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This study examined the effects of smoking withdrawal on several depressive dimensions, and specifically on loss of interest, a core but less investigated symptom of depression. 17 women and 11 men engaged in relatively interesting leisure activities during smoking as usual phase, and again, after 48 hours of abstaining smoking. As predicted, in the non-smoking phase participants demonstrated lower subjective levels of interest, as assessed by subjective levels of enjoyment and motivation in engaging in the activity. However, contrary to expectations, there was no overall increase in level of depressive symptomology after abstaining smoking. Instead, exploratory analysis revealed an interactive pattern, in which men demonstrated significantly higher level of depressive symptomology in the non-smoking phase compared to women. As predicted, there was a decline in self-appraisal of performance in the non-smoking phase compared to the smoking phase. No such decline was found in objective measurements of performance. In this study the predictions that men will demonstrate lesser interest, energy, and greater level of tiredness/fatigue after abstaining smoking, compared to women, was not confirmed. Also, the hypothesis that men will demonstrate poorer level of performance in the non-smoking phase compared to women was not confirmed.

Strengths and limitations for the current study and suggestions for future studies are discussed.

THE EFFECT OF NICOTINE WITHDRAWAL ON LOSS OF INTEREST IN ENGAGING IN LEISURE ACTIVITIES IN MEN VS. WOMEN

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CHAPTER 1

INTRODUCTION

Smoking is a risky behavior that can cause death. Although many smokers try to quit, the relapse rates are very high. Depressive symptoms characterize smoking cessation and may increase relapse rates. This study tried to expand the knowledge about the relationship between smoking cessation and depressive symptoms with a focus on loss of interest, a core depressive symptom. It also examined gender-based differences in several dimensions, mainly in loss of interest after short-term smoking cessation.

Depression is a relatively common disorder. According to the *Diagnostic and Statistical Manual of Mental Disorders-IV-Text Revision*, the lifetime risk for having major depressive disorder has varied from 10% to 25% for women and 5% to 12% for men (*DSM-IV-TR*; American Psychiatric Association [APA], 2000). There are several theories that try to explain the onset of the disorder, including biological and cognitive ones, with some of them emphasizing the role of loss in depression.

Although there are many manifestations of the disorder, one of the two main criteria for diagnosing depression is markedly diminished interest. Yet, previous research on depression focused mainly on the affective and cognitive facets of the disorder, while the motivational aspects, including loss of interest, have received considerably less attention. This study focused on the symptom of loss of interest.

Research indicates consistent relationships between depression and cigarette smoking. There is higher prevalence of history of major depressive disorder among smokers entering treatment (between 22% to 61%), relative to the lifetime prevalence in

the general population (approximately 17%). Theories are controversial regarding whether smoking causes depression, vice versa, or whether other variables cause both.

Numerous studies demonstrated the existence of withdrawal and depressive symptoms after short-term smoking cessation, some giving evidence for lower cognitive functioning. Some research on the effects of nicotine cessation on mood also found some evidence for diminished interest or pleasure during nicotine withdrawal.

The majority of research that tried to examine the difference of the effects of smoking cessation on men vs. women has found that women tend to have more difficulties in abstaining and higher rates of relapse. Although women might have more severe withdrawal symptoms or more affective symptoms after nicotine cessation, still the reasons for lower rates of abstaining in women is unknown.

This study tried to examine the effects of short- term nicotine withdrawal on depressive symptoms and specifically on loss of interest. The study used mixed-experimental design, using within and between comparisons, in which withdrawal symptoms, depressive symptoms, and interest in leisure activities were assessed before and after smoking cessation. Beyond that, the research investigated whether there are differences on those dimensions, especially in loss of interest between men and women.

The findings of this study might add knowledge that can be important in order to tailor adequate cessation programs, which take into consideration the impact of abstaining on withdrawal symptoms, on mood in general, and on loss of interest in men vs. women. In addition, the focus on loss of interest is important, since there is not sufficient research on this depressive symptom in general, and lack of research focusing on the way nicotine deprivation affects it. Moreover, to the best knowledge of the

researcher, there is no research reporting about the effects of nicotine deprivation on loss of interest in men vs. women.

Literature Review

Depression

Depression is a relatively common disorder which has been labeled "the common cold of psychopathology'' (Gilbert, 1992, p. 30). Indeed, according to the current *Diagnostic and Statistical Manual of Mental Disorders-IV-Text Revision*, "the lifetime risk for major depressive disorder in community samples has varied from 10% to 25% for women and 5% to 12% for men" (*DSM-IV-TR*; American Psychiatric Association [APA], 2000, p. 372). Major depression affects many aspects of a person's life. Its manifestation includes psychological symptoms, like self-criticism and anhedonia, biological symptoms like weight loss and insomnia, and social symptoms like avoidance and passivity. These symptoms impair an individual's ability to function normally (Katz, Shaw, Vallis, & Kaiser, 1995).

When looking at the *DSM-IV-TR*, it is evident that the singular label of major depression includes many different possible clusters of symptoms that might lead to this diagnosis. To be diagnosed with major depression, a person must have a major depressive episode, in which at least one of two main criteria must be met: 1) "depressed mood" or 2) "markedly diminished interest or pleasure in all, or most all, activities."
Beyond that, at least three to four additional features of the remaining seven criteria are needed in order to have depressive episode. These include: 3) "significant weight loss... or weight gain;" 4) "insomnia or hypersomnia;" 5) "psychomotor agitation or retardation;" 6) "fatigue or loss of energy;" 7) "feelings of worthlessness or excessive or

inappropriate guilt;" 8) "diminished ability to think or concentrate, or indecisiveness;" and 9) "recurrent thoughts of death...recurrent suicidal ideation" (APA, 2000, p. 356). Thus, depression has many different manifestations.

Biological and Cognitive Models of Depression

A number of theories and models try to explain depression. Considerable attention has been devoted to the investigation of the biological and cognitive aspects of depression.

Biological perspective. Research has examined biological aspects of depression on the genetic, anatomic, and neurochemical levels. Several researchers demonstrated the importance of some genetic component in depression. Higher concordance rates exist for affective illness in identical twins, compared to fraternal twins, siblings, or other first-degree relatives (Thase & Howland, 1995). In addition, Wender et al. (1986) found that adopted children with an affective disorder had much higher rates of biological relatives with unipolar depression relative to other disorders. Beyond that, disturbances in some of the neurovegative symptoms of depression, like agitation and loss of appetite, might be due to disturbances in the prefrontal cortex, forebrain, and limbic system (Thase & Howland, 1995). Most biological theories hypothesize the existence of disturbance on the neurochemical level. Research addressed the role of number of neurotransmitters, including norepinephrine (NE), dopamine (DA), serotonin (SE), and acetylcholine (ACh), in depression (Thase & Howland, 1995).

Cognitive perspective. Sacco and Beck (1995) show that the cognitive theory for depression believes that the essential component of depressive disorder is a negative cognitive set. Beck (1967), a pioneer in the cognitive theory of depression, claims that the

depressed person tends to view the self, the future, and the world in a dysfunctional and negative way. He describes several systematic errors in logic, which reflect these dysfunctional cognitive schemes. "Personalization," the tendency to relate external events to oneself without evidence, and "overgeneralization," the tendency to draw a general rule on the basis of an isolated incident and to generalize it to unrelated situations, are two examples for systematic errors, which reflect the activity of dysfunctional cognitive schemes.

Loss of Interest in Depression

Although the cognitive and biological perspectives add important dimensions for our understanding of depression, this present study focused on loss of interest, a motivational aspect of depression, with a consideration to the role of loss in its emergence. As mentioned, loss of interest is one of the two cardinal symptoms for major depression, and it is second and alternative only to "depressed mood" symptom. Its importance was demonstrated by several studies. For example, in recent research, Nair et al. (1999) tried to assess the importance and hierarchy of the symptoms listed in the DSM. By using neural network modeling technique of assessment, they found loss of interest to be second in importance (after sadness) as discriminative feature for depression, although it was not a frequent symptom. In another study, which tried to assess symptoms of depression among adolescents, Patton, Coffey, Posterino Carlin, and Wolfe (2000) found loss of interest and pleasure as one of the discriminative features between those with depressive disorder and control groups. Although not as frequent as depressed mood, this symptom had a greater discriminative value. Despite the importance of this symptom, Klinger (1993) claims that, when talking about depression, there is an

emphasis on the affective side, including feelings of sadness or emptiness. He also points out that in recent decades there has been a surge of research on cognitive factors that contribute to depression. However, the motivational aspects of depression and the loss of interest in things have received considerably less attention in research.

The construct of loss of interest, Klinger (1993) asserts, takes different conceptualizations, from the pervasive to the particular. In the broader sense there is apathy toward nearly everything, and the positive consequence that an individual once received (e.g., from friendly conversations, community activities, recreational pursuits, and occupational achievements) has dropped to the point that the activities no longer seem to be worth the trouble. Loss of both appetite and interest in sex is among the widely recognized symptoms of clinical depression, and in a broad sense, social withdrawal and isolation can also indicate loss of interest.

The Role of Loss in Depression

Many theories, which try to understand the etiology of depression, attribute it on some level to some kind of loss. For example, in *Mourning and Melancholia*, when comparing mourning to melancholia, Freud emphasizes the unconscious loss of an object as a cause of depression (as cited in Gilbert, 1992). As Gilbert mentions, according to Bowlby and Attachment theory, in depression there is loss of self-esteem due to lack of adequate care giving.

Research also demonstrates the importance of loss as related to depression. For example, in a study conducted in Ahtari, in western central Finland, Kivela (1999) assessed depression in the aged population. After assessing onset and relapse of depression, the author concluded that an early loss of the father among women and early

loss of a mother among men predicted depression. In men, loss of physical functional abilities was also a predictor of depression.

Within the framework of his theory, "incentive disengagement," Klinger (1975) explains depression as a consequence of some kind of loss. He argues that, whether symbolic or real, the loss of some object which is important to the individual causes the symptom of loss of interest and depression (Klinger, 1993). The theory delineates a sequence of phases a person can go through, which might culminate in depression, whether normal or pathogenic. The uniqueness of the theory is in emphasizing motivational aspects for depression and the importance of loss of interest in depression.

The sequence includes invigoration of goal striving, then anger and frustration and possible aggression, depression, and finally disengagement from the goal and emotional recovery. The cycle begins when a person is engaged in an incentive, which is defined as "objects or events that attract organism or repel it." The organism becomes "committed" to that particular goal, a state that is also called "current concern" about achieving that goal. When the person confronts obstacles in the way toward the goals, he or she responds to the obstacle with increased vigor, with more powerful motions, more rapid responses, intense concentration, and so forth. In this phase there is also frustration, which is reflected by the behavioral invigoration but also by the value of the blocked incentive. That is, people are frustrated when they come to perceive the incentive as more attractive than before. Klinger also suggests that in the invigoration and aggression phases not only does the blocked incentive become more attractive but also others become less so. In this stage there is "loss of perspective" when the person becomes over involved in frustrating activities. During the sustained frustration, the person begins to

give up and depression, whether mild or severe, might emerge, with apathy and loss of interest towards incentives as one of its most salient characteristics. After a period of time there is an emotional recovery and return to normal functioning (Klinger, 1975).

Smoking and Mood

According to the National Health Interview Survey, which was analyzed by the Centers for Disease Control and Prevention (2002), approximately 23.3% of adults were current smokers and 19.1% of adults were everyday smokers. Smoking is a risky behavior, which can lead to numerous dangerous medical conditions, including respiratory disorders, cardiovascular hazards, and 12 types of cancers, with lung cancer being the leading cancer death in most high-income countries (Bartal, 2001). Current estimates predict that by 2030 tobacco use will cause 10 millions deaths per year (Lopez, 1999).

