is a list of some of the ways you may have felt or behaved. Please indicate how often you have felt this way during the past week: (circle one number on each line)

0 = Rarely or none (less than 1 day)
1 = Some or a little of the time (1-2 days)
2 = Occasionally or a moderate amount of time (3-4 days)
3 = All of the time (5-7days)

During the past week...

1. I was bothered by things that usually don't bother me	0	1	2	3
2. I had trouble keeping my mind on what I was doing	0	1	2	3
3. I felt depressed	0	1	2	3
4. I felt that everything I did was an effort	0	1	2	3
5. I felt hopeful about the future	0	1	2	3
6. I felt fearful	0	1	2	3
7. My sleep was restless	0	1	2	3
8. I was happy	0	1	2	3
9. I felt lonely	0	1	2	3
10. I could not "get going"	0	1	2	3

APPENDIX H

State Trait Anxiety Inventory – State Anxiety Subscale

Below are a list of feelings and emotions. Please select how well each describes you at this time.

	Not at all	Somewhat	Moderately	Very much
1. I feel calm	1	2	3	4
2. I am tense	1	2	3	4
3. I feel upset	1	2	3	4
4. I am relaxed	1	2	3	4
5. I feel content	1	2	3	4
6. I am worried	1	2	3	4

APPENDIX I

Appraisal of Social Concern

Below is a list of specific outcomes that people sometimes believe will happen to them in social situations such as public speaking, or talking to people at a party. Read each item carefully and then choose a number from the scale below which best describes the degree to which you would be concerned by the particular outcome when placed in a challenging social situation.

Not at all concerned		Mildly concerned			Moderately concerned			Very concerned		Extremely concerned
0	10	20	30	40	50	60	70	80	90	100

1. Trembling

0	10	20	30	40	50	60	70	80	90	100

2. Appearing stupid

0	10	20	30	40	50	60	70	80	90	100

3. People laughing at you

0	10	20	30	40	50	60	70	80	90	100

4. Blushing (turning red)

0	10	20	30	40	50	60	70	80	90	100

5. People ignoring you

0	10	20	30	40	50	60	70	80	90	100

6. People staring at you

0	10	20	30	40	50	60	70	80	90	100

7. Twitching

0 10 20 30 40 50 60 70 80 90 100

8. Voice quality (cracking, stuttering, squeaking, etc.)

0 10 20 30 40 50 60 70 80 90 100

9. Appearing incompetent

0 10 20 30 40 50 60 70 80 90 100

10. Being incoherent (not making sense)

0 10 20 30 40 50 60 70 80 90 100

11. Losing control (screaming, running out, etc.)

0 10 20 30 40 50 60 70 80 90 100

12. Not performing adequately

0 10 20 30 40 50 60 70 80 90 100

13. Being tense

0 10 20 30 40 50 60 70 80 90 100

14. Appearing weird

0 10 20 30 40 50 60 70 80 90 100

15. People ridiculing you

0 10 20 30 40 50 60 70 80 90 100

8. Not being able to think

0 10 20 30 40 50 60 70 80 90 100

17. Appearing ugly

0 10 20 30 40 50 60 70 80 90 100

18. Appearing weak

0 10 20 30 40 50 60 70 80 90 100

19. People rejecting you

0 10 20 30 40 50 60 70 80 90 100

20. Sweating

0 10 20 30 40 50 60 70 80 90 100

APPENDIX J

Positive and Negative Affect Schedule

This scale consists of a number of words that describe different feelings and emotions. Read each item and then circle the appropriate number that indicates to what extent you feel this way right now.

		Very slightly or not at all	A little	Moderately	Quite a bit	Extremely
1.	Interested	1	2	3	4	5
2.	Distressed	1	2	3	4	5
3.	Excited	1	2	3	4	5
4.	Upset	1	2	3	4	5
5.	Strong	1	2	3	4	5
6.	Guilty	1	2	3	4	5
7.	Scared	1	2	3	4	5
8.	Hostile	1	2	3	4	5
9.	Enthusiastic	1	2	3	4	5
10.	Proud	1	2	3	4	5
11.	Irritable	1	2	3	4	5
12.	Alert	1	2	3	4	5
13.	Ashamed	1	2	3	4	5
14.	Inspired	1	2	3	4	5
15.	Nervous	1	2	3	4	5
16.	Determined	1	2	3	4	5
17.	Attentive	1	2	3	4	5
18.	Jittery	1	2	3	4	5
19.	Active	1	2	3	4	5
20.	Afraid	1	2	3	4	5

