Predicting cervical screening in college women: A test of the theory of reasoned action

Lori L. Armstrong

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Predicting cervical screening in college women: 
A test of the Theory of Reasoned Action

by

Lori L. Armstrong

M.A., The University of Montana, 1997

Presented in partial fulfillment 
of the requirement for the degree of 
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Cervical Screening and College Women

ABSTRACT

Armstrong, Lori L., May 2001

Predicting cervical screening in college women: A test of the Theory of Reasoned Action

Director: Christine Fiore, Ph.D.

The predominant cause of cervical cancer worldwide has been identified as the sexually transmitted human papilloma virus (HPV). Accordingly, the majority of deaths attributed to cervical cancer are preventable with the combination of safe sex and routine Papanicolaou (Pap) smears. Due to the biological transformations of puberty, the prevalence of HPV in this population, and the large number of behavioral risks practiced by this cohort, young women may be at greater risk to develop cervical neoplasia. The Theory of Reasoned Action (TRA) was examined by the current study for its potential to understand Pap smear screening intention and behavior in college women. Whereas previous studies utilized prior behavior to measure the predictive ability of the TRA, the current investigation examined behavior subsequent to participants’ cervical screening intention ratings. To gain a more comprehensive illustration of behavior, variables external to the TRA were also explored.

Although the primary analyses did not support the TRA’s assertion that both attitudes and social norms regarding Pap smears would accurately forecast cervical examination intentions, procurement of a Pap test was successfully predicted by intention. This finding demonstrates that intention to obtain a cervical exam can accurately predict the subsequent performance of this behavior, verifying the utility of the Theory of Reasoned action for populations without a history of the target behavior.

The intention to obtain an examination was also shown to be related to a participant’s Pap smear history, number of perceived barriers to obtaining a Pap test, and level of Pap smear knowledge. Obtainment of a cervical examination was related to both Pap smear history and level of Pap smear knowledge. Additional analyses examined behavioral trends over a period of three decades, reported descriptive statistics regarding subject demographics, sexual history, Pap smear and HPV knowledge and practices, intention, stage of change, and explored the predictive ability of these variables. The results of this investigation highlight the need for increased education and intervention to stem the tide of HPV infection among college women.
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Overview

In 1996, a panel of experts convened by the National Institutes of Health concluded that of the nearly 5,000 American women who die of cervical cancer annually, virtually all the deaths could be prevented by routine Pap smears and safe sex ("Experts," 1996). If cervical cancer is detected in an initial asymptomatic stage it is nearly always curable by surgery or radiotherapy (World Health Organization, 1997b). In both developed and developing countries, more than 90% of the new cases of cancer of the cervix are due to sexually transmitted human papilloma virus infection of the cervix.

Among college-age women, the average infection rate of HPV is greater than 20%, double the prevalence of the general population; some research studies have even demonstrated the frequency of infection for this population to be nearly forty percent (Burk et al., 1996; Kiviat et al., 1989; Ley, et al., 1991; Rohan et al., 1991; Wheeler et al., 1993). Data suggest that about one-third of patients who have histologically confirmed HPV cervical infection can be expected to develop cervical intraepithelial neoplasia within a year (Nash, Burke, & Hoskins, 1987). Adolescents may be at greater risk for cervical neoplasia than adult women because of the biologic changes occurring in the cervix during puberty, the prevalence of HPV, and the high number of behavioral risk factors in this age group (Roye, 1993).

The World Health Organization is presently developing a vaccine against the virus (World Health Organization, 1997a). However, the estimation that more than 6
million women in the U.S. currently have HPV (National Cancer Institute, 1995) demands that prevention cannot wait. The goal of Pap smear screening is to reduce cervical cancer deaths through early detection and management of cellular abnormalities. Since Dr. George Papanicolaou developed the Pap test more than 40 years ago, it has led to a 70% decline in the death rate from cervical cancer (Turk, 1994). Figures 1 and 2 (Appendix H) illustrate the relationship between HPV and cervical cancer, as well as the important role of Pap testing in fighting this disease.

The Theory of Reasoned Action will be described and its application to cervical screening will be reviewed as a potential means of understanding Pap smear screening behavior in college women. The ultimate goal of the current study is to increase utilization of cervical screening among a group at high risk for HPV - female college students - by obtaining information beneficial to future interventions. To provide greater understanding of the issues, the prevalence rates and relationship between cervical cancer and HPV are examined, as well as the risks associated with HPV and the perceived barriers to pelvic examinations.

Cervical Cancer

According to the World Health Organization (WHO), cancer of the cervix uteri, also known as cervical cancer, is a global public health problem. It is the most common cancer in women in developing countries and the second most common cancer in women worldwide. Globally, there are over 500,000 new cases and more than 300,000 deaths each year (World Health Organization, 1996).
Survival of cervical cancer depends on the stage of the disease at diagnosis. Today, women with localized disease have a 90% five-year survival rate. This contrasts sharply with a survival rate of less than 10% with distant spread (World Health Organization, 1997c). Mass screening programs, in which women have Pap tests at least once every 3-5 years, have proven effective in reducing cervical cancer mortality and morbidity rates. In British Columbia and Finland, for example, organized screening has made it possible to reduce mortality rates by up to 70% (World Health Organization, 1997b).

In the U.S. there are an estimated 16,000 new cases of invasive cancer of the cervix and 5,000 deaths each year. Unfortunately, the current death rate is believed to be far higher than it should be. The vast majority of these cases (more than 90%) can and should be detected early through the use of the Pap smear. These statistics highlight the fact that approximately one-third of American women are not obtaining regular Pap smears (National Cancer Institute, 1995).

Cancer of the cervix usually grows slowly over a period of time. Before cancer cells are found on the cervix, the tissues of the cervix go through changes in which cells that are not normal begin to appear, a condition known as dysplasia. At this point, a Pap smear will usually detect these abnormal cells. Later in the process, cancer cells start to grow and spread more deeply into the cervix and to surrounding areas (National Cancer Institute, 1994b).

The rate of invasive cervical cancer among all age groups has steadily decreased over the last several decades. However, women under the age of 50 have evidenced an alarming increase. Cervical carcinoma in situ, a precancerous condition, is now more

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frequent than invasive cancer, especially in this age group (American Cancer Society, 1995).

Precancerous changes of the cervix usually do not cause pain. In fact, they generally do not cause any symptoms and are not detected unless a woman has a pelvic exam and a Pap test. Symptoms usually do not appear until abnormal cervical cells become cancerous and invade nearby tissue. When this happens, the most common symptom is abnormal bleeding. This includes bleeding between regular menstrual periods or longer or heavier periods, after sexual intercourse, douching, or a pelvic exam. Bleeding after menopause also may be a symptom of cervical cancer, as is increased vaginal discharge (National Cancer Institute, 1994c).

As noted previously, the World Health Organization (1997b) postulates that the overwhelming percentage of cervical cancer is caused by the human papilloma virus. The progression from human papilloma virus infection to cervical abnormality can be frighteningly rapid: within just one year of infection, approximately one-third of women are likely to develop cervical intraepithelial neoplasia (Nash, Burke, & Hoskins, 1987).