There is extensive research on the linkage between major depression and smoking. An interesting finding is that there is a high prevalence of history of major depressive disorder among the smokers entering treatment, with estimations of 22% to 61% (Glassman et al., 1988; Grinsberg, Hall, Reus, & Munoz, 1995; Hall, Munoz, & Reus, 1994; Kinnunen, Doherty, Militello, & Garvey, 1996). This is considerably higher prevalence than the lifetime prevalence of major depression in the general population, which is approximately 17% (Kessler, 1994). In their research Roy, Parker, Mitchell, and Wilhelm (2000) summarize the theories that try to explain this correlation between depression and smoking. One interpretation is that depression plays a causal role in smoking initiation and progression toward heavier smoking, a so-called 'self medication' pathway with mood altering effects of nicotine reinforcing its use. A second explanation

is that smoking is playing an etiological role to depression by affecting relevant neurobiological systems. A third explanation is that higher order factors contribute to both depression and smoking. Some of these variables include peer disapproval, socioeconomic factors, and genetic factors. For example, neurochemical systems and anatomical structures in the brain that are targets of nicotine, also have a role in the regulation of mood (Mrkou, Kosten, & Koob, 1998; Watkins, Koob, & Markou, 2000). This finding suggests that mood regulation and nicotine dependence might be based on overlapping biological and/or genetic structures.

Nicotine Cessation and Mood States

Although the majority of smokers report interest in quitting smoking, the percentage of smokers who have quit is low among some populations (Center of Disease Control and Prevention, 2002), with few dependent smokers being able to stop smoking unaided (Hughes, 1999).

According to the *DSM IV–TR*, nicotine withdrawal is characterized by abrupt cessation of nicotine use, or reduction in the amount of nicotine used, with at least four symptoms that follow within 24 hours. The first symptom listed is "dysphoric or depressive mood." The other symptoms that may emerge include insomnia, irritability, frustration or anger, anxiety, difficulty concentrating, restlessness, decreased heart rate, and increased appetite or weight gain.

The majority of studies which assess the effects of smoking cessation on mood in patients with history of major depression indicate that participants tend to have more depressive symptoms while quitting compared to the time of smoking as usual (e.g., Covey, Glassman, & Stetner, 1990; Hall et al., 1994). Several studies using non-clinical

samples have also demonstrated that short-term smoking cessation causes more depressive symptoms relative to smoking condition. For example, Parrott and Garnham (1998) examined mood states of participants after deprivation of 12 hours. Using a brief mood states questionnaire and withdrawal symptoms questionnaire, they found feelings of stress, irritability, poor concentration, depression, and low pleasure to be significantly higher in deprived smokers relative to a group of non-smokers and a group of smokers that smoked as usual. Thus, withdrawal symptoms and depressive symptoms were found after abstaining for 12 hours. Similar results were obtained by Parrott and Kaye (1999), whose deprived smokers also reported significantly more cognitive failures in everyday life tasks.

Overall, the majority of studies demonstrated deprived smokers to perform poorly in cognitive tasks, relative to smoking condition and relative to active smokers (Parrot & Craig, 1992; Wesnes & Parrott, 1992). For example, Absi, Amunrud, and Wittmers (2002) examined performance on two tasks in smokers before abstaining and after short-term abstinence. The first task included calculating the sum of a three-digit number and adding it to the original number. The second task included summing consecutive numbers, which were presented by auditory tape. In the deprived state, participants showed significantly lower level of performance, as demonstrated by fewer correct responses and fewer attempts completed, relative to smoking as usual state.

The above studies have demonstrated the impact of short-term cessation on withdrawal symptoms, depressive symptoms, and on cognitive performance. It is important to note that the first few days of a quitting attempt might be of crucial importance, with failure to remain abstinent in early phase predicting poor long-term

outcomes. Moreover, depressive symptoms in early abstinence might play a crucial factor in early relapse among people entering cessation programs (Pomerleau, Brouwer, & Pomerleau, 2001), and among self quitters (Hughes as cited in Pomerleau, Brouwer, & Pomerleau, 2001).

Nicotine Withdrawal and Loss of Interest

Some research, which examined the impact of nicotine withdrawal on mood and other states also assessed to a limited degree loss of pleasure (a related and highly correlated depressive symptom with loss of interest). For example, Parrott and Kaye (1999) found that smokers who abstained for 11 to 23 hours reported feeling more irritated and less satisfied relative to non-smokers and smokers. This finding served, according to these authors, as an indication for reduction of pleasure in abstaining smokers.

Although most studies did not focus on the symptom of loss of interest, there is some research that specifically addresses the relationship between nicotine withdrawal and loss of interest, or diminished pleasure. Harrison, Liem, and Markou (2001) administrated nicotine through mini-pumps to rats for 7 days. On the seventh day administration of nicotine was stopped, and thus nicotine withdrawal period begun. The researchers found that threshold of rewarding (electrical stimulation) increased in the withdrawal phase relative to the nicotine phase, and relative to a comparison group. Also, the latency of response (time elapse until rats rotated a wheel) was longer in the withdrawal phase relative to the nicotine phase. These findings might serve as an indication of decreased motivation and diminished interest or pleasure during nicotine withdrawal.

In his dissertation, Leftwich (1999) tried to find whether nicotine withdrawal affects loss of interest in humans. Using a true experimental design, the participants' enjoyment of leisure activities was assessed during smoking period and after cessation for 48 hours. He found that smoking cessation and withdrawal caused an increase in depressive symptomology, as measured by the BDI. Moreover, he found significant differences in reported enjoyment, and subjective levels of performance, between the smoking and non-smoking conditions, though no differences were found in objective performance. This finding, that withdrawal from nicotine affects perceived enjoyment from leisure activity, which is an appetitive activity, suggests that nicotine withdrawal may contribute to loss of interest.

Gender and Smoking

Several researchers tried to examine the differences between men and women on several dimensions that are related to smoking. A consistent finding is that women have equal or more difficulties quitting, but not fewer difficulties quitting compared to men (Ockene, 1993; Osler, Prescott, Godtfredsen, Hein, & Schnohr, 1999; Ward, Klesges, Zbikowski, Bliss, & Garvey, 1997; Wetter et al., 1999). Women also seem to have higher relapse rates, a consistent finding, even when different populations were examined (e.g., self-quitters or individuals aided by professionals) (Perkins, 1996). Perkins (1996) mentions that several explanations for the poorer success of women to abstain have been offered. For example, smoking might play an important role in body weight and food control, and there might be a reduced availability of social support for cessation for women. He also offers other reasons that might explain lower rates of successful abstinence in women. He suggests that men might smoke for nicotine reinforcement,

while women for non-nicotine factors (e.g., sensory effects of smoke inhalation, conditioned responses to smoke stimuli, and secondary social reinforcement).

However, the reasons for the difference in abstaining rates, which was mostly found in nicotine replacement therapies, is still unknown. For example, Wetter et al. (1999) examined 632 participants enrolled in different types of therapy in eight different settings. The researchers found men to be much more successful in remaining abstinent compared to women, one week after starting cessation program, at end of treatment, and 6 months later. Although differences appeared between men and women in some characteristics, both before and after abstaining, there was no factor that could serve as a mediator between gender and post-cessation outcome.

Perkins also mentions that there is some evidence that women may experience more severe withdrawal symptoms relative to men (Hatsukami, Skoog, Allen, & Bliss as cited in Perkins, 1996). However, this is also a controversial issue with inconclusive evidence. For example, Pomerleau, Tate, Lumley, and Pomerleau (1994) reported that studies finding more severe withdrawal symptoms in women were based on retrospective reports, while prospective studies revealed no difference. This hypothesis was confirmed in their own study, in which after 48 hours of abstaining there was no difference in reported withdrawal symptoms between men and women. Yet, some men tended to report less severe withdrawal symptoms in previous attempts of quitting.

The current line of research indicates that women use smoking more as a method of coping with negative affect or stress, relative to men (e.g., Perkins, 1999; Pomerleau, Pomerleau, & Garcia, 1991). Gilbert (1995) mentioned several studies, which found that women tend to report negative affect as their primary motivation for smoking, in contrast

to men who reported stimulation as a primary factor that motivated them to smoke. However, as Delfino, Jamner, and Whalen (2001) mentioned, these studies were based on retrospective data, and thus vulnerable to data bias. In their research, participants filled out a diary three times per hour for two days. From these data the researchers tried to detect temporal relationships among smoking behavior, urge to smoke, and mood. They found in men higher rates of urges to smoke while feeling sad relative to women. Yet, they found decreased alertness to predict smoking in men but not in women. Moreover, they found fatigue to be associated with smoking urge only in men. They concluded that men might use smoking for negative affect regulation as much as women. However, men may use tobacco more actively as a stimulant than do women.

Intercorrelations among Depressive Symptoms

In recent years a few studies have tried to assess the validity of the Beck Depression Inventory, second edition (BDI-II). These studies measured intercorrelations between depressive symptoms, as measured by the BDI –II items. In a recent study, Steer, Ball, Ranieri, and Beck (1999) examined the intercorrelations among BDI-II items in an outpatient population. They found tiredness or fatigue symptom to be mostly associated with loss of energy (r = .71) and loss of interest (r = .54). In another study, Whisman, Perez, and Ramel (2000) examined intercorrelations among the BDI-II items in an undergraduate sample. They found loss of interest to be mostly associated with loss of pleasure, sadness, and loss of energy. They also found loss of energy to be mostly correlated with tiredness or fatigue, loss of pleasure, and loss of interest. The above studies seem to cluster loss of interest with loss of energy and tiredness or fatigue.

As mentioned, men tend to report smoking for stimulation more frequently, relative to women. Delfino, Jamner, and Whalen (2001) found fatigue to be associated with an urge to smoke in men but not in women was in support with this hypothesis. In addition, tiredness or fatigue and other physiological symptoms like loss of energy are highly correlated with loss of interest. Thus, smoking may serve more to increase levels of interest in men relative to woman. If this is the case, it might be that loss of interest is more associated with men than with women as a depressive symptom, which follows smoking cessation.

Summary

Depression is a highly prevalent disorder, and several theories try to explain its emergence. The disorder has many manifestations, loss of interest being one of its core and most discriminative symptoms. Yet, this motivational symptom earned less research than other aspects of depression, with most attention being devoted to biological and cognitive aspects.

There is extensive research on the linkage between smoking, mood states, and depression. It is evident that smoking cessation causes withdrawal symptoms, including depressive symptoms. Several studies also showed linkage between nicotine withdrawal and loss of pleasure. Yet, most studies did not focus on this symptom. Also, some research demonstrated lower concentration and cognitive ability during short-term cessation.

Some differences on smoking seem to be gender based, with the vast majority of studies demonstrating poorer abstinence outcomes for women relative to men. The reasons for that are not quite clear. Several studies also suggest smoking to serve more as

a stimulant for men than for women. Thus, it might be that nicotine use might serve to increase enjoyment and interest in men relative to women.

This study is trying to examine the effects of short-term smoking cessation on depressive symptoms and specifically on loss of interest in men vs. women. Although there is a large body of research on smoking cessation on depressive symptoms, there is relatively lack of research on the impact of nicotine cessation and withdrawal on loss of interest. Research that did examine this factor in humans usually did not focus on this symptom. Moreover, to the best knowledge of the researcher there is no research that addresses the difference between men and women on the loss of interest.

This knowledge might be important since smoking is a highly prevalent risky behavior that can cause many serious medical conditions. It is important to the field to understand how smoking cessation affects individuals in order to program treatment plans that take into account different factors, which might impact relapse rates. The current study evaluated some of these factors by examining withdrawal symptoms, depressive symptoms, loss of interest, and gender based differences on those factors.

Research Questions

Research question 1. Will individuals who are instructed to abstain from smoking (non- smoking state) show more withdrawal symptoms compared to the state of smoking as usual?

Research question 2. Will individuals in the non-smoking state show concurrent increases in depressive symptomology, relative to the state of smoking as usual?

Research question 3. Will individuals in the non-smoking state show less interest in engaging in leisure activities, relative to the state of smoking as usual?

Research question 4. Will men in the non-smoking state show less interest in engaging in leisure activities relative to the state of smoking as usual, compared to women?

Research question 5. Will men in the non-smoking state show higher levels of fatigue/tiredness and lower levels of energy while engaging in leisure activities relative to the state of smoking as usual, compared to women?