APPENDIX K

Demographic Information

1. What is your age? _____
2. How many years of undergraduate schooling have you had?

   _____Completed semesters

   _____Incomplete semesters

3. What classification are you?
   a. Freshman
   b. Sophomore
   c. Junior
   d. Senior

4. Please indicate your ethnicity.
   a. Hispanic or Latino
   b. Not Hispanic or Latino

5. Please indicate your race. (Check all that apply)
   a. American Indian/Alaska Native
   b. Asian
   c. Native Hawaiian or Other Pacific Islander
   d. Black or African American
   e. White
   f. Other: _____

6. What is your household's annual income?
    a. Less than $25,000
    b. $25,001 to $50,000
    c. $50,001 to $100,000
    d. More than $100,000

7. What is your marital status?
    a. Never married
    b. Married
    c. Widowed
    d. Divorced

8. What is your current living arrangement?
    a. Alone
    b. With roommate(s)
    c. With parent(s), grandparent(s), or sibling(s)
    d. With romantic partner
    e. With spouse
    f. With spouse and children
        i. How many children? _____
    g. Other (please explain) _____

9. How many cigarettes do you normally smoke <u>each week</u>?
    _____

10. Do you take prescribed antidepressant medication?
    a. No
    b. Yes
        i. If yes, describe the name, dose, length of time taken
        Name:_____

Dose:_____

Length of time taken: _____

11. Do you take prescribed erectile dysfunction medication?
    a. No
    b. Yes
        i. If yes, describe the name, dose, length of time taken

        Name:_____

        _____Dose:_____

        _____Length of time taken:

        _____

12. Are you currently in a steady relationship?
    a. Yes
    b. No

13. If you are currently in a steady relationship, how long have you been in this relationship? (in months)

    _____

14. If you are *not* currently in a steady relationship, have you been involved in a "long-term" (3 months or more) dating relationship within *the past 12 months*?
    a. Yes
    b. No

15. Have you ever had sexual intercourse [penile penetration (or entry) of the vagina]?
    a. Yes
    b. No

16. Are you *currently* sexually active (i.e., having sexual intercourse in the past 4 weeks)?
    a. Yes
    b. No

APPENDIX L

Erotic Film Segment Awareness Assessment

Erotic Film A

Please answer the following questions about the film you watched. Please select one answer choice for each question. If you do not know the answer, please make your best attempt possible.

At the beginning of the video, the woman was:

a. Standing at the top of the stairs
b. Reading a magazine on a couch
c. Laying on a bed

At the beginning of the video, the man:

a. Started to kiss the woman and touch her legs
b. Lifted the woman and took her over to a couch
c. Straddled the woman, who was laying on the couch

When the man joined the woman on the couch, he started to:

a. Kiss her legs and her clitoris
b. Pull her up onto him and begin intercourse
c. Take off all her clothes

The woman:

a. Wore nothing throughout the entire time
b. Kept her top on the entire time
c. Wore her pants for the first part of the time

When the man and woman first engaged in sexual intercourse:

a. She was laying on the couch, positioned underneath the man
b. He was sitting on the couch, and she was sitting on top of him
c. He was laying on the couch, and she was sitting on top of him

The woman was:

a. Unshaved in her genital area
b. Completely shaved in her genital area
c. Partially shaved in her genital area

The man had:

a. One tattoo
b. At least two tattoos
c. No tattoos that I could see

Erotic Film A

Please answer the following questions about the film you watched. Please select one answer choice for each question. If you do not know the answer, please make your best attempt possible.

At the beginning of the video, the woman was wearing:

d. A sheer top and panties
e. A sheer top and a black skirt
f. Only a bra

At the beginning of the video, the man:

d. Started to kiss the woman's stomach
e. Lifted the woman and took her over to the couch
f. Caressed her

The woman:

d. Kept her clothes on during the video
e. Took her clothes off at the beginning of the video
f. Kept her top on only

What was in the background in the video?

d. A desk, tree, and lamp
e. A kitchen and lamp
f. A wall with windows

After the man gave the woman oral sex, they had intercourse:

d. With the woman on top facing backwards from the man
e. With the woman laying on her back and the man on top
f. With the man sitting on the couch and the woman on top

The man wore:

d. A watch throughout the video
e. Underwear at the beginning of the video
f. A shirt throughout the video

The woman's hair color was _____ and the man's hair color was _____.

d. Brown; black
e. Blonde, brown
f. Black; brown

APPENDIX M

Pill Efficacy Rating

1. Please rate the extent to which the pill you ingested affected the strength of your erection during the film.

Strong negative effect	Moderate negative effect	Slight negative effect	Neither positive nor negative effect	Slight positive effect	Moderate positive effect	Strong positive effect
-3	-2	-1	0	1	2	3