**Human Papilloma Virus (HPV)**

Human papilloma virus (HPV) is actually a group of viruses that includes more than 70 different types (American Social Health Association, 1994). Genital infections caused by HPV have become the most prevalent sexually transmitted disease in the US and the most common clinical expression of genital HPV infection is condyloma acuminata, otherwise known as genital warts (Krowchuk & Anglin, 1992).
Once thought to cause only benign skin lesions such as common warts, plantar warts, and genital warts, HPV has gained the respect of the medical research community since the 1980's. With some degree of overlap, each HPV type has an affinity for a particular epithelial surface. For example, HPV type 1 causes plantar warts, HPV-2 causes common warts, and HPV-6 and HPV-11 are the major causative types in condyloma acuminata (Brown & Fife, 1990). Precancerous cervical lesions associated with HPV types 16, 18, 31, 33 and other "high-risk" types are thought to be more likely to progress to invasive cancer than lesions associated with HPV types 6 and 11 (Koss, 1989).

Although it is clear that genital HPV infection is transmitted sexually, the exact mechanism of infection is not known. It is generally assumed that the virus gains entry to the basal cell layer of epithelial surfaces through small or microscopic abrasions, leading to transformation of one or more basal cells. Genital lesions usually appear after an incubation period of approximately 3 months, with a range of 3 weeks to 8 months (Brown & Fife, 1990).

Immunological factors are known to affect the clinical behavior of genital warts, and immunosuppression - via drugs, radiation, and possibly even cigarette smoking and the use of oral contraceptives - may increase vulnerability to genital HPV infection (Oriel, 1990). In 105 immunosuppressed renal transplant recipients, evidence of HPV infection was found in 17.5% and evidence of genital neoplasia was found in 9.5%. The incidence of HPV-related disease in these patients was 17 times greater, and the risk of cervical neoplasia 9 times greater than in healthy subjects (Brown & Fife, 1990).
Prevalence of HPV

HPV infections are not reportable to public health departments and are not always easy to diagnose. Therefore, accurate incidence figures are difficult to obtain. Surveys of consultations by private physicians for genital warts have shown an increase from an estimated 169,000 consultations in 1966 to 1,150,000 consultations in 1984. The majority of patients were between the ages of 15 and 30, with more women than men seeking treatment (Becker, Stone, & Alexander, 1987). Because these estimates do not include patients treated in public health clinics and do not include patients who elect not to seek treatment, they represent only minimum figures.

In addition, the incidence of genital warts is merely an indirect indicator of the true incidence of genital HPV infection. The spectrum of HPV is much wider and also includes minimally symptomatic lesions, subclinical infections, and latent infections. It has been estimated that genital warts may represent only 10% or less of the total spectrum of genital tract HPV infections (Koutsky, Galloway, & Holmes, 1988).

Because there is no simple, sensitive, and accurate test for the diagnosis of HPV that can economically be applied to large populations, direct measurements of the prevalence are not available (Brown & Fife, 1990). However, studies of selected populations have provided some estimates of prevalence that suggest that a significant number of individuals may be infected.

Although prevalence rates vary among studies, all of the numbers equal significant proportions of the population. Among young female samples, the incidence of HPV has been found to range between 10.6% and 38.2%, with an average infection rate of 22.7% (Fisher, Rosenfeld, & Burk, 1991; Kiviat et al., 1989; Moscicki, Palefsky,
Gonzales, & Schoolnik, 1990; Reed et al., 1993; Rosenfeld, Vermund, Wentz, & Burk, 1989; Shew, Fortenberry, Miles, & Amortegui, 1994). Studies of college-age females have yielded even higher prevalence rates; the range for this population was found to be between 11.4% and 46%, with an average incidence of 29.5% (Burk et al., 1996; Kiviat et al., 1989; Ley, et al., 1991; Rohan et al., 1991; Wheeler et al., 1993).

**HPV Risk Factors**

Several studies have explored the risk factors associated with HPV, resulting in important information for intervention and education. The four risk factors most often cited in the literature are: multiple sex partners (Burk et al., 1996; Fisher et al., 1991; Kataja et al., 1993; Kenney, 1996; Ley et al., 1991; Lucas, 1988; Syrjanen et al., 1984; Rosenfeld et al., 1989; Roye, 1993), early onset of sexual activity (Kenney, 1996; Ley et al., 1991; Lucas, 1988; Roye, 1994; Shew et al., 1994), current or past smoking (Burger et al., 1993; Kataja et al., 1993; Kenney, 1996; Ley et al., 1991; Lucas, 1988; Roye, 1994; Shew et al., 1994), and a history of other sexually transmitted diseases (Fisher et al., 1991; Kenney, 1996; Ley et al., 1991).

Other identified risk factors include genital warts in sexual partners (Kataja et al., 1993; Ley et al., 1991), casual sex - defined as "once only" sexual partners (Kenney, 1996; Syrjanen et al., 1984), male sex partner's number of previous partners (Burk et al., 1996; Kenney, 1996), oral contraceptive use (Kenney, 1996; Ley et al., 1991), having been sexually active for more than two years (Fisher et al., 1991), high-risk sexual practices - i.e. not using condoms (Lucas, 1988), alcohol and drug abuse (Sikstrom et al., 1996), age at menarche (Ley et al., 1991), increasing frequency of sexual partners per
week (Kataja et al., 1993.), and known intercourse with an uncircumcised man (Ley et al., 1991).

**Pap Testing**

Although DNA testing for HPV is available, it is rarely used due to the expense and length of the testing process. Additionally, current DNA tests only indicate the existence of HPV, not potential cervical abnormalities. However, Pap smears report both changes to the cervix and the presence of HPV cells. Cervical examination cost is also moderate and its accompanying cytology process comparatively rapid.

Since the Pap smear can detect cellular cervical changes before abnormality becomes invasive cancer, and guidelines (National Cancer Institute, 1994a) suggest the test is only needed once a year (unless an abnormality is discovered) in women who are or have been sexually active or who have reached the age of eighteen, it seems that this relatively simple procedure would be completed by the majority of women regularly. However, a recent Gallup poll found that 44% of American women don't get annual gynecological checkups (Turk, 1994). What are the possible reasons for this phenomenon?

Branson and associates conducted an investigation to determine why women presenting for cervical cancer screening at a free Pap smear clinic had previously delayed the procedure. The main perceived barrier to screening participation was cost. Also cited were embarrassment, fear of discomfort, fear of occult disease, and issues of convenience (too busy, unavailability of evening or weekend examinations). Misinformation, such as ignorance of screening recommendations or disbelief in screening effectiveness, was also
listed as a barrier. The lack of availability of a female physician was cited less frequently (Sadovsky, 1997). Furthermore, Wilson & Fazey (1995) found that fear, worry, and embarrassment were negatively correlated with the decision to have a Pap smear. In a study by Paskett, Carter, Chu, and White (1990), the perceived risk of cancer, fear of cancer, familiarity with their doctor, the importance of femininity, and lack of time were all factors that distinguished subjects who complied with exam recommendations from subjects who did not.

Other surveys have identified a number of sources of distress associated with pelvic exams. These include position on the examination table (Haar et al., 1977; Petravage et al., 1979), lack of information about procedures (Haar et al., 1977; Petravage et al., 1979), lack of information about the exam gown, physicians using cold instruments, and lack of gentleness (Petravage et al., 1979).

Millstein, Adler, & Irwin (1984) found that less previous experience with pelvic exams was significantly associated with greater concern about embarrassment and higher anxiety about examination. Additionally, this survey of adolescent patients found that their major causes of concern were fear of discovery of a pathological condition, fear of pain, embarrassment about undressing, and worry about cleanliness. In this group, the most frequent source of information about the pelvic examination was peers, and the most common specific message from peers was that the examination was painful.