CHAPTER 2

METHOD

Participants

The sample in the present study was recruited from undergraduate students who smoked at least 10 cigarettes a day, were not attempting to quit or cut down, above 18-years-old, and without medical or psychological conditions which indicated that participation in the study could have been harmful for them. The pool of potential participants who met the criteria as obtained by screening form and verified by phone call consisted of 40 students. Out of this group, 2 individuals scored below the Carbon Monoxide (CO) level criterion for this study (see Instrumentation section) on the first meeting, and thus were excluded. Three other individuals decided they did not want to participate in the study and did not show up for the first meeting.

From the remaining 35 students who completed the first session, 28 completed both phases of the study. This final sample was composed of 11 men and 17 women, with a range of ages between 18 – 38 (M = 20.07, SD = 4.07). Smoking characteristics suggest that participants in the current study were dependent smokers. The range of number of cigarettes smoked per day was 10 – 35 (M = 14.75, SD = 5.51). The mean number of years of smoking was 5.73 (SD = 5.57). The average CO level was 19.07 (SD = 7.31), and the mean score on the Fagerström Test for Nicotine Dependence (see Instrumentation section) was 4.04 (SD = 2.12). None of the participants were trying to quit or cut down, although 23 out of 27 participants indicated that they tried (unsuccessfully) to quit at least once in the past. Subjective measurements of enjoyment (M = 5.21, SD = 1.34) and motivation (M = 5.5, SD = 1.35) as assessed by the Leisure Activity Ranking Scales (see

Instrumentation section) assured that on the average participants enjoyed the task and felt motivated to engage in it. Except for one participant who was not qualified to get research credit points for participating (but had a possibility of wining a monetary prize), all others gained research credit points and a possibility of winning a monetary prize.

The 7 participants who did not complete the second phase of the study (i.e., non-smoking phase) consisted of 4 women and 3 men. Five out of 7 participants indicated they had tried to quit in the past. Attempts were made to reschedule them for a second time, so they would complete the second phase. However, none of them completed the second phase. Some claimed they could not quit and/or did not score below the criterion for the CO monitor. Others claimed they did not have the time or simply did not show up for their scheduled appointment.

In order to assess whether there were differences between those who completed the study ($N = 28$), and those who completed the first phase only ($n = 7$), two-tailed independent t tests on age, smoking characteristics, level of depressive symptomology, and enjoyment and motivation to engage in the task were performed. There were no significant differences between the two groups, except for level of depressive symptomology, $t(33) = 2.56$, $p < .05$. The mean level of depressive symptoms, as assessed by the BDI (see Instrumentation section), for those who completed the first phase only was 3.57 ($SD = 2.64$), while the mean level for those who completed the study was 7.96 ($SD = 4.32$).

Sampling Procedures

The participants were recruited by advertising on the Psychology board, announcements in classes, and by fliers and screening forms distributed on campus. The

advertisement asked students who met the criteria of the study, to take a screening questionnaire (see Appendix A), which was posted on the Psychology board. Interested individuals were instructed to fill out the questionnaire and to put it in the box located on the counter in the psychology department office, at the University. Participants were also recruited through announcements in classes. The researcher or research assistant gave the same information in the advertisement, and screening questionnaires were distributed to interested students. The researcher or research assistant collected the questionnaires after their completion. Also, fliers and screening questionnaires were distributed to students who smoked or to students who were acquainted with smokers. The content of the fliers was identical to the one in the advertisement.

The experimenter telephoned individuals who reported on the questionnaires that they were smoking 10 or more cigarettes per day, and above the age of 18. In the phone call, the information that was gathered from the questionnaire was verified. In cases where quitting or cutting down was mentioned, further exploration was done in order to find what action (and not just intention or wish to quit or cut down) was made. In cases where action took place, the individual was excluded from the study. Brief description of the nature of the study was given, as well as incentives that could be earned from participation. For more information regarding the phone call procedure, see Appendix B.

Since the research involved quitting smoking for 48 hours, it was expected that there would be difficulties in recruiting and retaining an adequate final number of participants. In order to attract and retain potential participants for both phases of the study, the experimenter informed students about earning research credit points and the

possibility of winning a monetary prize via lottery. This method was applied in a previous study with moderate success (Leftwich, 1999).

Procedures

After the initial recruitment procedures took place, those who agreed to participate were scheduled for orientation and the first experimental phase (the first of two meetings). In the first session, the experimenter read the consent form to the participant. Both the experimenter and participant signed it, and a copy of it was given to the participant. The consent form explained what the participant would have to do in the study, and the terms under which the participant could earn research credit points and monetary prize. For more information regarding the consent form, see Appendix C.

After reading the consent form, a number was assigned to each participant, with explanation regarding its importance for confidentiality. Participants were sent outside in order to smoke one cigarette before continuing the next steps in the research. Then, participants took Carbon Monoxide (CO) exam, filled out the Beck Depression Inventory (BDI) questionnaire (see Appendix D), the Fagerström Test for Nicotine Dependence, FTND (see Appendix E), and The Tobacco Withdrawal Symptom Checklist (WSC see Appendix F). The last phase of the session included engaging in leisure activities (word searches and/or building blocks) and filling out forms regarding the activities. For details regarding instructions for participants in engaging in the two activities, as well as information about the activities themselves, see Appendix G. Participants were given a choice between the two activities. After engaging for 8 minutes with their preferred activity, they filled out the Leisure Activity Rating Scales form (see Appendix H). Then, they had a choice, either to continue with the activity, to switch to the other activity, or sit

and relax for the remaining time (for the next 8 minutes). If they continued with either one of the activities, they filled out another Leisure Activity Rating Scales form. At the end of the first session, each participant was scheduled to have a meeting in the following week at the same day and time and was reminded to abstain from smoking for 48 hours prior to the second meeting.

The experimenter called the participants 60 to 72 hours before the second session and reminded them about the second meeting and the requirement to abstain from smoking. In the second meeting every participant took another CO exam and filled out the BDI and WSC again. Then, the participant played with equivalent version of the game he or she played with in the previous meeting. As in the first session, after 8 minutes the participant filled out the Leisure Activity Rating Scales form. Then, he or she had a choice to continue with the same activity, to switch tasks, or to sit and relax for the remaining time (8 minutes). For instructions for participants in the second session, see Appendix G. In both sessions, the experimenter recorded some objective measurements regarding the participants' performance while engaging in the activity or activities on the performance-rating sheet (see Appendix I).

Instrumentation

Beck Depression Inventory (BDI). A 21-item questionnaire, which assesses symptoms of depression, was designed by Beck et al. (1979). The BDI is rated on a 4-point likert scale, ranging from 0 to 3, with a total score that can range from 0 to 63. Higher scores indicate more depressive symptoms with greater severity. The BDI was used in previous research to determine possible changes in mood in smoking vs. non-smoking phases (e.g., Burgess et al., 2002). It was also widely used with college students

and it has been empirically shown to be a reliable and valid measurement of depressive symptomology. In non-clinical samples, the BDI test-retest reliability ranges from .60 to .90. Internal consistency in non-psychiatric populations is .81 (Kramer & Conoley, 1992). In this study the BDI was administered twice, once per session.

Fagerström Test for Nicotine Dependence (FTND). This self-report measure of tobacco dependence was designed by Heatherton, Kozolowski, Frecker, and Fagerström (1991). The FTND assesses details of a person's smoking behavior, such as number of cigarettes smoked daily and how soon a person smokes after waking up in the morning. The instrument was derived from numerous empirical studies of nicotine dependence and has been shown to be a reliable and valid measure of tobacco dependence. Smokers who are nicotine dependent typically score in the 6 ± 2 range according to the literature (e.g., Payne et al., 1994; Pomerleau et al., 1994). The FTND was administered in the first session in order to assess level of dependency among participants.

The Tobacco Withdrawal Symptom Checklist (WSC). The instrument was designed by Hughes and Hatsukami (1986). The WSC is a 14-item survey assessing symptoms of nicotine withdrawal and the severity of each symptom on a 0-3 likert scale, ranging from 0 = "not present" to 3 = "severe." This instrument was used in past research that measured withdrawal symptoms after short-term abstinence (e.g., Absi, Amunrud, & Wittmers, 2002). It was administered twice, once per session.

Leisure Activity Rating Scales. This instrument, which was updated from Leftwich (1999) for this research, asks participants to rate the level of enjoyment, motivation, and performance they felt when they engaged in the activity. Responses to each question are rated on a likert scale ranging from 1 to 7. Beyond that, participants

had to circle on a likert scale ranging from 1 to 7, their level of energy, and tiredness or fatigue they felt while performing the task. This instrument was administered four times, twice per session.

Performance rating sheet. This form was used to gather objective information regarding the performance of the participants in the leisure activity. The information includes time spent on the activity, progress of performance, and number of errors the participant made.

CO monitor. In this study a Micro CO Meter, Model MCO2; Micro Medical, Inc was used. This instrument is a physiological measure of exhaled parts per million (ppm) of carbon monoxide (CO) in the lungs. CO monitors have been used in previous smoking research in order to verify biochemically abstinence from cigarette smoking (e.g., Burgess et al., 2002). The CO monitor is accurate within $\pm$ 2 ppm CO, using cutoffs of $\geq$ 12 ppm for people who report smoking regularly, and $<$ 10 ppm for those who are light smokers or for regular smokers who have not smoked within the past several hours. The CO monitor requires participants to exhale through a disposable mouthpiece into a monitor. CO levels were assessed in both sessions and were recorded on the performance-rating sheet.

Experimental Design and Analysis

The study was a mixed quasi-experimental design. The manipulated variable, using within-groups comparison, was smoking state. Participants smoked as usual in the first session and then stopped smoking for 48 hours prior to the next session. The subject variable was gender, where a group of women was compared to a group of men.

Data regarding objective level of performance, as well as subjective level of interest during engaging in the activity were collected, in both the smoking and the non-smoking phases. Objective measures of performance that might indicate enjoyment and interest in the activity or activities included progress rate (percentage of the task done correctly per minute) and error rate (number of mistakes per minute). Levels of enjoyment and motivation, which were reported on the Leisure Activity Rating Scales form, served as the subjective measurement of enjoyment and interest to do the task. On this form participants also reported their subjective feeling regarding their level of performance. Level of tiredness or fatigue and level of energy while performing the task were also reported on this form. In addition, the BDI served as an assessment of depressive symptomology. The CO monitor was used as a biochemical indication for participants' abstinence, while the WSC was used as a self-report assessment of withdrawal symptoms.

In this study two 2 x 2 multivariate analysis of variance (MANOVA) procedures were performed. The within group independent variable was smoking state with two levels (smoking vs. non-smoking). The between groups independent variable was gender with two levels (men vs. women).

The first MANOVA was used for assessing number of withdrawal symptoms, severity of withdrawal symptoms, and CO level. The second MANOVA consisted of eight dependent variables, six of them based on self-report and two based on objective measurements. The subjective measurements included motivation in engaging in the activity; enjoyment in engaging in the leisure activity; performance level; fatigue or tiredness while performing the activity; level of energy while performing the activity; and

level of depressive symptomology during the past week. The objective variables included in this MANOVA were progress rate (percentage of the task correctly completed per minute) and error rate (number of mistakes per minute). Using a MANOVA as the statistical design was selected in this study, since the researcher assumed that there were associations among dependent variables assessed within each MANOVA. Follow up ANOVAs were utilized as needed.

Hypotheses

Hypothesis 1a. The researcher expected to find that individuals instructed to abstain from smoking for 48 hours (the non-smoking phase) would show lower CO levels, as measured by the CO monitor, relative to the smoking phase. The main effect of gender and the interaction between gender and smoking state were also examined.

Hypothesis 1b. The researcher expected to find that individuals instructed to abstain from smoking for 48 hours (the non-smoking phase) would show higher scores on the WSC questionnaire relative to the smoking phase. The main effect of gender and the interaction between gender and smoking phase were also examined.

Hypothesis 2. The researcher expected to find that individuals in the non-smoking phase would show increased scores obtained by the BDI relative to the smoking phase. Main effect of gender and the interaction between gender and smoking phase were also examined.

Hypothesis 3a. The researcher expected to see that individuals in the non-smoking phase would report decreased levels of motivation, enjoyment, and performance, as measured by the Leisure Activity Rating Scales, relative to the smoking phase.