APPENDIX N

Debriefing Questionnaire

No Pill Control Condition

1. Percentage that I believed the study I participated in was testing an herbal substance.

0%___ 10%___ 20%___ 30%___ 40%___ 50%___ 60%___ 70%___ 80%___ 90%___ 100%___

Memory-Enhancing Pill Condition

1. Percentage that I believed the study I participated in was testing an herbal substance.

0%___ 10%___ 20%___ 30%___ 40%___ 50%___ 60%___ 70%___ 80%___ 90%___ 100%___

2. Percentage that I believed the pill was enhancing my memory during the first film.

0%___ 10%___ 20%___ 30%___ 40%___ 50%___ 60%___ 70%___ 80%___ 90%___ 100%___

3. Percentage that I believed the pill's effects had worn off during the second film.

0%___ 10%___ 20%___ 30%___ 40%___ 50%___ 60%___ 70%___ 80%___ 90%___ 100%___

Erection-Enhancing Pill Condition

1. Percentage that I believed the pill was enhancing my memory during the first film.

0%___ 10%___ 20%___ 30%___ 40%___ 50%___ 60%___ 70%___ 80%___ 90%___ 100%___

2. Percentage that I believed the pill was enhancing my erectile performance during the first film (after receiving the instructions).

0%___ 10%___ 20%___ 30%___ 40%___ 50%___ 60%___ 70%___ 80%___ 90%___ 100%___

3. Percentage that I believed the pill's effects had worn off during the second film.

0%___ 10%___ 20%___ 30%___ 40%___ 50%___ 60%___ 70%___ 80%___ 90%___ 100%___

4. Percentage that I believed the study I participated in was testing sexual arousal response to two new erotic films.

0%___ 10%___ 20%___ 30%___ 40%___ 50%___ 60%___ 70%___ 80%___ 90%___ 100%___

APPENDIX O

Study Scripts

General Pill Instructions Provided During Informed Consent Procedures
Introduction Film: As part of this study, you will be ingesting a new herbal supplement "Genia" that has been previously tested for health safety and can be taken with most medications. The herbal supplement has been developed as a memory-enhancing agent that is fast acting, peaking around one hour. We are testing its effects on the recall of emotionally charged stimuli, the erotic films you will be viewing.
Researcher: Do you have any questions? If the participant expresses health concerns: "If at any time, you feel bodily discomfort, the University Health Services is located in the building next door."

No-Pill Information Provided During Informed Consent Procedures
The purpose of this study is to test two new erotic films for use in future studies.

Erection Enhancing Pill Instructions Provided After Viewing Pre-manipulation Film
After reviewing your penile plethysmograph results, you showed a 122% increase in the size of your penis during the erotic film relative to your response during the documentary film. However, the pill you took was not a memory enhancing supplement, but an herbal remedy that is being tested for its erection enhancing properties. We needed to deceive you about the actual effects of the herb in order to better evaluate the true pharmacological effects of this compound. The herb that you ingested is formulated to give men stronger erections. Your 122% increase in size achieved during the erotic film is about average (48th percentile) for males your age watching erotic videos in our laboratory without the assistance of an erectile performance enhancer. Do you understand why we had to deceive you about the true nature of the herbal supplement? Do you have any questions about your data concerning your erectile performance?

Now I will ask you to fill out the pre-film questionnaire while the plethysmograph returns back to pre-manipulation. Afterwards, you will undergo a repeat of the same procedures with two exceptions – the neutral and erotic videos you watch next will be slightly different and most importantly, you will not be given a second dose of Genia. This will allow us to test your performance both with and without the aid of the pill. Because of Genia's short half-life, its effects should no longer be present during this second film viewing. Once the erotic film starts, please try to achieve your strongest possible erection.

Memory Enhancing Pill Instructions Provided After Viewing Pre-manipulation Film
After reviewing your penile plethysmograph results, you showed a 122% increase in the size of your penis during the erotic film relative to your response during the documentary film. Your 122% increase in size achieved during the erotic film is about average (48th percentile) for males your age watching erotic videos in our laboratory. The pill that you took was not a memory enhancing pill, but a placebo pill, an empty capsule. We needed to deceive you in order to assess the psychological effects of taking a pill that does not contain active herbal ingredients.

Now I will ask you to fill out the pre-film questionnaire while the plethysmograph returns back to pre-manipulation. Afterwards, you will undergo a repeat of the same procedures with two exceptions – the neutral and erotic videos you watch next will be slightly different. Once the erotic film starts, please try to achieve your strongest possible erection.

No Pill Condition
After reviewing your penile plethysmograph results, you showed a 122% increase in the size of your penis during the erotic film relative to your response during the documentary film. Your 122% increase in size achieved during the erotic film is about average (48th percentile) for males your age watching erotic videos in our laboratory. As I mentioned earlier, we are screening two new erotic films in which we are measuring participants' erectile response. Now I will ask you to fill out pre-film questionnaire while the plethysmograph returns back to pre-manipulation. Afterwards, you will undergo a repeat of the same procedures with two exceptions – the neutral and erotic videos you watch next will be slightly different. Once the erotic film starts, please try to achieve your strongest possible erection.