These studies indicate that the pelvic examination is associated with negative cognitive, affective, and behavioral processes. Clinical observations of gynecological patients indicate that they are reluctant to have pelvic examinations (Millstein et al., 1984). This aversion may be particularly problematic among adolescents, since recent
data found that women's past use of routine gynecological care is the best predictor of
current acceptance of routine gynecological testing (Burack & Lang, 1987; Howe &
Bzduch, 1987). Research indicates that teenagers may delay seeking health care, in part
due to their anxiety about the procedure (Millstein et al., 1984). Thus, this population
may be at greater risk of not receiving important health care.

The Theory of Reasoned Action

The Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980; Fishbein &
Ajzen, 1975) is a theory of attitude-behavior relationships connecting attitudes, subjective
norms, and behavioral intentions to behavior. Behavior is presumed to result from
behavioral intentions, which in turn are produced by the combination of a person's
attitude toward performing the behavior in question and their perceptions of the
subjective norm to perform that behavior. Figure 3 (Appendix H) illustrates the
interaction of the TRA's elements.

Attitudes are seen as arising from a mixture of a person's salient beliefs about
behavioral outcomes and their evaluations of those outcomes. Subjective norms are
proposed as having origins in a combination of people's perceptions that important others
think they should or should not perform the behavior in question and their motivation to
comply with others' wishes.

Thus, according to TRA, individuals are more likely to engage in health behaviors
if such actions are seen as essential to achieving desired consequences and are considered
worthwhile by persons or groups the individual wishes to please. Hecker and Ajzen
(1983) proposed that all other variables that influence health behaviors are mediated through the attitudinal and normative components of the model.

Mathematically, attitude is the sum of the products of beliefs about the behavioral outcome (expectancy) and the evaluation of this outcome (value). Social norm is the sum of the products of normative beliefs about the expectations of others (expectancy) and the motivation to comply with those expectations (value). Ajzen and Fishbein (1980) also recommend that attitude be measured directly using semantic differential scales in relation to the target behavior and social norm be measured directly using a global social norm item.

Fishbein and Ajzen's Theory of Reasoned Action has been successful in predicting intentions and behaviors in diverse areas, including the use of birth control (Crawford & Boyer, 1985; Fishbein, Jaccard, Davidson, Ajzen, & Loken, 1980), voting (Ajzen, Timko, & White, 1982), dieting and exercise (Bentler & Speckart, 1981; Sejwacz, Ajzen, & Fishbein, 1980), breast feeding (Manstead, Proffitt, & Smart, 1983), and weight control (Saltzer, 1981).

**Research Utilizing TRA with Cervical Cancer Screening**

With the wealth of research on the Theory of Reasoned Action among a diverse group of health behaviors, it is somewhat surprising that few have looked at this model in relation to cervical screening. All three reviewed found that the TRA was a significant predictor of Pap smear intentions (Barling & Moore, 1996; Hennig & Knowles, 1990; Hill, Gardner, & Rassaby, 1985).
However, the generalizability of these studies to a U.S. population may be questionable as they were all performed in Australia; social and sexual norms may be quite different between the two cultures. In addition, the age groups examined may be a confounding variable. Hennig and Knowles (1990) only looked at women over forty years of age, while Hill et al. (1985) and Barling and Moore (1996) analyzed results for a wide range of adult ages. If only younger women were examined, based on the differences already noted for this population regarding anxiety, a dissimilar outcome might be noted.

**Comparisons of TRA with Other Theories**

Developed by Rosenstock, the Health Belief Model (HBM) predicts preventive health behavior from five factors: health motivation, perceived severity of an illness, perceived susceptibility to the illness, belief in the benefits of the preventive action, and the perceived barriers to taking that action (Rosenstock, 1974). The HBM has been evaluated in comparison to the TRA in two of the studies listed above. Each found both theories to be significantly predictive of the intention to have a Pap smear. Regarding the total variance explained in the Hill, et al. study, there is little difference between the TRA (26%) and the HBM (30%). Nevertheless, the authors assert that the TRA is the more useful model due to its economy (the TRA has only two components compared to five in the HBM).

In contrast to this investigation, Hennig and Knowles (1990) found the HBM to be a better predictor of intention than the TRA. However, the researchers note that the age difference between subjects in the two studies was the variable responsible for this
distinction; their study surveyed only women over the age of 40 with a mean age of 54, while the earlier study looked at women from 18 to 70 with a mean age of 34 years. Since the proposed research will have an even lower mean age, this difference should be beneficial to its outcome. In addition, Hennig and Knowles found that only three of the HBM's five components predicted intention, while both of the TRA's were significant predictors.

According to Toneatto and Binik (1987), the Theory of Reasoned Action possesses several advantages over other expectancy-value attitude theories, such as the HBM. First, the theory has explanatory value in addition to predictive value, which makes it especially valuable and suitable to the needs of behavioral health. The TRA not only evaluates the relationship between attitude and behavior, but also provides information concerning the actual beliefs and values that underlie these attitudes. Second, normative beliefs are measured, which provides useful information about the individual's beliefs about how others view the target behavior. Third, the TRA considers actual behavior to be a function of a prior intention rather than a direct result of attitudes. Therefore, behavior is considered to be purposeful and voluntary, not an automatic function of prior attitudes, beliefs, and values.

These three characteristics of the theory are significant for the interests of a discipline such as behavioral health for two reasons: 1) the inferred volitional nature of preventive health behavior is taken for granted, and 2) knowledge of personal and normative beliefs, values, and attitudes has both practical and diagnostic value in isolating and modifying dysfunctional, inaccurate, or incorrect cognitions (Toneatto &
Binik, 1987). For such reasons the Theory of Reasoned Action serves as a potentially powerful model of health behavior.

The Theory of Planned Behavior (Ajzen, 1985) is an extension of the Theory of Reasoned Action. Within this model, perceived behavioral control is expressly included as an antecedent to behavioral intentions. Perceived behavioral control refers to the beliefs regarding the possession of required resources and opportunities for performing a given behavior. The more resources and opportunities individuals think they possess, the greater should be their perceived control over the behavior. When people believe that they have little control over performing the behavior because of a lack of requisite resources, then their intentions to perform the behavior may be low even if they have favorable attitudes and/or subjective norms concerning performance of the behavior.

Thus, perceived behavioral control is included as an exogenous variable that has both a direct effect on behavior and an indirect effect on behavior through intentions. The direct path from perceived behavioral control to behavior is assumed to reflect the actual control an individual has over performing the behavior. The direct effect of perceived behavioral control on actual behavior should be significant when 1) the behavior in question is likely to have some aspect not under volitional control and b) perceptions of control over the behavior are accurate.

Behaviors that are repetitive or require a high frequency of action are best suited to this type of model. Examples of these include exercising outdoors regularly or receiving eight hours of sleep each night. Regular exercise may be hindered by inclement weather and noisy neighbors or a snoring spouse may disrupt sleep. In such situations both of these behaviors are affected by factors outside of volitional control.
Prochaska and DiClemente conceptualized the process of behavior change as a series of stages through which a person progresses toward a specific activity. The Transtheoretical Model (Prochaska and DiClemente, 1984; DiClemente, C.C., Prochaska, J.O., Fairhurst, S., Velicer, W.F., Velasquez, M.M., & Rossi, J.S., 1991) describes five distinct stages of change:

- **Stage 1) Precontemplation**
  Unaware of problems relating to target behavior or not considering changing the behavior.