Hypothesis 3b. The researcher expected to see that individuals in the non-smoking phase will demonstrate lower progress rate (percentage of the task done correctly per minute), and/or demonstrate higher error rate (assessed by number of mistakes per minute), compared to the smoking phase.

Hypothesis 4a. The researcher hypothesized that men would have lower scores on the enjoyment and motivation questions, as assessed on the Leisure Activity Rating Scales, in the non-smoking phase relative to the smoking phase, compared to women.

Hypothesis 4b. The researcher hypothesized that men would demonstrate lower progress rate (percentage of the task done correctly per minute), and/or would have higher error rate (assessed by number of mistakes per minute) in the smoking phase relative to non-smoking phase, compared to women.

Hypothesis 5. The researcher hypothesizes that men would have lower scores on the fatigue/tiredness and energy items (i.e., increased levels of tiredness/fatigue, and decreased level of energy), as measured by the Leisure Activity Rating Scales, in the non-smoking phase relative to the smoking phase, compared to women.

CHAPTER 3

RESULTS

In the present study two 2 x 2 MANOVAs were employed. The first MANOVA was employed in order to have some verification that participants quit smoking and experienced withdrawal symptoms. Differences between the smoking phase and the non-smoking phase were assessed with CO level and withdrawal symptoms serving as a collective dependent variable. Also, in this MANOVA overall gender differences and interaction between gender and smoking phase were examined. The second MANOVA was employed in order to find out whether there were differences in mood related characteristics, and specifically in level of interest between smoking and non-smoking phases. Also, this MANOVA was employed in order to find out if there was an interactive pattern between gender and phase on these variables. Eight dependent variables, two objective and six subjective, served as the collective dependent variable.

In order to assess whether there were differences in age, depressive symptoms, and smoking characteristics between men and women in this sample, two-tailed independent *t* tests were performed for the smoking phase. Significant differences were detected in FTND scores, $t(26) = -2.05$, $p = .05$. Men, on the average, scored higher on the FTND ($M = 5.00$, $SD = 1.65$) compared to women ($M = 3.41$, $SD = 2.21$). It is also important to note that women in this sample scored, on the average, below the typical range (6 ± 2) for dependent smokers (e.g., Payne et al., 1994). In addition, significant differences were found in number of cigarettes smoked per day $t(26) = -5.73$, $p < .01$. Men smoked more cigarettes per day ($M = 18.23$, $SD = 6.22$) compared to women ($M = 12.50$, $SD = 3.66$). No significant differences were found in other smoking characteristics

(e.g., CO level, number of withdrawal symptoms). Also, there were no significant differences in age or level of depressive symptomology between men and women.

The first 2 x 2 MANOVA was computed in order to verify that participants instructed to quit smoking actually quit, and experienced withdrawal symptoms. The dependent variables for this MANOVA were ppm of CO in the breath, and number and severity of withdrawal symptoms, as assessed by the WSC. With an alpha level of .05, the effect of phase was statistically significant, $F(3, 24) = 65.25$, $p < .01$. However, there was no significant effect for gender, $F(3, 24) = 2.02$, $p = .14$. Also, there was no significant interaction between gender and phase, $F(3, 24) = 1.67$, $p = .20$.

In order to assess which dependent variables contributed to the significant main effect MANOVA for phase, and to answer more specifically the hypotheses in this research regarding how gender and phase might affect each dependent variable, three two-way ANOVAs were performed, one for each dependent variable. There was a significant effect of phase on CO level, $F(1, 26) = 100.14$, $p < .01$, with changes being in the direction predicted in Hypothesis 1a: higher CO level in the smoking phase ($M = 19.07$, $SD = 7.31$) compared to the non-smoking phase ($M = 4.96$, $SD = 2.06$). There was not a significant effect of gender on CO level, $F(1, 26) = 3.99$, $p = .06$, nor for the interaction between gender and phase on CO level, $F(1, 26) = .38$, $p = .54$. For number of withdrawal symptoms endorsed on the WSC, there was a significant main effect for phase, $F(1, 26) = 61.26$, $p < .01$, with changes being in the direction predicted in Hypothesis 1b: greater number of reported withdrawal symptoms in the non-smoking phase ($M = 8.96$, $SD = 3.07$) compared to number of reported withdrawal symptoms in the smoking phase ($M = 3.89$, $SD = 3.38$). However, there was no significant effect for

gender, $F(1, 26) = 1.51$, $p = .23$, nor for interaction between gender and phase, $F(1, 26) = 3.96$, $p = .06$. For severity of withdrawal symptoms endorsed on the WSC, there was a significant effect for phase, $F(1, 26) = 53.08$, $p < .01$, with changes being in the direction predicted in Hypothesis 1b: greater severity of reported withdrawal symptoms in the non-smoking phase ($M = 16.32$, $SD = 7.42$) compared to severity of reported withdrawal symptoms in the smoking phase ($M = 5.29$, $SD = 5.97$). However, again, no main effect for gender, $F(1, 26) = 1.95$, $p = .17$, nor for interaction between gender and phase, $F(1, 26) = 3.93$, $p = .06$, was found. The significant main effects for number and severity of withdrawal symptoms is in line with Hypothesis 1b, which predicted higher levels of withdrawal symptoms in the non-smoking phase compared to the smoking phase. Means and standard deviations of CO level and withdrawal symptoms by gender and phase appear in Table 1.

The second 2 x 2 MANOVA was performed in which the dependent variables consisted of two objective variables (progress rate and error rate), and six subjective variables (level of enjoyment, motivation, tiredness/fatigue, energy, performance, and depressive symptomology). The MANOVA yielded significant main effect for phase, $F(8, 19) = 4.41$, $p < .01$. However, no significant main effect for gender, $F(8, 19) = 1.39$, $p = .26$, nor significant interaction effect between phase and gender, $F(8, 19) = 0.66$, $p = .72$, were found.

Follow up ANOVAs were performed in order to assess which dependent variables contributed to the significant main effect MANOVA for phase. It was hypothesized that participants in the non-smoking phase will score higher on the BDI compared to the smoking phase (Hypothesis 2). However, this hypothesis was not confirmed, $F(1, 26) =$

Table 1

Means and Standard Deviations of Objective and Subjective Measurements in the Smoking and Non-Smoking Phases for Women and Men

	Smoking phase		Non-smoking phase	
$N = 28$	Women n =17 *M* (*SD*)	Men n =11 *M* (*SD*)	Women n =17 *M* (*SD*)	Men n =11 *M* (*SD*)
CO level	17.59 (6.39)	21.36 (8.33)	4.18 (1.85)	6.18 (1.83)
Number of withdrawal symptoms	3.94 (3.67)	3.82 (3.06)	7.94 (2.59)	10.55 (3.21)
Severity of withdrawal symptoms	5.47 (6.77)	5.00 (4.77)	14.00 (6.07)	19.91 (8.14)
Motivation[a]	5.47 (1.46)	5.27 (1.19)	4.59 (2.24)	3.45 (1.44)
Enjoyment[a]	5.24 (1.44)	5.48 (1.25)	4.24 (1.64)	4.00 (1.41)
Energy[a]	4.53 (1.74)	4.81 (1.66)	4.29 (1.79)	3.45 (1.81)
Fatigue[a]	4.41 (2.12)	5.73 (1.74)	4.12 (2.09)	4.64 (1.69)
Performance[a]	4.59 (1.84)	4.64 (1.36)	4.29 (1.99)	3.64 (1.63)
BDI	7.94 (4.10)	8.00 (4.84)	6.41 (3.95)	10.45 (6.99)
Progress rate[b]	6.00 (2.90)	6.41 (3.23)	6.51 (4.01)	5.80 (3.61)
Error rate[c]	0.12 (0.17)	0.16 (0.22)	0.09 (0.14)	0.16 (0.24)

[a]As assessed on a scale of 1 (*not*) to 7 (*very*).

[b]Correct percentage of task per minute.

[c]Mistakes per minute.

0.31, $p = .58$. There was a significant effect of phase on subjective levels of motivation and enjoyment: for enjoyment, $F(1, 26) = 13.86$, $p = .01$; for motivation, $F(1, 26) = 16.99$, $p < .01$. The changes of subjective enjoyment and motivation were in the predicted direction (i.e., less enjoyment and less motivation in the non-smoking phase relative to the smoking phase), and in line with Hypothesis 3a. Also, there was a significant effect of phase on subjective appraisal of performance, $F(1, 26) = 5.24$, $p < .05$. The changes were as predicted in Hypothesis 3a: decline in subjective appraisal of performance in the non-smoking phase, relative to the smoking phase. Means for subjective measurements of enjoyment, motivation, and performance by phase appear in Figure 1. The effect of phase on objective measurements of performance was not significant: for progress rate, $F(1, 26) = 0.01$, $p = .92$; for error rate, $F(1, 26) = 0.28$, $p = .62$. Thus, hypothesis 3b, which predicted decrease in some or all of the objective measurements of performance, was not confirmed.

Hypotheses 4a, 4 b, and 5 predicted interactive pattern between gender and phase on the dependent variables. Hypothesis 4a, which predicted that men's scores on motivation and enjoyment will decrease to a greater extent, from smoking phase to non-smoking phase, compared to women, was not confirmed: for enjoyment, $F(1, 25) = 0.1$, $p = .76$; for motivation, $F(1, 25) = 1.18$, $p = .29$. Also Hypothesis 4b, which predicted that men will show greater decrease in some or in all objective measurements in the smoking phase relative to the non-smoking phase compared to women was not confirmed: for progress rate, $F(1, 25) = 1.09$, $p = .31$; for error rate, $F(1, 25) = 0.14$, $p = .71$. Also, Hypothesis 5, which predicted that men will show greater increase in level of tiredness/fatigue, and greater decrease in level of energy compared to women, was not

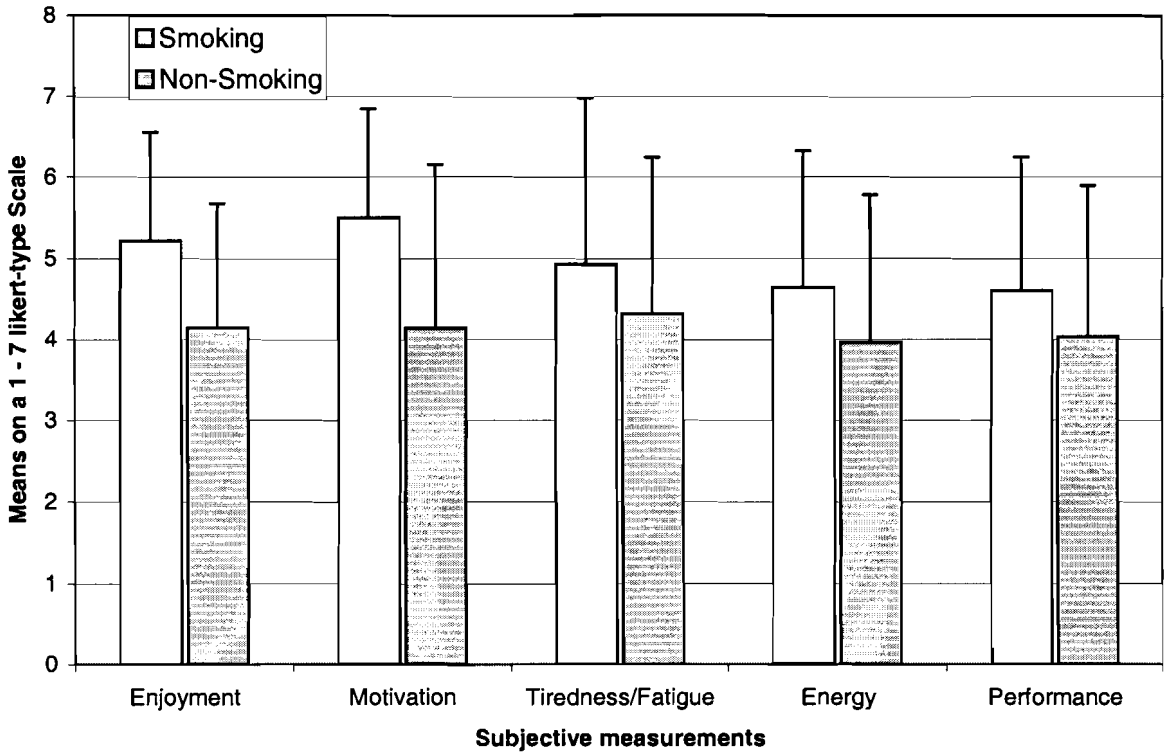

Figure 1. Means levels of subjective measurements (+*SD*) in the smoking phase and the non-smoking phase

confirmed: for tiredness/fatigue, $F(1, 25) = 0.75$, $p = .39$, for energy, $F(1, 25) = 1.91$, $p = .18$. Means and standard deviations for subjective and objective measurements by phase and gender appear in Table 1.