APPENDIX P

Study Eligibility Questions

1. Are you between the ages of 18 and 30?
    a. Eligibility: Must be 18 to 30.

2. Are you comfortable reading the consent form and questionnaires in English?
    a. Eligibility: Must be able to read and comprehend the written information that will be distributed during the experiment.

3. What is your sexual orientation?
    a. Eligibility: Primarily heterosexual

4. Are you currently in psychological treatment for erectile dysfunction or sexual anxiety?
    a. Eligibility: Not in current treatment for ED or issues with sexual anxiety

Additional Screening Question:

5. Have you ever been diagnosed with a mental disorder? (examples: depression, anxiety, substance abuse)
    a. If yes, how is it currently affecting you?

APPENDIX Q

An Explanation of the Penile Plethysmograph Data Loss and Recovery Efforts

Throughout the data collection period of the present study, penile plethysmograph data files were visually inspected for cases of faulty recordings. Specifically, the files were reviewed for baseline penile circumference measurement at the start of each recording. For example, a 9 cm strain gauge would display 9 cm at the start of the recording. After the first recording for an experimental session, the template file would be saved as a new file with participant ID, session number, and date. According to standard protocol for the Acqknowledge Software, the penile plethysmograph data acquisition software, the second recording would commence with selecting the "start" button in the software's interface. After the completion of the second recording, the newly recorded file would be saved with a new title reflecting the second assessment for the same participant.

The data reduction began once the last participant completed the study protocol. The reduction process consists of three steps. First, movement artifacts greater than 5 millimeters were removed among a generally smooth line. Second, the raw data were reduced to penile circumference averages, in centimeters, across 1-second epochs. Last, the 1-second epochs were calculated according to the specific physiological sexual arousal variable. Upon calculation of the first variable, raw change in penile tumescence, exact raw change scores emerged for several participants' first and second recordings. Further investigation revealed that after the pilot data were collected, the majority of the recordings were similar in time stamps when each file was saved (e.g., First recording saved at 9:03, second recording saved at 9:05). The time stamp placed the recording at approximately the time of the second assessment. File modification time stamps also confirmed that the first file was created earlier and modified just prior to the second recording's saving.

I contacted the University of Texas at Austin Liberal Arts IT support desk to discuss data recovery options. The Department of Psychology servers, where the penile plethysmograph data resided, were backed up for only 30 days. All files on the servers older than 30 days are erased. The data in question were determined as unrecoverable. I then contacted Biopac Systems Inc., the supplier of the physiological data collection equipment and owner of Acqknowledge software. I submitted a support request with the appropriate descriptions of the equipment used in the study. I received an email response that I should resolve my data file issues by purchasing updated equipment. I send a similar email to the regional independent distributor and regional tech support person. I received a response from the tech support person indicating that the older data acquisition equipment used in our lab has been known to have a problematic file-overwriting feature that was corrected four years ago with the updated software. The feature is an option to warn the user that the file will be overwritten if "start" is selected: "Overwrite existing

data?" Many of strain gauge templates that were created earlier in the data collection did not have the overwrite warning feature engaged and the result was an overwritten first recording.

While in pursuit of an explanation for the overwritten files, I recreated the penile plethysmograph database by analyzing each data file and gathered usable data of both first and second recordings. My efforts have resulted in 42 cases with complete penile plethysmograph data for a total of five physiological sexual arousal variables for analysis. The results section of the dissertation has been completely revamped with a modified, more robust analytical strategy. The physiological sexual arousal variables were analyzed first with the 42 cases (within and between-subjects analyses), and then with the 115 cases with second recordings for between-pill condition comparisons. Although the entire sample consisted of 128 participants, 115 participants had valid penile plethysmograph data, surpassing the a priori power analysis recommendation for sample size.

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VITA

Yasisca Pujols was born in New York City in 1981, the daughter of Pericles and Silka Pujols. After completing her secondary school education at Conroe High School in Conroe, Texas, in 1999, she entered The University of Texas at Austin, Austin, Texas. She received the degree of Bachelor of Arts in Studio Art in May, 2003. She returned to The University of Texas at Austin to complete coursework for a second major in Psychology with Thesis Honors. She entered The University of Texas at Austin clinical psychology doctoral program in August, 2007. She received the degree of Master of Arts in Psychology in December 2010 during her time in the program.

Permanent e-mail address: yasiscapujols@gmail.com

This dissertation was typed by the author.