- **Stage 2) Contemplation**
  Seriously considering altering the behavior but not yet committed to change.

- **Stage 3) Preparation**
  Committed to the behavior change.

- **Stage 4) Action**
  Performs the target behavior change.

- **Stage 5) Maintenance**
  Continues the behavior change made during the action stage and prevents relapse.

**Purpose and Hypotheses**

The commencement of college life brings many changes. Often students move out of their parental home, possibly to be on their own for the first time. This newfound freedom may allow them to explore their sexuality and increase other risk-related behaviors. Based upon medical research, it appears that among college women there exists a significant prevalence of HPV. As the necessity for regular pelvic exams to increase detection of cervical abnormalities arising from HPV has been discussed, the next step is to determine how to promote this behavior among this population, particularly given that past behavioral practices to obtain a Pap smear may not have been established as yet.
The present study was designed to examine the utility of the Theory of Reasoned Action in relation to intentions to obtain cervical exams. In order to extend and develop the application of this theory to college-age females, a new questionnaire will be tested. This measure will seek to determine the attitudes and subjective norms of female college students, along with their intention to obtain a Pap smear within a predetermined amount of time.

Although this research appears similar to previous studies using TRA with cervical smears, several important distinctions should be noted. As previously reported, each of the studies was performed in a dissimilar culture using very different age-based populations. More significantly, previous research based the measurement of future behavior upon past actions. In a population of young college women, this is especially problematic. Due to their age, many of these women may never have had a Pap smear before, rendering useless a prediction that is derived from past behavior. To determine how intention is related to actual behavior, participants will be contacted within six months after the original survey and asked if they obtained a cervical examination during that period.

This study seeks to discover the utility of the TRA in regard to Pap testing among college women, along with pertinent distinguishing factors that could provide information beneficial to the development of future interventions with this population. In addition to the Theory of Reasoned Action components, variables external to the theory will be explored. These include demographic indicators, past sexual history, reasons for prior cervical exams, knowledge about cervical exams, components of the Transtheoretical Model, and level of risk and knowledge about HPV. This study will also
examine potential differences, such as the Pap smear intentions reported by Seow, Wong, Smith, and Lee, (1995), between women who have and have not had a Pap smear in the past.

**Hypotheses**

I) The Theory of Reasoned Action will accurately predict intention to have a Pap smear through the theoretical components of attitude and social norms, and level of intention will predict the behavior of Pap smear obtainment.

II) College women with no previous cervical screening history will have a lower intention to obtain a Pap smear than women with a past history of smears, and

III) The "no prior Pap" group will correspondingly evidence a lower performance of this behavior.

IV) Lower levels of knowledge about cervical exams and HPV, will be correlated with lower levels of intention and Pap screening behavior.

V) Reportedly required Pap smears (due to birth control prescriptions or abnormal Pap results) will indicate higher intentions and behaviors than those who are not required.

VI) Greater numbers of endorsed barriers to Pap smears will indicate lower intentions and behaviors.

VII) Exploratory analyses of demographic information, sexual behavior, cervical examination history, knowledge levels regarding Pap smears and HPV, factors contributing to HPV risk, and the Transtheoretical Model will be undertaken to further understand this high-risk population.
Chapter 2

METHOD

Overview

Human papilloma virus (HPV) is the most common sexually transmitted disease and a growing epidemic on college campuses. The most effective method to prevent this infection from developing into cervical cancer is the performance of regular Pap smears. The proposed questionnaire is designed to gather information on subjects' Pap testing knowledge, history and experiences, risk factors, pertinent demographics, intentions, attitudes, and subjective norms toward Pap smears, and knowledge about HPV. In addition to testing the efficacy of a popular theory, the resulting data may be used to design health education programs detected at this high-risk population.

Three hundred and thirteen females were recruited through the Psych 100 screening pool, freshman seminar classes, and other psychology and health and human performance courses for this study. Questionnaires regarding Pap smears were issued and completed during class time, Psych 100 screening, or specially arranged sessions. After a four to six-month interval, 123 subjects were successfully contacted by telephone or e-mail for follow-up. After the data were analyzed, a debriefing was held to answer questions and describe the results.

Subjects

Three hundred and thirteen female university students participated in this study as part of an experimental research requirement for an introductory psychology course, a
freshman seminar experience, or other psychology and health and human performance classes. All groups participated in the study in a classroom setting either during class time or at other arranged times.

During and after the administration of the questionnaire, a research assistant was available to answer questions. The names of the subjects did not appear on any form except for the locator information sheet. Instead, each subject was assigned a code that allowed his or her responses to be collated in the second part of the study.

Out of 313 total subjects, 121 women were not included in the follow-up due to missing data, recent Pap smears, and/or required Pap smears for birth control prescriptions; therefore, 192 valid subjects remained. From this group, 123 women were successfully contacted and their responses were included in the test of the hypotheses. However, available data from all 313 subjects were utilized in post hoc analyses.

Measure

In the first part of the experiment, subjects completed a survey asking about their demographic information (age, marital status, race, year in school, religious preference), sexual history (age at first intercourse, number of past/current partners, sexually transmitted diseases), sexual abuse history, use of birth control, smoking history, Pap smear history (ever had one, age at first one, timing of last one, regularity, reasons for prior Paps, where they receive screening), intention to have a Pap smear in the next four to six months, how they learned about Pap smears, barriers to having a Pap smear, attitudes toward Pap smears, their subjective norms toward Pap smears, their stage of
change relating to their current practice of obtaining a Pap smear, knowledge about Pap smears, and knowledge about HPV (see Appendix A).

The subjects were also given forms requesting several ways to contact them for the second part of the study (see Appendix B). Two questions were used to screen ineligible participants: “When was your last Pap smear?” and “Was your last Pap smear required to obtain birth control?” Subjects who had received a Pap test less than six months previously or who had obtained an exam as part of a prescription requirement were eliminated from follow-up.

In the second part of the experiment, eligible subjects were contacted by phone or e-mail and asked if they received a Pap smear in the time elapsed since the original survey (see Appendix C). Prior to this query, subjects were reminded of the confidentiality of their responses and given the option to refuse response. Subjects were also told that once it was scheduled, the debriefing would be announced in the Kaimin.

**Instrumentation**

The questionnaire utilized was a 73-item instrument specifically developed for this study. Several items were created especially for this study; others were adapted from previous questionnaires utilizing the Theory of Reasoned Action, some expressly regarding Pap smears. Research colleagues, supervisors and advisors, as well as college-age women reviewed drafts of the survey questions. Open-ended interviews with six college-age women were also utilized to acquire further information regarding the validity of the questionnaire; their feedback was integrated into both revisions of current questions and formulation of new questions.
Due to the difficulty of obtaining a satisfactory number of valid surveys, the process of administration continued past the original deadline. As a result, the corresponding date of follow-up was also affected. After consultation with the committee chairperson, it was decided that all subjects would share the same date for Time 2 contact (April 1, 1999) and all surveys administered after October 1998 would be modified to reflect this change.

**Procedures**

At Time 1, between October and December 1998, subjects were informed they were participating in a study to assist in future health education planning. Consent forms were distributed and any questions regarding them were answered (see Appendix D). Survey questionnaires were then distributed and directions given; the approximate average completion time was 20 minutes. To address any undesirable consequences participants experienced, a resource list identifying local mental and physical health services was included with each questionnaire (see Appendix F).