The assumption that the eight variables will correlate served as initial justification for using all of these variables in the same MANOVA. In order to assess this assumption, calculation of correlations among the eight dependent variables was performed for the non-smoking phase (see Table 2). The rating direction of the tiredness/fatigue scale was reversed for this calculation, in order to match the direction of the other scales in the Leisure Activity Rating Scales (i.e., higher rating on the scale would reflect higher level of the construct). As can be seen from Table 2, in the non-smoking phase there was a distinctive pattern of correlations. Enjoyment, motivation, performance, tiredness/fatigue, and energy measurements (all subjective task related measurements) were significantly correlated. In addition, significant correlation was found between the objective variables (i.e., error rate and progress rate). However no correlation was found between objective measurements and subjective ones. Also, scores on the BDI did not correlate with any other variable. Thus, according to the actual correlations that were found, three separate analyses were performed. In a MANOVA, where motivation, enjoyment, performance, tiredness/fatigue, and energy took place, there was a significant main effect for phase, $F(5, 22) = 4.13$, $p < .01$. There was no effect for gender, $F(5, 22) = 1.90$, $p = .14$, nor for interaction between gender and phase $F(5, 22) = 0.55$, $p = .74$. In a MANOVA for the objective measurements (progress rate and error rate), no significant main effect for phase was found, $F(2, 25) = 1.20$, $p = .89$. Also, no significant effect for gender, $F(2, 25) = 4.38$, $p = .65$, nor interaction between gender and phase $F(2, 25) = 6.29$, $p = .54$,

Table 2

Correlations Among Dependent Variables in the Non-smoking Phase for the Entire Sample (N = 28)

	BDI	Enjoyment	Motivation	Performance	Energy	Tiredness/ Fatigue	Progress	Error Rate
BDI		-.18	-.09	-.33	-.22	.04	-.02	.11
Enjoyment			.69***	.49**	.65***	-.39*	.34	-.01
Motivation				.42*	.76***	-.56**	.23	-.12
Performance					.51**	-.40*	.71***	.13
Energy						-.68***	.37	.02
Tiredness/ Fatigue							-.26	-.03
Progress								.39*
Error rate								

< .05 (2-tailed)

<.01 (2-tailed)

p < .001 (2-tailed)

were found. In an ANOVA that was performed for level of depressive symptomology, no significant main effect for phase was found, $F(1, 26) = .31$, $p = .58$. Also, there was no significant main effect for gender, $F(1, 26) = 1.46$, $p = .24$. However, there was a significant interaction between phase and gender, $F(1, 26) = 5.78$, $p < .05$. Thus, the additional analyses did not find new significant effects, except for the interaction between gender and phase on the BDI scores. Post-hoc analysis, using Tukey's Honestly Significant Difference procedure, revealed significant differences between men's BDI mean score in the non-smoking phase, 10.45 ($SD = 6.99$), and women's mean score in the non-smoking phase, 6.41 ($SD = 3.95$). Therefore, men demonstrated significantly higher level of depressive symptomology compared to women, in the non-smoking phase.

CHAPTER 4

DISCUSSION

This study examined several mood-related characteristics and especially loss of interest following nicotine withdrawal in men vs. women. Two main premises were examined to ensure that the study reached its purpose. Firstly, CO exam and FTND questionnaire were employed in order to examine if the current sample actually consisted of dependent smokers. Both measurements indicated that participants were fairly addicted. Secondly, it was important to see that participants actually found the tasks enjoyable and felt motivated to engage in them. Entry level of enjoyment and motivation rating ensured that, on the average, participants felt motivated to engage in the activities and found them enjoyable.

Out of 35 participants who completed the first phase, 7 dropped out (20 % of attrition). No differences were found in smoking characteristics, age, or entry level of enjoyment and interest to engage in the task between those who completed the study and those who dropped out after the first session. This suggests that dropping out was not related to levels of dependency, age, or interest in the activities, and generalization of the findings in this study should not be limited because of these factors. Interestingly, the group that dropped out also demonstrated significantly lower level of depressive symptomology, compared to the group that completed the study. As will be discussed later, the depressive level of the sample in this study was somewhat atypical (relatively high), and it might be that the results of this study should be applied to non-clinical populations, who demonstrate relatively high level of depressive symptomology.

Hypothesis 1 predicted that participants instructed to quit smoking would show more withdrawal symptoms and lower level of CO in the lungs. Assessing this hypothesis served mainly as a manipulation check, in order to insure that participants actually quit smoking. This hypothesis was confirmed, suggesting that participants did quit smoking, and experienced withdrawal symptoms in the non-smoking phase. However, it is important to note that complete abstinence was not assessed directly by either of the two measurements employed in this study. The CO-monitor cut-off employed in this study could differentiate between heavy smokers and light smokers, or between regular smokers and regular smokers who have not smoked within the past several hours. Thus, it could not reliably differentiate between those who quit smoking completely for 48 hours and those who smoked few cigarettes. Also, the CO monitor does not measure nicotine level, but rather the level of CO, which is a chemical substance produced from the burning of cigarette when smoking. Thus, if some participants used smokeless tobacco or nicotine gum, the CO monitor could not detect it. However, it is important to note that nicotine has short half-life, and absorption of nicotine by other methods takes much longer than through the lungs (USDHHS, 1988). Therefore, it is reasonable to say that, even if some participants unknowingly used smokeless tobacco or nicotine replacement products, this would likely not totally eliminate withdrawal symptoms.

Although the main effect for phase on CO level and on number and severity of withdrawal symptoms was significant, there was no main effect for gender, and no significant effect for the interaction between phase and gender on these dependent variables. This is in line with Pomerleau, Tate, Lumley, and Pomerleau (1994) notion that measurements, which assess withdrawal symptoms during abstaining period, reveal no

differences between genders. In contrast to some other studies, which used retrospective measurements of withdrawal, the self-report measurement used in this study (WSC) asked about the withdrawal symptoms at the time of filling out the questionnaire.

It is important to note that in the smoking phase men showed some signs of being more addicted than women. They had significantly higher scores on the FTND, and they significantly smoked more cigarettes per day compared to women. This is relatively consistent with previous studies, which found men to be more addicted than women (e.g., Wetter et al., 1999). Thus, in this study, men did not show more withdrawal symptoms in spite of being more addicted. As Gilbert (1995) mentioned, the lack of differences in withdrawal symptoms between the genders, in the face of men being heavier smokers could indicate that women might have more withdrawal symptoms if controlling for nicotine intake. However, it is also important to note that the interaction effect between gender and phase on number and severity of withdrawal symptoms almost reached significant levels: $F(1, 26) = 3.96$, $p = .06$; $F(1, 26) = 3.93$, $p = .06$, respectively. From looking at the groups' means (see Table 1), it is evident that both men and women endorsed more withdrawal symptoms with greater severity in the non-smoking phase, compared to the smoking phase. However, men demonstrated greater increase in number and severity of withdrawal symptoms compared to women. The lack of statistical significance might be partly due to low statistical power. The power for the interaction effect in the MANOVA assessing withdrawal symptoms was .38. This low power is partly caused by the low sample size, especially of the group of men ($n = 11$). Thus, it might be that with sufficient number of men and adequate statistical power, the

interaction term could have been significant, with men demonstrating more withdrawal symptoms compared to women.

It was hypothesized that participants would demonstrate higher level of depressive symptomology in the non-smoking phase, compared to the smoking phase (Hypothesis 2); however, this did not occur. In fact, the level of depressive symptomology was quite stable in the smoking and non-smoking phases. This finding is in contrast with previous research, which found increase in level of reported depressive symptomology after short-term abstinence (Absi, Amunrud, & Wittmers, 2002; Leftwich, 1999; Parrott & Garnham, 1998).

There are several possible explanations for the lack of increase in depressive symptomology. First, the BDI instructions asked participants about symptoms they had been experiencing in the last week, including the day of filling out the questionnaire. However, the abstinence period in this study took place only in the previous 2 days. Therefore, the BDI scores in the current study might underestimate the impact of abstinence period on the level of depressive symptomology.

Also, the lack of overall effect for depressive symptomology might be due to relatively high entry level of depressive symptomology demonstrated in the sample of this study. In the smoking phase, the average score on the BDI was 8. This is a relatively high entry level, and close to the cut-off for dysphoric mood, which is 10 according to some authors (e.g., Kendall, Hollon, Beck, Hammen, & Ingram, 1987). For comparison, Leftwich (1999) who used similar population, and assessed depressive symptomology with the BDI, reported an entry level of 5.52. The high entry-level score in this study might create a ceiling effect in which participants, taken from non-clinical population, did

not have enough room to increase their scores, within the non-clinical range. Also, the baseline in this study is more comparable to a mean level found in Burgess, et al. (2002), in which participants with probable history of major depression had an average score of 7.9 on the BDI. In their study, using cluster analysis, they found several clusters; each cluster consisted of participants with different pattern of changes in level of depressive symptomology over the course of time following abstinence. Most clusters did not demonstrate increase in depressive symptoms after short-term abstinence (within the first week). Similar results were found in Niaura et al. study (1999), in which a group of participants with probable history of depression did not demonstrate increase in level of depressive symptomology within the first 21 days. In their study, the group with probable history of depression demonstrated delayed increase of depressive symptoms (started only 28 days after quitting), while the group without probable history of depression demonstrated rapid increase in depressive symptomology (within the first week). Although participants in the current study were asked if they had any medical or psychological condition that might prevent them from participating in the study, a thorough psychological assessment/screening did not take place. However, the high average score in the smoking phase might raise the question whether relatively large number of participants with depressive history participated in the current study. If this was the case, it might have contributed to the lack of increase in level of depressive symptomology after short-term abstinence.

Although no main effect for phase was found, exploratory analysis revealed an interactive pattern between gender and phase on depressive symptoms. While the baseline level of depressive symptoms was quite equivalent for both genders, in the non-

smoking phase men showed significantly higher level of depressive symptomology compared to women. The reason for this finding is unknown. Previous research did not indicate consistent gender-based differences in mood after smoking cessation (Gilbet, 1995). Beyond that, the differences in this study are probably not due to the fact that men showed some indication of being more addicted. Although there was a significant correlation between number of cigarettes smoked per day and depressive symptomology for men, no such correlation was found between other smoking characteristics (i.e., level of FTND, number of years of smoking, and CO level) and depressive symptomology.

The hypothesis that participants demonstrating withdrawal symptoms will report less interest in the activity (Hypothesis 3a) was confirmed. In this study loss of interest was mainly measured by two self-report items, which assessed level of motivation and level of enjoyment in engaging in the activity. Although participants showed, on the average, high motivation to engage in the activity and found it enjoyable in the smoking phase, their rating significantly decreased in the non-smoking phase. This finding is in line with previous research, which found decline in enjoyment and pleasure after short-term abstinence (Absi, Amunrud, & Wittmers, 2002; Leftwich, 1999; Parrott, & Garnham, 1998). It is also in line with a study which found loss of enjoyment as well as loss of motivation during withdrawal phase in rats (Liem & Markou, 2001). This expanding evidence of loss of interest during nicotine withdrawal period is in support with Klinger's (1993) assertion that loss of interest in activities, which used to be rewarding to the individual, follows after loss of an object, which was important to the individual. Although loss of interest in people, loss of appetite, or loss of interest in sex, were typically taken as indications for loss of interest (Klinger, 1993), the current study

demonstrated loss of interest in leisure activities. Yet, it is important to note that Klinger's theory talks about real loss, while in this study participants could well go back to smoke again after 48 hours of abstinence. Also, in his theory, "incentive-disengagement," the loss causes loss of interest in other previously rewarding activities as part of movement toward depression. However, as mentioned, in this study there was no indication of overall greater depressive level after abstaining smoking. It might be that the group of men, which revealed some indication of being more depressed after 48 hours, contributed more to the self-reported loss of interest.