Extensive locator information was collected from subjects, with the understanding that they would be contacted again in four to six months (dependent upon date of survey administration). All of the information gathered was kept confidential, with subjects detaching the page with their locator information before handing in their survey. Subjects then placed the survey and locator information into two separate boxes. After April 1, 1999 (Time 2), eligible subjects were contacted either via telephone or e-mail and asked if they had received a Pap smear during the elapsed time.
After being advertised in the Kaimin, a debriefing was held to provide a full description of the experiment and its results and to answer any questions that subjects might have. However, upon the day of the debriefing, no participants attended.

Confidentiality

Within the consent form, subjects were notified that their name would not be associated with the data collection, and instead, a subject number was assigned to their responses for the purposes of analysis. In the instructions for the questionnaire, the confidential nature of the data collection was again stated, the personal nature of the questions noted, and subjects were instructed not to write their name on the survey. On the locator sheet, the subject's name and address were requested, but it was stated and written that this page was to be detached from the survey by the subject after completion.

Completed questionnaires and locator sheets were kept in a locked file cabinet in the office of the faculty supervisor. Only the investigator, research assistants, and faculty supervisor had access to this information. Research assistants were instructed as to the importance of confidentiality prior to the collection of any data.
Overview

A total of 313 female students from The University of Montana participated in this experiment during the 1998-1999 academic year. As a result of missing data, recent Pap smears, and/or required cervical exams for birth control, 175 subjects were not included in the follow-up portion of the study. Out of the 138 remaining women, 123 (39% of the total number of subjects surveyed; 89% of the potential experimental subjects) were successfully contacted during follow-up and their responses analyzed in the testing of the hypotheses. In addition, the usable data from all 313 subjects were included in additional post hoc analyses.

The modal age of the 123 women included in the planned analyses was 18 years ($M = 20.89$, $SD = 5.7$), with the majority (56%) declaring freshman status. The racial composition was 93% Caucasian, 3% Asian/Pacific Islander, 2% Hispanic, and less than 1% each Native American or African American. The modal age of menstruation onset was 13 years and over 41% of the sample professed virginity. Of the women who had previous sexual intercourse, the age range for their first experience was 11 to 21 years, with a modal age of 18 years.

Thirty-seven percent of this experimental group endorsed having a previous Pap smear, with 78% obtaining at least one by age 18. A plurality (33%) of the women rated their intention to obtain a Pap smear within the allotted amount of time to be "extremely likely", 29% claimed neutrality, and 10% stated it would be “extremely unlikely”; more
than 28% acquired a Pap smear before follow-up. Over 60% acknowledged having never heard of HPV before they received the survey. Further frequency and demographic information about all subjects can be found in Appendix H.

Data for all portions of this study were analyzed using SPSS. Attitude and social norm questions were condensed into an attitude score and social norm score, respectively. Employing linear regression, the dependent variable of intention to procure a Pap smear by Time 2 was investigated utilizing these independent variables. Logistic regression was used to evaluate the ability of intention to predict cervical exam procurement.

Additional analyses were performed to investigate hypothesized relationships between several variables. Level of intention and Pap smear obtainment was examined in regard to cervical smear history, Pap testing and HPV knowledge, and the number of perceived barriers to receiving a Pap smear.

A logistic regression was performed to examine the relationship between experience, intention, and behavior. The dependent variable of Pap smear obtainment between Time 1 and Time 2 and the independent variables of past Pap history (never or ever had one before) and intention to have a cervical exam by Time 2 were analyzed to determine significant interaction.

Participants who reported their last cervical examination had been a requirement for birth control were removed from all hypotheses testing even though one proposed analysis directly addressed this characteristic's relationship to intention and behavior. This decision was made due to the correspondence between such a compulsory action and the concept of volition, a component of the Theory of Planned Behavior. The
potential inability to differentiate between the effects of the Theory of Reasoned Action
and the Theory of Planned Behavior outweighed the benefits of the variable’s inclusion.

Exploratory analyses reported descriptive statistics for seven groups: subjects
with and without a prior Pap smear, subjects who did and did not obtain a Pap smear
before the follow-up contact, all experimental subjects (the combination of subjects who
were able to be reached in follow-up), subjects whose last Pap smear was required for
birth control purposes, and all surveyed subjects combined. These figures represented
demographic information, sexual and Pap smear history, sexual practices, subject
knowledge of Pap smears and HPV, endorsed barriers to Pap smears, and responses to
level of intention and stage of change queries.

Logistic regression was also applied to the interplay of Pap smear obtainment
(dependent variable) and past Pap smear history, risk factors, demographic information,
cervical screening knowledge, HPV knowledge, reasons for avoiding/delaying Pap
smears, and the stages of change from the Transtheoretical Model (independent
variables). A list of survey questions utilized in each of these variables is listed in Table
1 (Appendix G).

**Utilizing Theory of Reasoned Action Components to Predict Subjects’ Level of
Intention and Pap Smear Behavior**

Before analysis, subjects’ responses to questions referring to their attitudes and
social norms about Pap smears were consolidated into two separate summary scores.
These were computed by tallying the values associated with individual questions
comprising the attitude and social norms components. Reverse scoring was utilized when
necessary to indicate that higher scores represented more positive responses. Finally, the
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totals were transformed into percentages, reflecting the sums of endorsed responses for attitude and social norms, divided by the highest possible scores of 65 and 55, respectively. Internal consistency for both of these measures was high (attitude score $\alpha = .83$; social norm score $\alpha = .87$), demonstrating strong reliability.

Using the “enter” method for variable input (all variables are inserted into the equation at the same time), linear regression was applied to these scores to determine the ability of these TRA components to predict a subject’s intention level in regard to receiving a cervical exam. Although the regression was a poor fit ($R^2_{adj} = 20\%$), the overall relationship was significant, $F(2,120) = 16.4, p < .001)$. With the other variable held constant, levels of intention were positively related to both social norm and attitude scores, increasing by .035 of a level for each additional social norm point and .021 of a level per one point rise in attitude score. However, the specific effect of attitude was not significant ($t_{120} = 1.95, p = .053$).

The lack of significance for the attitude component does not absolutely refute the hypothesis that both Theory of Reasoned Action components would accurately forecast intention. A post hoc analysis revealed that there was enough statistical power to detect the smallest worthwhile effects only 51% of the time. Therefore, it is possible that low power contributed to the non-significant finding of attitude. Tables 2 and 3 outline the results of this regression (Appendix G).

To predict performance of the behavior (obtaining or not obtaining a cervical smear by April 1, 1999) a logistic regression analysis was performed using participants’ intention to get a Pap smear as the independent variable. The model was significant [$x^2(1, N = 123) = 21.84, p < .001$] and accurately predicted behavior performance in 77% of
the cases (81% of the subjects who did not obtain a pap smear and 67% of those who did).

These results demonstrate that the greater the intention to obtain a cervical exam, the more likely it is that a study participant obtained the test. In fact, with each increase in intention level, the odds of acquiring the exam increased by 142% (95% CI = 1.57, 3.73). This outcome confirms the hypothesis that the intention element of the Theory of Reasoned Action accurately predicts the behavior of Pap smear obtainment. Table 4 summarizes the results of this analysis (Appendix G).