It was predicted that participants would report poorer performance in the non-smoking phase compared to the smoking phase (Hypothesis 3a). This hypothesis was confirmed and in line with research in which participants reported more cognitive failures after abstaining smoking (Parrott & Kaye, 1999). However, although self-report performance declined, there were no significant changes in objective measurements that assessed performance. Participants did not progress in lower rate, and did not demonstrate higher error rate in the non-smoking phase, compared to the smoking phase. This is in contrast with the majority of research, which demonstrated decline in objective measurements of performance after abstaining (e.g., Parrot & Craig, 1992; Wesnes & Parrott, 1992). However, most research that assessed objective measurements of performance did not use leisure activities, but rather more pure cognitive tasks, like arithmetic computation, or word cancellation. The tasks in the current study were similar to the ones employed by Leftwich (1999), who also used leisure activities, and did not find decrease in objective measurements; yet, like in this study, found decrease in self reported measurement of efficacy. It might be that in relatively interesting activities,

objective levels of performance stay the same in the smoking period and during withdrawal period, while subjective levels of performance decrease. Alternatively, it might be that lack of differences in objective measurements in this study was due to the short time interval (8 minutes), in which participants were assessed for their performance. It might be that with longer time interval, significant differences in error rate and/or progress rate, between smoking phase and non-smoking phase, would have been revealed. It is also important to note that in this research objective measurements of performance were taken as some indication of interest. However, the correlation matrix did not reveal direct association between enjoyment and/or motivation (or other subjective measurement), and any of the objective measurements in the non-smoking phase.

Hypotheses 4a, 4b, and 5 predicted interaction between gender and phase for subjective measurements of interest, objective performance, and tiredness/fatigue and energy. It was predicted that men would show greater changes in these variables relative to women. However, none of the MANOVAs analyzing these hypotheses were significant. It was hypothesized that men's level of interest, as assessed by subjective level of enjoyment and motivation will decline to a greater degree compared to women (Hypothesis 4a). The rationale for this prediction was based on the assumption that if smoking serves more as a stimulant for men (Delfino, Jamner, & Whalen, 2000; Gilbert, 1995), then they will experience greater decline in level of interest while in withdrawal period. As a consequence, it was hypothesized, their level of performance will decline to a greater extent, compared to women (Hypothesis 4b). Based on the same rational, it was also hypothesized that men will show greater increase in levels of tiredness, and greater

decrease in level of energy, compared to women (Hypothesis 5). This last hypothesis was also based on Jamner, and Whalen (2000) study, which found men, but not women, to have an urge to smoke when tired.

However, in the current study these hypotheses were not confirmed. This is in spite the fact that men demonstrated significantly higher level of depressive symptomology in the non-smoking phase. One explanation for the lack of significant interactions stem from the low number of participants in the men's group (n = 11). Low sample sizes lower the statistical power, and the ability to find an effect, if it does exist. Moreover, if gender-based differences do exist, they might be subtle. As Gilbert (1995) mentioned, the size of differences in studies which found men to report smoking more for stimulation compared to women was small to moderate. In the current study the ability to detect these differences was low, as could be indicated by the observed power for the interaction terms. For example, in the MANOVA that used eight dependent variables, the observed power for the interaction term was .22, and for the MANOVA that used subjective measurements alone it was .17. It could be that with larger sub-sample of men significant differences could have been detected. However, it also might be that gender-based differences which were found in previous research were at least partly affected by memory bias (in retrospective studies), and /or by gender bias (e.g., men might reported smoking for stimulation rather than for regulation of mood since it is more accepted culturally).

Strengths, Limitations, and Suggestions for Future Research

Several strengths could be found in the current study. First, this study used repeated measurement design for finding main effects. This was a powerful design

because of its ability to eliminate variability caused by individual differences, and thus to increase power. Beyond that, this research used several self-report measurements that assessed feelings and experiences that occurred during the time of assessment. This might eliminate memory biases that might be found in retrospective measurements. Also, the inclusion of real life activities instead of artificial activities increased the ecological validity of this study. In addition, it is important to note that in the current study participants had a choice to engage in one of two relatively different leisure activities. This increased the probability that each participant would engage in a task that he or she found interesting. Moreover, after 8 minutes of engaging in the activity, the participant again had a choice to continue with the task or switch to another task. Although measurements in this research were based on the first 8 minutes, it was important to give choices, since this is more comparable to real life situation in which people have choices.

Several limitations are applicable to this research. In this study the group of men who completed the study was small (11 participants). This is probably partly because the accessible population for this research consisted of relatively low number of men. In addition, 3 men dropped out prematurely, a fact that reflects the difficulty to abstain smoking for 48 hours. Small sub-samples decrease statistical power, especially when interaction terms are assessed. Future research should strive to include larger sample sizes of each group. This could be done by recruiting participants from larger accessible population, and/or by using greater incentives in order to prevent attrition.

Another factor important to this study and other similar studies is related to assessment of depressive symptoms. As mentioned, using the BDI might have limited the ability to detect depressive changes in this study, due to incongruity between time

interval of abstaining (2 days) and time interval assessed by the BDI (7 days). Future study should strive to equate the time interval of abstaining with the time interval assessed for depressive symptoms. Also, it might be important for future studies to assess and take into account participants' history of depressive disorder, since it might affect the degree of change in level of depressive symptomology after short-term abstinence.

Another issue is related to the fact that participants could smoke after the non-smoking phase. As mentioned, this might limit the value of the loss associated with not smoking, and might contribute to lack of changes in depressive symptomology in this study. Future research might try to assess participants in the non-smoking phase and then after additional time while maintaining abstinence, as part of a cessation program.

Another factor is related to the type of tasks and their version used in this study. Giving participants a choice between two rather different types of leisure activities (Lego, vs. Word search) was important in order to heighten the probability that the activity will be an interesting one for the specific individual, and in order to give a similar to real life situation. However, it might also serve as a confounding factor, especially in the between groups comparisons, in which the proportion of men who chose the Lego was greater than the proportion of women (4/11 and 3/17, respectively). Assessment of the impact of type of task, or interaction of type of task and phase, did not reveal any significant differences on subjective task-related measurements. Yet, the fact that only 7 participants chose Lego probably limited the ability to detect differences due to low statistical power. Analyses of interaction between type of task and gender were not performed due to very small cell sizes. In addition, in the non-smoking phase participants played for the first 8 minutes with different version of the same type of task they played with in the smoking

phase. Different versions were used, in order to eliminate carry-over effect, in which, for example, participants might do better in the non-smoking phase because of familiarity of the specific version of the task; or do poorly, for example, because of boredom caused by repetition of the same task. Although quite comparable in number dimensions (number of pieces, similar level of difficulty), the versions were not completely identical, as can be implied by the fact that they are not standard measurement, but real leisure activities. This fact might affect the results of the current study in ways unpredicted by the investigator. A pilot study, which would assess the comparability between types of tasks, as well as comparability among versions of each type of task, might be advisable in future studies.

Finally, this study found indication for loss of interest in leisure activities during withdrawal period. Future research might assess the importance of this factor in relapse, whether in smoking cessation programs or among self-quitters. Also, future research might examine, with adequate number of participants for each gender, if degree of loss of interest is confined by gender; and if so how it affects relapse. As could be understood from Wetter et al. (1999), it is hard to find a mediator that might give and explanation regarding why women are less successful remaining abstinent compared to men.

REFERENCES

Absi, M., Amunrud, T., & Wittmers, L. E. (2002). Psychophysiological effects of nicotine abstinence and behavioral challenges in habitual smokers. *Pharmacology, Biochemistry and Behavior, 72*, 707-716.

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders-Text Revision* (4th ed.). Washington, DC: Author.

Bartal, M. (2001). Health effects of tobacco use and exposure. *Monaldi Archives for Chest Disease, 56,* 545-554.

Beck, A. T. (1967). *Depression: Clinical, experimental, and theoretical aspects.* New York: Harper & Row.

Beck, A. T., Rush, A. J., Shaw, B. E., & Emery, G. (1979). *Cognitive therapy of depression.* New York: The Guilford Press.

Burgess, E. S., Brown, R. A., Kahler, C. W., Niaura, R., Abrams, D. B., Goldstein, M. G., et al. (2002). Patterns of change in depressive symptoms during smoking cessation: Who's at risk for relapse? *Journal of Consulting and Clinical Psychology, 70*, 356-361.

Center for Disease Control and Prevention. (2002). Cigarette smoking among adults – United States, 2000[Electronic version]. *Morbidity and Mortality Weekly Report (MMWR), 51*, 542-645.

Covey, L. S., Glassman, A. H., & Stetner, F. (1990). Depression and depressive symptoms in smoking cessation. *Comprehensive Psychiatry, 31,* 350-354.

Delfino, R. J., Jamner, L. D., & Whalen, C. K. (2001). Temporal analysis of the relationship of smoking behavior and urges to mood states in men versus women. *Nicotine & Tobacco Research, 3,* 235-248.

Gilbert, D. G. (1995). Gender differences in tobacco use and effects. *Smoking: Individual differences, psychopathology, and emotion* (pp. 177-191). Washington, DC: Taylor & Francis.

Gilbert, P. (1992). *Depression: The evolution of powerless.* New York: The Guilford Press.

Ginsberg, D., Hall, S. M., Reus, V. I., & Munoz, R. F. (1995). Mood and depression diagnosis in smoking cessation. *Experimental and Clinical Psychopharmacology, 3,* 389-395.

Glassman, A. H., Stetner, F., Walsh, B. T, Raizman, P. S., Fleiss, J. L., Cooper, T. B., & Covey, L. S. (1988). Heavy smokers, smoking cessation, and clonidine. *Journal of the American Medical Association, 259,* 2836-2866.

Hall, S. M., Munoz, R. F., & Reus, V. I. (1994). Cognitive-behavioral intervention increases abstinence rates for depressive-history smokers. *Journal of Consulting and Clinical Psychology, 62,* 141-146.

Harrison, A. A., Liem, Y. T. B., & Markou, A. (2001) Fluoxetine combined with Sretonin–1A receptor antagonist reversed reward deficits observed during nicotine and amphetamine withdrawal in rats. *Neuropsychopharmacology, 25,* 55-71.

Heatherton, T. F., Kozlowski, L. T., Frecker, R. C., & Fagerström, K. O. (1991). The Fagerström Test for Nicotine Dependence: A revision of the Fagerström

Tolerance Questionnaire. *British Journal of Addiction, 86,* 1119 – 1127.

Hughes, J. R. (1999). Four beliefs that may impede progress in the treatment of smoking. *Tobacco Control, 8,* 323-332.

Hughes, J. R., & Hatsukami, D. K. (1986). Signs and symptoms of tobacco withdrawal. *Archives of General Psychiatry, 43,* 289-294.

Katz, R., Shaw, B. F., Vallis, T. M., & Kaiser, A. S. (1995). The assessment of severity and symptom patterns in depression. In E. E. Beckham & W. R. Leber (Eds.), *Handbook of depression* (2nd ed., pp. 61-85). New York: The Guilford Press.

Kendall, P. C., Hollon, S. D., Beck, A. T., Hammen, C. L., & Ingram, R. E. (1987). Issues and recommendations regarding use of the Beck Depression Inventory. *Cognitive Therapy and Research, 11,* 298-299.

Kessler, R. C. (1994). The national comorbidity survey of the United States. *International Review of Psychiatry, 6,* 365-376.

Kinnunen, T., Doherty, K., Militello, F. S., & Garvey, A. J. (1996). Depression and smoking cessation: Characteristics of depressed smokers and effects of nicotine dependence. *Journal of Consulting and Clinical Psychology, 64,* 791-798.