Additional Hypotheses Testing

Level of Intention Differences and Cervical Screening History

An independent samples t-test was employed to determine if women with no prior history of cervical examination would display a lower intention to obtain one in the future, as compared to women who had undergone such an examination previously. The results proved this hypothesis, communicating that subjects who had a past history of Pap smears were more likely to have a greater intention to get one in the future ($t_{121} = -2.771$, $p < .01$). Level of intention means within the two categories of past Pap exam history are presented in Table 5 (Appendix G).

Predicting Pap Smear Obtainment Utilizing Past Pap Smear History and Intention

A logistic regression analysis was performed using past Pap smear history and level of intention to predict obtainment of a Pap smear by Time 2. Due to the continuous nature of the independent variable “intention”, logistic regression replaced the log linear analysis first proposed. The final model, which included both previous Pap test history
and level of intention, was significant \( \chi^2 (1, N = 123) = 26.39, p < .001 \) and accurately predicted behavior performance in 78% of the cases (91% of the subjects who did not obtain a pap smear and 46% of those who did).

This outcome supports earlier hypotheses, revealing that women who had procured a Pap smear were more likely to have received one in the past and had a greater intention to obtain one during the allotted time. Those women who had received a Pap smear in the past had a 164% increase in the odds of procuring a Pap smear by Time 2 (95% CI = 1.08, 6.45) and for every level of increase in intention to obtain a Pap smear, there was a 46% rise in the odds of getting an exam (95% CI = .30, .71). Table 6 summarizes the results of this analysis (Appendix G).

**Correlations of Pap Smear and HPV Knowledge, Level of Intention, and Pap Smear Behavior**

Participants' responses to questions referring to their level of knowledge about Pap smears and HPV were consolidated into two separate summary scores. The method employed to compute these values was similar to that used for the attitude and social norms scores. Values assigned to responses on the Pap smear and HPV knowledge sections of the questionnaire were tallied and the totals transformed into percentage scores based on the number of correct answers. These summary scores were used to test the hypothesis that lower levels of knowledge would be positively correlated with lower levels of intention and behavior performance.

Utilizing point biserial correlation, the resulting information indicated that intention to have a Pap smear was negatively and significantly related to obtaining a Pap smear \( (r_{121} = -.391, p < .01) \). Due to the survey's method of inquiring about intention
level (1 = extremely likely, 5 = extremely unlikely), this outcome is interpreted to mean that women with a higher intention - i.e. lower score - were also more likely to procure a cervical exam.

Additionally, this correlation affirms that higher knowledge levels regarding Pap smears were associated with higher knowledge levels about HPV ($r_{121} = .346$, $p < .01$), higher levels of intention ($r_{121} = -.230$, $p < .05$) and higher obtainment of cervical screenings ($r_{121} = .297$, $p < .01$). Of special note, knowledge about HPV had no correlation to either level of intention or Pap smear obtainment, refuting that portion of the research hypothesis. Table 7 presents the intercorrelations, means, and standard deviations for these variables (Appendix G).

The Relationship of Intentions and Behavior Performance to the Number of Barriers for Pap Exam Attainment

It was predicted that the overall number of barriers to undergoing a Pap smear would be negatively related to a woman’s level of intention regarding cervical screening and later performance of this behavior. The Pearson Product-Moment Correlation was applied to test one half of this hypothesis. The result of the analysis substantiated this prediction, indicating that as the number of barriers to an exam increased, a subject's level of intention to receive an exam decreased ($r_{121} = .192$, $p < .05$).

To complete the test of this hypothesis, a point biserial correlation was utilized to examine the interaction of barriers and Pap smear behavior. The result demonstrated no relationship between the variables of a subject's sum total Pap smear barriers and her subsequent Pap smear behavior performance ($r_5 = -.093$, $p = .309$). This rejection of the
hypothesis was further supported by an independent samples t-test of these variables ($t_{121} = 1.001, p = .319$).

**Exploratory Analyses**

**Identifying the Best External Predictor Variables for Pap Smear Obtainment**

To explore the impact of other variables on Pap smear completion, subjects' past Pap smear history, knowledge about cervical screening and HPV, risk factors for HPV, demographic data, their stage of change relating to their current practice of obtaining a Pap smear, intention to obtain a cervical exam, and reasons they have avoided and/or delayed obtaining Pap smears were examined. Logistic regression was used to determine which of the multiple variables would most significantly anticipate subjects' acquisition of a cervical exam.

Due to the large number of independent variables and the exploratory nature of the inquiry, data analysis was performed in two phases. All groups of variables that were comprised of more than two survey questions (e.g. HPV risk factors) and not represented by a single summary score were entered into separate regression analyses. Table 8 displays the composition of these clusters (Appendix G). To further refine the model, the statistically significant variables from each of these clusters were then entered into a second logistic regression, along with the previously ignored variables (Table 9, Appendix G).

Since no hypothesis existed regarding the relative importance of any of these variables, the “enter” method of variable input was utilized in both phases. From the clusters of demographic and HPV risk factors, only relationship status and use of oral
contraceptives, respectively, were statistically significant. No variables from the group of Pap smear history questions were statistically significant and therefore not included in the second regression analysis. Intention to receive a Pap smear, cervical screening and HPV knowledge, stage of change, and the number of endorsed barriers to Pap obtainment were combined with relationship status and oral contraceptive use for a simplified model.

The final model was significant, \[ \chi^2 (8, N = 123) = 51.19, p < .001 \] and predicted Pap behavior with 83% accuracy (60% of subjects who obtained a Pap smear, 92% who did not). Intention and oral contraceptive use were the only significant predictors in this model, suggesting that women who were most likely to get a Pap smear were those who had greater intentions to obtain an exam and used oral contraceptives. Women who were taking oral contraceptives had an 86% increase in the odds of obtaining a Pap smear by Time 2 (95% CI = .02, .79) and for every one-point increase in the intention to obtain a Pap smear, there was an 88% increase in the odds of procuring a Pap test (95% CI = 1.15, 3.09). A summary of these logistic regression results comprises Table 10 (Appendix G).

**Subject Demographics**

As noted previously, 313 female students at The University of Montana participated in this study by completing a survey during the fall semester of 1998. At the time of the survey, the ages of respondents extended from 17 to 51 years, and age 19 was endorsed more than any other. The plurality of subjects (46%) declared themselves to be freshman, 24% had sophomore status, 15 % were in their junior year, 14 % were seniors, and 2% utilized the category of "other" (Figure 4, Appendix H).
Thirty-four percent of participants said they had been living away from home less than six months, 6% had been gone between 6 months and one year, 17% had left one to two years ago, 30% had been away more than two years, and 12% were still living at home (Figure 5, Appendix H). Ninety-four percent of subjects were Caucasian and both Native Americans and Asian/Pacific Islanders comprised 2% of the population; Hispanics, African Americans, and a group endorsing the category of "other" each claimed 1% of participants.

Sexual Characteristics and Experiences

Of the total number of subjects, 97% were heterosexual, and less than 2% each endorsed homosexuality and bisexuality. Fifty-four percent stated they were currently in a relationship; 7% of these participants were married (Figure 6, Appendix H). Twelve percent of subjects said they had been sexually abused and 14% acknowledged having been sexually assaulted in the past (Figures 8 and 9, Appendix H).

The age at subjects' first menstruation ranged from 8 years to 18 years, with participants reporting age 13 with greatest frequency. Seventy-eight percent of subjects were in a previous sexual relationship (Figure 7, Appendix H). Age 16 was most often cited as the age of subjects' first sexual experience, and this figure ranged from age four to twenty-four years. Women endorsed their lifetime number of sexual partners using the following categories: 26% had one partner, 39% had two to four partners, 22% had between five and ten partners, and 13% stated they had more than ten partners.

Participants were also asked to estimate the number of other people each of their previous partners had sexual intercourse with and then combine these numbers for their
answer. Sixty-three percent listed zero to 10 others, 19% guessed between eleven and twenty-five, and 6% per category estimated the number of partners as twenty-six to fifty, fifty-one to one hundred, and more than one hundred partners.

Participants who had been diagnosed with a sexually transmitted disease comprised 9% of the total subjects. This figure increased to 12% when only subjects with a prior cervical smear were included in this calculation. Within the STD-diagnosed population, chlamydia was the most often cited infection, followed by HPV (Figure 10, Appendix H). Nearly 3% of sexually experienced women reported they knowingly had sexual intercourse with a partner infected with genital warts, one expression of the human papilloma virus.

Pap Smear Responses

Participants were fairly knowledgeable about Pap smears. Subjects obtained a mean score of 65 (SD = 13.66) out of a possible 100 points on the Pap knowledge score and 99% of total participants stated they had heard of Pap tests before the day of the survey.

Seventy-two percent of all subjects stated they had a past cervical exam. From this subset of women with a prior Pap test, more than 81% had obtained an exam by age 18. Forty-five percent of these subjects stated their last cervical screening was a requirement for obtaining birth control and 13% disclosed that the results of their last exam were abnormal (Figure 11, Appendix H).

A majority (78%) of women with at least one previous Pap smear claimed they obtained a yearly cervical exam. When all subjects were asked if their mother received
regular cervical exams, 72% responded positively, 8% stated their mothers did not obtain regular Pap smears, and 20% said they did not know about their mother's exam history (Figure 12, Appendix H).

Subjects who had received a Pap test within the six months preceding the survey also were in the majority (54%). The remainder of responses included 31% in the six months to one year category, 11% had an exam between one and two years ago, and it had been more than two years since 4% of these subjects had undergone the test (Figure 13, Appendix H).

A private physician's office served as the setting for a plurality (49%) of participants. The University of Montana Curry Health Center and Planned Parenthood received an approximately equal number of patients (22%) and some other facility performed the service for 6% of these women (Figure 14, Appendix H). The majority (72%) of all participants knew that the university's student health service offered Pap smear exams to students, but only 50% were aware these exams were inexpensive and available even to those without insurance (Figures 15 and 16, Appendix H).

Regarding the entire group surveyed, 94% had learned about Pap testing by the age of 18, while age 15 was most often reported by subjects. Participants were asked to endorse all forms of information they had utilized in learning about Pap smears. The largest number (56%) of subjects cited parents as at least one method of education. They were followed in descending order of answers by respondents' friends (19%), school courses (18%), doctors and/or nurses (12%), media – i.e. television, magazines, etc. (8%), other source(s) not listed (5%), and school personnel (3%).
Although thirty-nine percent of all subjects espoused having never delayed or avoided getting a Pap smear, the remaining respondents acknowledged an average of two barriers to cervical examinations. The five most common reasons for eschewing the test, in descending order of frequency, were feeling uncomfortable or embarrassed (49%), being too busy (47%), forgetting to schedule an appointment (29%), anxiety about the exam (23%), and believing there was nothing wrong with themselves and seeing no reason to obtain an exam (18%) (Table 11, Appendix G).

**HPV Information**

Participants were relatively uninformed about HPV: less than 40% of surveyed subjects stated they had heard of HPV before the survey, and participants earned a mean score of only 35 (SD = 22.65) out of a possible 100 points on the HPV knowledge portion of the survey. However, when those participants who had never previously heard of HPV were removed from analysis, the average HPV knowledge score increased by 13 points to a score of 48. A mere 46% of these women with awareness of HPV knew that it can cause cervical cancer, 48% correctly answered that HPV is incurable, and only 32% understood that HPV risk increases as the age of first intercourse decreases.

To further illustrate potential factual deficiencies, subjects' responses to selected HPV knowledge questions were compared with their replies to the corresponding risk behaviors. Results of these comparisons are listed in Figures 17 through 22 (Appendix H).
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Level of Intention

A plurality (41%) of respondents rated their intention to get a Pap smear within the designated time frame to be "extremely likely", compared to the 8% who considered it to be "extremely unlikely" they would obtain one. The midpoint ("neutral") of this Likert-like scale was endorsed by 25% of all subjects. Those who reported more positive intentions (level one) consisted of 19% of respondents, while those who expressed a lower intention (level four) to obtain a cervical exam accounted for 7% (Figure 23, Appendix H).

Within the experimental subject population, comparisons were made of intention levels between participants’ Pap smear history and the behavior of obtaining a cervical examination before the follow-up portion of the study. Of those subjects who received a Pap test before Time 2, a greater percentage (76% and 10%, respectively) of women who had a previous exam described their intention for this behavior as both “extremely likely” and “extremely unlikely”. However, in the three categories between these contradictory levels, the women who had never had a Pap smear exceeded those who had (Figure 24, Appendix H).

When examining the results for those participants who did not obtain a Pap smear before the follow-up, a slightly different outcome was observed. A larger percentage of subjects who had a positive Pap smear history also placed themselves in the “extremely likely” and “extremely unlikely” categories (32% and 12 %, respectively), although the differences seen between the Pap history groups were negligibly smaller and the percentage of those in level one was lower (Figure 25, Appendix H).
Once again, subjects in levels three and four contained a larger percentage of subjects without a prior Pap test, but the disparity between these was greater than that observed with the first group. In a reversal of the findings for level two, women who had a previous cervical examination slightly exceeded the percentage of those women with a negative Pap history.

Stages of Change

Reviewing all subjects' responses to the Stages of Change model, a slight majority (51%) professed being in the maintenance stage (stage five) of obtaining regular, yearly Pap smears. The next largest group of subjects (27%) identified themselves as contemplators (stage two); they did not have a cervical examination during the previous year, but were thinking of getting one before the projected follow-up date.

A nearly equal percentage of participants stated they were in stages four and one (10% and 9%, respectively). Stage four represents action, in which subjects reported having a Pap test during the previous year, although inconsistently prior to that. Precontemplation corresponds to stage one; in which they acknowledged they had not had a cervical smear in the year before, and had no intention of obtaining one prior to the projected follow-up. The fewest number (2%) of participants associated their behavior with that of stage three – preparation. The members of this stage reportedly had a Pap smear scheduled for the month following the survey, but had not obtained an examination during the prior twelve months. Descriptions of the stages of change for other subgroups can be seen in Figure 26 (Appendix H).
Historical Comparisons of Findings

As a further means of describing the subjects in the current study, selected responses were compared with those from previous research possessing analogous questions and participants. DeBuono, Zinner, Daamen, and McCormack (1990) published the results of three studies completed in 1975, 1986, and 1989 at an unnamed northeastern United States university. These findings offered an interesting opportunity to examine possible trends, similarities, and changes in several areas relating to sexual practices and health.

The age of subjects at both the time of the studies and at menarche were very much like those of the current survey. Additionally, the percentage of participants who had previous sexual intercourse remained fairly constant across three decades.