Kivela, S. L. (1999). Depression in the aged. *Psychiatria Fennica, 30,* 132-144.

Klinger, E. (1975). Consequences of commitment to and disengagement from incentives. *Psychological Review, 82,* 1-25

Klinger, E. (1993). Loss of interest. In C. G. Costello (Ed.), *Symptoms of depression* (pp. 43-62). New York: John Wiley and Sons.

Kramer, J. J., & Conoley, J. C. (Eds.). (1992). *The eleventh mental measurement yearbook.* Lincoln, NE: University of Nebraska Press.

Leftwich, M. J. T. (1999). Depressive mood changes during nicotine withdrawal: Their effects on leisure activities from a behavioral economics perspective. Unpublished doctoral dissertation, Oklahoma State University, Oklahoma.

Lopez, A. D. (1999). Measuring the health hazards of tobacco. *Bulletin of the World Health Organization, 77,* 82-83.

Mrkou, A., Kosten, T. R., & Koob, G. F. (1998). Neurobiological similarities in depression and drug dependence: A self-medication hypothesis. *Neuropsychopharmacology, 18,* 135-174.

Nair, J., Nair, S. S., Kashani, J. H., Reid, J. C., Mistry, S. I., & Vargas, V. G. (1999). Analysis of the symptoms of depression – a neural network approach. *Psychiatry Research, 87,* 193-201.

Niaura, R., Britt, D. .M., Borrelli, B., Shadel, W. G., Abrams, D. B., & Goldstein, M. G. (1999). History and symptoms of depression among smokers during self initiated quit attempt. *Nicotine & Tobacco Research, 1,* 251-257.

Ockene, J. K. (1993). Smoking among women across the life span: Prevalence, interventions, and implications for cessation research. *Annals of Behavioral Medicine, 15,* 135-148.

Osler, M., Prescott E., Godtfredsen, N., Hein, H. O., & Schnohr, P. (1999). Gender and determinants of smoking cessation: A longitudinal study. *Preview Medical, 29,* 57-62.

Parrott, A. C., & Craig, D. (1992). Cigarette smoking and nicotine gum (0 mg, 2mg, 4mg): Effects upon visual attention tasks. *Neuropsychobiology, 25*, 34-43.

Parrott, A. C., & Garnham, N. J. (1998) Comparative mood states and cognitive skills of smokers, deprived smokers and nonsmokers. *Human Psychopharmacology, 13,* 367-376.

Parrott, A. C., & Kaye, F. G. (1999). Daily uplifts, hassles, stresses and cognitive failures: in cigarette smokers, abstaining smokers, and non-smokers. *Behavioral Pharmacology, 10,* 639-646.

Patton, G. C., Coffey, C., Posterino, M., Carlin, J. B., & Wolfe, R. (2000). Adolescent depressive disorder: A population-based study of ICD-10 symptoms. *Australian and New Zealand Journal of Psychiatry, 34,* 741-747.

Payne, T. J., Smith, P. O., McCracken, L. M., McSherry, W. C., & Antony, M. M. (1994). Assessing nicotine dependence: A comparison of the Fagerström Tolerance Questionnaire (FTQ) with the Fagerström Test for Nicotine Dependence (FTND) in a clinical sample. *Addictive behaviors, 19*, 307-317.

Perkins, K. A. (1996). Sex differences in nicotine versus nonnicotine reinforcement as determinants of tobacco smoking. *Experimental and Clinical Psychopharmacology, 4,* 166-177.

Perkins, K. A. (1999). Nicotine discrimination in men and women. *Pharmacology, Biochemistry, and Behavior, 64,* 295 –299.

Pomerleau, C. S., Brouwer, R. J. N., & Pomerleau, O. F. (2001). Emergence of depression during early abstinence in depresses and non-depressed women smokers. *Journal of Addictive Diseases, 20*, 73-80.

Pomerleau, C. S., Carton, S. M., Lutzke, M. L., Flessland, K. A., and Pomerleau, O. F. (1994). Reliability of the Fagerström tolerance questionnaire and Fagerström test for nicotine dependence. *Addictive Behaviors, 19,* 33-39.

Pomerleau, C. S., Pomerleau, O. F., & Garcia, A. W. (1991). Biobehavioral research on nicotine use in women. *Behavior Journal of Addiction, 86,* 527-531.

Pomerleau, C. S., Tate, J. C., Lumley, M. A., & Pomerleau, O. F. (1994). Gender differences in prospectively versus retrospectively assessed smoking withdrawal symptoms. *Journal of Substance Abuse, 6,* 433-440.

Roy, K., Parker, G., Mitchell, P., & Wilhelm, K. (2000). Depression and smoking: examining correlates in a subset of depressed patients. *Australia and New Zealand Journal of Psychiatry, 35,* 329-335.

Sacco, W. P., & Beck, A. T. (1995). Cognitive theory and therapy. In E. E. Beckham, & W. R. Leber (Eds.), *Handbook of depression* (2nd ed., pp. 329-351). New York: The Guilford Press.

Steer, R. A., Ball, R., Ranieri, W. F., & Beck, A. T. (1999). Dimensions of the Beck Depression Inventory-II in clinically depressed outpatients. *Journal of Clinical Psychology, 55,* 117-128.

Thase, M. E., & Howland, R. H. (1995). Biological processes in depression: An updated review and integration. In E. E. Beckham & W. R. Leber (Eds.), *Handbook of depression* (2nd ed., pp. 213-279). New York: The Guilford Press.

U. S. Department of Health and Human Services. (1988). *The health consequences of smoking: Nicotine addiction: A report of the Surgeon General.* (DHHS

Publication No. CDC 88-8406). Washington, DC: U.S. Government Printing Office.

Ward, K. D., Klesges, R. C., Zbikowski, S. M., Bliss R. E., & Garvey, A. J. (1997). Gender differences in the outcome of an unaided smoking cessation attempt. *Addictive Behavior, 22*, 521-533.

Watkins, S. S., Koob, G. F., & Markou, A. (2000). Neural mechanisms underlying nicotine addiction: Acute positive reinforcement and withdrawal. *Nicotine & Tobacco Research, 2,* 19-37.

Wender, P., Kety, H., Rosenthal, D., Schulsinger, F., Orthmann, J., & Lunde, I. (1986). Psychiatric disturbance in the biological and adoptive families of adopted individuals with affective disorder. *Archives of General Psychiatry, 43,* 923-929.

Wesnes, K., & Parrott, A. C. (1992). Smoking, nicotine and human performance. In Smith, A., & Jones, D. (Eds.), *Factors affecting human performance*, (Volume II, pp. 127-167). Academic Press, London.

Wetter, D. W., Kenford, S. L., Smith, S. S., Fiore, M. C., Jorenby, D. E., & Baker, T. B. (1999). Gender differences in smoking cessation. *Journal of Consulting and Clinical Psychology, 67,* 555-562.

Whisman, M. A., Perez, J. E., & Ramel, W. (2000). Factor Structure of the Beck Depression Inventory-second edition (BDI-II) in a student sample. *Journal of Clinical Psychology, 56,* 545-551.

APPENDIX A

Screening Questionnaire

Smoking Form

QUESTIONNAIRE

Please fill out the questions below

Gender: M / F Age: _____ Tel: ( )_____

Best Times to Call

_____

1. What type of tobacco products do you currently use? (Circle one).

   Cigarettes **Cigars** **Pipe** **Smokeless Tobacco User**

2. Approximately, how many Cigarettes per day do you smoke?

_____

3. For how long have you been smoking? Years____ Months_____
4. Have you ever tried to quit before? Yes / No

   If yes, when was the last time you tried?

_____

5. Have you substituted one form of tobacco use for another? Yes / No
6. Are you currently trying to quit or cut down? Yes / No

After completing this form please leave it in the box on the counter in Psychology Department OfficeRoom 327 Visser Hall

APPENDIX B

Instructions for Phone Call

Instructions for the phone call

ello, this is researcher/assistant _____ with the Smoking Project from the Psychology ment at Emporia State University. Today we are contacting those individuals who completed the ng form for this project. May I speak to the individual who filled out that form?

his research, there will be two meetings, spread over a two-week period. Each meeting will be ximately 1 hour. In the first meeting, the participant will fill out questionnaires and engage in activities. The second meeting will be one week later at the same time and on the same day of ek. The participant will again fill out the questionnaires and engage in the leisure activities. The pant will need to quit smoking for a period of 48 hours prior to the second meeting. As nsation, a participant who completes this study will earn four research points. As an added ve for completing this research, there will be three cash drawing in the amounts of $40, $25, $10

rst, may I ask do you feel that you could stop smoking for 48 hours? Yes or No

yes, would you like to participate in this research? Yes or No

no, thank them for their time and end conversation.

ust want to make sure that I have your information correct?

ou are _____ years of age correct? Yes or No

ou smoke at least _____ times per day is this correct? Yes or No.

ou are not currently trying to quit or cut down at this time, is this correct? Yes/ No

no, how are you trying to quit or cut wn._____

understand you do not have any medical or psychological condition that might prevent you from rticipating in this research is this correct? Yes or No

ould you be able to meet on the following dates and time? (Remind them to write it down) ay_____ Time_____ Date_____/_____ Room no._____

a last bit of information, five minutes after you arrive to the first meeting I will ask you to go tside and smoke one cigarette. So, please bring your own cigarettes and lighter to that meeting.

esearcher/Researcher Assistant:

_____

te of call: _____ Participant Phone # _____ Participant #_____
minder # 1 date/time _____ Contacted yes – no – message - machine

minder # 2 date/time _____Contacted yes – no – message - machine

APPENDIX C

Informed Consent Form

Consent Form

Smoking withdrawal, Emotional, and Leisure Activities

Mr. Shai Levinger

Participants should note that neither Emporia State University nor its researchers endorse or encourage continuation of smoking; rather, the purpose of this study is to research certain effects upon those who are currently smoking.

The Department of Psychology and Special Education at Emporia State University supports the practice of protection for human subjects participating in research and related activities. The following information is provided so that you can decide whether you wish to participate in the present study. You should be aware that even if you agree to participate, you are free to withdraw at any time, and that if you do withdraw from the study, you will not be subject to reprimand or any other form of reproach.

You are being asked to participate in a research study, which will look at smoking and leisure activities. However, this is not a project on quitting smoking.

This study includes two sessions spread over two weeks. Today (first session) you will be asked to choose from two leisure activities and perform on one of them. Next week (second session), you will be asked to perform the preferred activity after abstaining from smoking for 48 consecutive hours. In both sessions, after several minutes of engaging in the activity, you will have an opportunity to switch tasks or sit and relax. In both sessions you will also fill out a questionnaire after engaging in the activity.

Before performing the activity, I will take a measure of the carbon monoxide (CO) in your breath, which is an indication of smoking exposure. Also, you will be asked to rate how much you want a cigarette and fill out a brief survey on your current mood. Ratings and surveys will use simple ratings scales; you will circle the number that best represents your opinion.

This research project requires that you attend 2 sessions in order to complete all phases of the study. The first session will last approximately 1 hour. At this time all aspects of the study will be explained to you (including this consent form). If you agree to participate, you will be asked to come to the lab for another session, which will also take approximately 1 hour.

There may or may not be some physical and/or emotional discomfort associated with not smoking 48 hours straight. If you become too uncomfortable during the 48 hours of not smoking, you will not be penalized in any way if you withdraw early from the study. Also, if you feel you need some professional help you are encouraged to refer to

the "The Counselor Education Clinic," an on-campus clinic available to students, in telephone no: 341-5789.

For participating in this research you will be compensated by having research credit hours. You will earn 1 research point for each session or part of it you will participate. For completing both sessions, you will earn a total of 4 research points. Also, upon completion of the 2 sessions you will have an opportunity to win one of the 3 lottery prizes. The amounts of the prizes are $40, $25, and $10, in cash.

All information obtained during the study will remain confidential. Records will be coded by number, and your name will not appear on any forms other than this consent form. The only individuals who will have access to this data are Mr. Shai Levinger and the research assistants conducting the project with you. The nature of this study and the information provided by your participation will not be revealed.

"The purpose of the procedure is to investigate the withdrawal of nicotine and the impact of certain variables on aspects of withdrawal."

"I have read the above statement and have been fully advised of the procedures to be used in this project. I have been given sufficient opportunity to ask any questions I had concerning the procedures and possible risks involved. I understand the potential risks involved and I assume them voluntarily. I likewise understand that I can withdraw from the study at any time without being subjected to reproach"

"I may contact Dr. Michael Leftwich at (620) 342-5317 should I wish further information about the research.
"I certify that I am 18 years of age or older and that I have read and fully understand the consent form. I sign it freely and voluntarily. A copy has been given to me."

"Date: _____ Time:_____ (a.m./p.m.)"

"Signed _____
(Signature of the subject)

"I certify that I have personally explained all elements of this form to the subject before requesting the subject to sign it."

"Signed _____"

(Project director or his/her authorized representative)

APPENDIX D

Beck Depression Inventory

BECK INVENTORY

Subject number _____ Date_____

On this questionnaire are groups of statements. Please read each group of statements carefully. Then pick out the one statement in each group which best describes the way you have been feeling the PAST WEEK, INCLUDING TODAY. Circle the number beside the statement you picked. If several statements in the group seem to apply equally well, circle each one. Be sure to read all the statements in each group before making your choice.

1. 0 I do not feel sad
   1 I feel sad
   2 I am sad all the time and can't snap out of it
   3 I am so sad or unhappy that I can't stand it

2. 0 I am not particularly discouraged about the future
   1 I feel discouraged about the future
   2 I feel I have nothing to look forward to
   3 I feel that the future is hopeless and that things cannot improve

3. 0 I do not feel like a failure
   1 I feel I have failed more than the average person
   2 As I look back on my life, all I can see is a lot of failures
   3 I feel I am a complete failure as a person

4. 0 I get as much satisfaction out of things as I used to
   1 I don't enjoy things the way I used to
   2 I don't get real satisfaction out of anything anymore
   3 I am really dissatisfied or bored with everything at the moment

5. 0 I don't feel particularly guilty
   1 I feel guilty a good part of the time
   2 I feel quite guilty most of the time
   3 I feel guilty all of the time

6. 0 I don't feel I am being punished
   1 I feel I may be punished
   2 I expect to be punished
   3 I feel I am being punished

7. 0 I don't feel disappointed in myself
   1 I am disappointed of myself
   2 I am disgusted with myself
   3 I hate myself

8. 0 I don't feel I am worse than anybody else
   1 I am critical of myself for my weaknesses or mistakes
   2 I blame myself for all my faults
   3 I blame myself for anything bad that happens

9. 0 I don't have any thoughts of killing myself
   1 I have thoughts about killing myself, but I would not carry them out
   2 I would like to kill myself
   3 I would kill myself if I had the chance

10. 0 I don't cry any more than usual
    1 I cry more than I used to
    2 I cry all the time now
    3 I used to be able to cry, but now I can't cry even though I want to

11. 0 I am no more irritated now than I ever am
    1 I get annoyed or irritated more easily than I used to
    2 I feel irritated all the time now
    3 I don't get irritated at all by things that used to irritate me

12. 0 I have not lost interest in other people
    1 I am less interested in other people than I used to be
    2 I have lost most of my interest in other people
    3 I have lost all of my interest in other people

13. 0 I make decisions about as well as I ever could
    1 I put off making decisions more than I used to
    2 I have greater difficulty in making decisions than before
    3 I can't make decisions at all anymore

14. 0 I don't feel I look any worse than I used to
    1 I am worried that I look old and unattractive
    2 I feel that there are permanent changes in my appearance that make me look unattractive
    3 I believe that I look ugly

15. 0 I can work about as well as before
    1 It takes extra effort to get started at doing something
    2 I have to push myself very hard to do anything
    3 I can't do any work at all

16. 0 I can sleep as well as usual
    1 I don't sleep as well as I used to
    2 I wake 1-2 hours earlier than usual and find it hard to get back to sleep

3 I wake up several hours earlier than I used to and cannot get back to sleep

17. 0 I don't get more tired than usual
1 I get tired more easily than I used to
2 I get tired from doing almost anything
3 I am too tired to do anything

18. 0 My appetite is no worse than usual
1 My appetite is not as good as it used to be
2 My appetite is much worse now
3 I have no appetite at all now

19. 0 I haven't lost much weight, if any, lately
1 I have lost more than 5 pounds
2 I have lost more than 10 pounds
3 I have lost more than 15 pounds
I am purposely trying to lose weight by eating less
Yes_____ No_____

20. 0 I am no more worried about my health than usual
1 I am worried about my physical problems such as aches and pains; or upset stomach; or constipation
2 I am very worried about physical problems and it's hard to think of much else
3 I am so worried about my physical problems, that I cannot think about anything else

21. 0 I have not noticed any recent changes in my interest in sex
1 I am less interested in sex than I used to be
2 I am much less interested in sex now
3 I have lost interest n sex completely

APPENDIX E

Fagerström Test for Nicotine Dependence (FTND)

Fagerström Test for Nicotine Dependence (FTND)

Participant Number: _____ Date: _____Gender _____

1. How soon after you wake up do you smoke your first cigarette (in minutes)?_____
2. Do you find it difficult to refrain from smoking in places where it is forbidden (e.g., in church, at the library, at the movies, etc.)?_____
3. Which cigarette would you hate most to give up?_____
4. How many cigarettes per day do you smoke?_____
5. Do you smoke more frequently during the first hours after waking than during the rest of the day?_____
6. Do you still smoke if you are so ill that you are in bed most of the day?_____

** Adapted from Heatherton, Kozolowski, Frecker, and Fagerström (1991). Written permission to use this scale is not required if it is used for research purposes, according to the authors.

APPENDIX F

Withdrawal Symptoms Checklist (WSC)

Withdrawal symptoms checklist (WSC)

Participant Number: _____ Gender: _____ Date:

_____

Smoking phase: **Smoking** **Non- Smoking**

DIRECTIONS: Please rate (circle) the degree to which each of the following descriptive phrases **APPLIES TO YOU AT THIS MOMENT**

	NOT PRESENT	MILD	MODERATE	SEVERE
1. Craving to smoke and/or chew/dip	0	1	2	3
2. Feeling irritable	0	1	2	3
3. Feeling anxious	0	1	2	3
4. Having difficulty concentrating	0	1	2	3
5. Feeling restless	0	1	2	3
6. Experiencing a headache	0	1	2	3
7. Feeling drowsy	0	1	2	3
8. Experiencing stomach pains and/or nausea	0	1	2	3
9. Feeling tired/fatigued	0	1	2	3
10. Feeling impatient	0	1	2	3
11. Feeling hunger	0	1	2	3
12. Feeling down/depressed	0	1	2	3
13. Feeling angry	0	1	2	3
14. Feeling frustrated	0	1	2	3
15. Did you have trouble sleeping last night?	Yes / No			

Appendix G

Leisure activities, and Activities Instruction Sheet

Activities

Activity no.1

Lego

"Harry Potter," model number 4731, distributed in USA by Lego Systems, Inc.

This activity includes 70 pieces of 3 dimensional blocks. The participant needs to construct a model by following 15 pictures in a progressive sequence. Each picture has additional 2 to 4 blocks compared to the previous one.

For the second session, equivalent version of "Harry Potter, 4731, will be administered.

Activity no. 2

Word Searching

"WEB BROWSER," word search number22, from "CIRCLE –A-WORD COLLECTION," VOLUME 54. Publisher: Ebb Publishing, A division of Kappa Publishing Group, Inc.

The activity includes a diagram of letters and a list of 36 computer related words. The participant needs to find and circle the words hidden in the array of letters. The words are always in a straight lined may read up, down, forward, backwards or diagonally.

For the second session, equivalent version of "WEB BROWSER" will be administered.

Activities Instruction Sheet

Session No .1

First phase "I have 2 games in front of you" (pointing).

Word searching – "One game is word searching (Pointing to the game). In this game the player s to identify and mark the words in the order they appear in the list (pointing on the list of words) en among the nonsense letters (pointing on the nonsense letters). The hidden words may lie ss, down, diagonally, or backwards, but always in a straight line."

ego – "The other game is a three-dimensional Lego (pointing on the Lego parts), in which the r needs to construct a model like the one in this picture (pointing on the picture). Here (browsing gh the instructions pages) is a set of step-by-step instructions on how to build the model.

I want you to choose the game you prefer to play with for the next several minutes." (After sing a game, the experimenter will say,) "Also, after several minutes, I will give you a form to fill and a choice to continue with the activity, or to start playing with the other activity. If you decide o do any of these activities, I will go outside, and you may sit and relax for the remaining time. Do have any questions?

Word searching - "Ok, so here is the list of words you need to find in the order they appear here nting and demonstrating). Mark here (demonstrating) each word that you find. You can start."

Lego - Ok. So here are the step by step instructions you need to follow. You can start."

Second phase Would you like to continue with the game, start with the other game or nd relax for the next several minutes?

they continue – "Ok, you can continue."

they switch – Repeat the instructions for the second game.

hey rest – "Ok, so please take your time and relax. I will come back after several minutes."

Activities Instruction Sheet

Session No .2

First phase

experimenter will say,) "Here is a game similar to the one you played with last week. Like in the ous meeting, after several minutes you will fill out a form, and have a choice to continue with this y, or to play with a similar version of the other activity, or sit and relax for the remaining time. ust want to remind you about this game" (According to the game he chose first in previous ng), read instructions for that game.

Word searching – "In this game the player needs to identify and mark the words in their order his list (pointing on the list of words) hidden among the nonsense letters (pointing on the nse letters). The hidden words may lie across, down, diagonally, or backwards, but always in a nt line. You need to find the words in the order they appear here (pointing and demonstrating). here (demonstrating) each word that you find. You can start."

Lego – "In this game the player needs to construct a model like in this picture (pointing on the e). Here (browsing through the instructions pages) is a set of step-by-step instructions on how to the model. Ok, so here are the step by step instructions you need to follow. You can start."

Second phase

uld you like to continue with the game, start with the other game or sit and relax for the next ral minutes?"

ney continue – "Ok, you can continue."

ney switch – Repeat the instructions for the second game

est – "Ok, so please take your time and relax. I will come back after several minutes."

APPENDIX H

Leisure Activity Rating Scales

Subject number:_____ Activity:_____ Date:_____ Session number_____

Leisure Activity Rating Scales

In the following questions, please circle the number that correspond best to how you felt while doing the activity you just engaged in. Please read each question and the descriptions under numbers 1 and 7 of each scale before answering. Circle only one number and please do not mark in between whole numbers (e.g., "3.5").

Rate your overall **enjoyment** while doing the activity

1	2	3	4	5	6	7
I did not enjoy this activity at all and would never do it again						I enjoyed this activity very much and would like to do it again

Rate your overall level of ***performance*** while doing the activity

1	2	3	4	5	6	7
I performed very poorly						I performed extremely well

Rate your overall level of ***energy*** while doing the activity

1	2	3	4	5	6	7
I felt that I did not have the energy						I felt very energetic

Rate your level of ***fatigue or tiredness*** while doing the activity

1	2	3	4	5	6	7
I felt very tired/ or fatigued						I did not feel tired / or fatigue at all

Rate your level of ***motivation*** to do the task while doing the activity.

1	2	3	4	5	6	7
I did not feel any motivation to do the activity						I felt very motivated to do the activity

Appendix I

Performance rating

Performance rating

Participate number: _____ Date: _____ Gender:_____

Smoking phase: **Smoking** **Non-Smoking** **(circle one)**

Co level _____

Phase 1 (8):

Name of Game (version/s): _____

Time spent on the activity: _____

Number of errors: _____

Progress rate (number of correct parts or words/ time spent on the activity):

Lego: number of correct parts

_____

Word search: numbers of correct words:

_____

Phase 2 (8):

Name of Game (version/s): _____

Time spent on the activity: _____

Number of errors: _____

Progress rate (number of correct parts or words/ time spent on the activity):

Lego - number of correct parts:

_____

Word search - numbers of correct words:

_____

Total time spent on activities: _____

(If one task only) Total number correct _____ Total number errors _____

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Date

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