From 1975 to 1986, the number of sexual partners reported by participants was reasonably static. Beginning in 1989, there was a 10% increase in the number of women indicating two to five partners, while those who claimed having had only one partner decreased. The current study showed growth in the percentage of women who had never had sex before, a decline in the category of two to five partners, and an increase of those disclosing more than five sexual partners (Figure 27, Appendix H). In comparison to 78% in the current study, 88% of participants in the 1995 National College Health Risk Behavior survey (Douglas, K.A., Collins, J.L., Warren, C., Kann, L., Gold, R., Clayton, S., Ross, J.G., and Kolbe, L.J., 1997) were reported to be sexually experienced.

Cigarette smoking, another risk factor for HPV, was reported by 28% of the 1975 participants. Over the eleven-year period until the next survey, that number fell to 12%; in 1989 the percentage had risen to 16%. By the time of the current study, the percentage
had increased dramatically, with 40% of the respondents describing themselves as smokers (Figure 28, Appendix H).

The regular use of condoms increased at a steady rate over the course of three decades, beginning with just 12% of subjects in 1975 and culminating with 50% of this study's sexually experienced participants (Figure 29, Appendix H). The current study describes a much larger proportion of women regularly using condoms than the 28% reported in the 1995 National College Health Risk Behavior survey (Douglas et al., 1997).

While the figures associated with condom use seem impressive, a greater proportion of women noted using oral contraceptives in each of the studies. In contrast to the continuous increase seen in habitual condom use, the number of women taking oral contraceptives fell sharply between 1975 and 1986, and then rose again by 8% and 16%, respectively, on the two subsequent questionnaires (Figure 30, Appendix H).
Several hypotheses were proposed for this examination of the sexual behavior and health practices of college women. The main purpose of this research was to investigate the utility of the Theory of Reasoned Action in regard to cervical examinations for this group. Regular, yearly Pap testing is an important tool in the prevention of cervical cancer. It is believed that 90% of new cases of invasive cervical cancer are directly linked to infection with the human papilloma virus, and the prevalence of HPV on college campuses is of epidemic proportions. Original hypotheses stated that the Theory of Reasoned Action would correctly predict the intentions of respondents to obtain a Pap smear and therefore, the performance of this behavior.

The Theory of Reasoned Action and its components of attitudes, socials norms, and intentions have been previously studied with respect to Pap testing. However, each of those inquiries relied upon the participants' self-reported past behavior as the determinant of future actions. In contrast, the current investigation examined subsequent behavior, which respondents predicted during the original survey using preset intentional levels. The inclusion of actual behavior (obtaining or abstaining from a cervical exam) in this research was intended to verify the predictive ability of the Theory of Reasoned Action more accurately.

Since earlier studies successfully demonstrated the Theory of Reasoned Action's prediction of subjects' intentions regarding Pap smear behavior, as well as a variety of other behaviors, it was assumed that the current investigation would replicate these
results and more reliably test the TRA's assumptions about behavior. In regard to the connection of intention and behavior, the Theory of Reasoned Action was validated. This outcome adds strength to the claims of this theory by proving that subsequent behavior is predictable by intentional levels. Such a proof is invaluable when utilizing the TRA in populations with little previous behavioral experience.

However, the research presented in this study did not support the basic components of the TRA. Only the social normative component of the TRA was shown to be a significant predictor of intentions, and its forecasting value was weak. These results infer that attitudes about cervical examinations were not significantly prognostic of the intention to obtain one, and prevailing social norms were able to claim only a small share of predictive weight. However, interpretation of these results must be tempered by statistical power limitations noted earlier in the Results section. That a significant effect was present but unable to be detected is highly possible.

Contrary to these inconclusive results, Barling and Moore (1996) reported that the combination of attitudes and social norms accounted for 36% of the variance in their study. Hennig and Knowles (1990) were able to explain only 12% of the variance in their investigation, although both attitudes and social norms were significant. The research of Hill et al. (1985) stated that 26% of the variance was accounted for, and the attitude component of the TRA made the greatest contribution to the model.

Other plausible explanations exist for the inconsistencies with previous research results and the absence of the attitude component from this investigation's final model. Comparisons of this study to earlier research may be limited by population differences such as age and culture or the conditions delineated for intentions, including scale ranges.
and time periods. While some differences reflect potential limitations of the current study, others may suggest methodical advantage over the previous investigations.

Although the reliability of both the social norm and attitude components was high, it is possible that attitudes were not accurately measured for the purposes of this study. Participants were asked to rate their agreement with several statements regarding Pap testing ("Personally, I think having a Pap smear is…"). It was assumed that women would respond according to their personal evaluation of having a Pap smear. Unfortunately, subjects may have interpreted these statements as evaluations of Pap smears regarding the general population of women, not necessarily their own Pap smear experience. Only one of the thirteen statements was unambiguous regarding its meaning (a five-point scale from "easy for me" to "difficult for me"). Rewording each statement more directly may clarify the intent of the questions.

The lower mean age of this study’s population may be a significant factor when comparing to prior studies. In contrast to this investigation’s mean age of 20.89 years, those of Hennig and Knowles (1990) and Barling and Moore (1996), were 54 years and 24.4 years, respectively; Hill et al. (1985) reported a median age of 34 years. Because the attitudes of a young woman may not be as firmly ingrained as those of a more mature woman, especially regarding newly or never-experienced events such as cervical examinations, it is possible that the Theory of Reasoned Action is neither sufficiently explanatory nor appropriate as applied to this population. Given the supposition of an age effect on attitudes, it would appear that educating women at this stage of life and encouraging positive views of Pap smears would present an outstanding opportunity to establish life-long positive attitudes and behaviors.
In addition to age-related variables, differences in findings may be attributable to culture. All of the previous studies examining the Theory of Reasoned Action and cervical examinations were performed in Australia. Possible disparities between our two cultures exist in social acceptance of Pap smears, levels of education, and individual attitudes toward the examination. Additional study of the TRA and Pap testing with American participants is required to rule out these potentially confounding variables.

The manner in which participants were asked to rate their behavioral intentions may also be a factor in the differences between studies. The current inquiry included fewer categories on the Pap testing intention scale with the belief that the use of five levels was more efficient and the extra categories were unlikely to provide an appreciable amount of additional information. Increased measurement specificity was also addressed with this five-point range. Although a seven-point scale, such as those used by both Hill et al. (1985) and Hennig and Knowles (1990), allows for a larger range of scores to be considered and a potentially greater effect, the strength of such information is questionable. The six-point scale employed by Barling and Moore (1996) imposes a marked split of responses into either positive or negative endorsements. This prohibits a neutral or ambivalent position and is less precise than the scale utilized in the current study.

The current investigation only inquired about one performance of the behavior, whereas two of the prior studies asked participants to predict their intention to establish a recurring behavior (i.e. having a Pap smear every two years). The Theory of Planned Behavior has been deemed better suited to such repetitive actions, and may have been a more appropriate model to use in those investigations. Moreover, if the effect of the
TRA on cervical exam repetition were to be truly tested, continued monitoring over a lengthy time period would be required. Both the cost of such a long-term study and the necessary sample size to battle attrition can be prohibitive.

While previous studies inquired about the intended behavior within a two-year period, due to time constraints, the current study used an abbreviated time frame when inquiring about a participant's intention to obtain a cervical smear. In addition, the preferred frequency for Pap testing in this country is once every year, especially for sexually active young women. This shortened interval should enable a woman to evaluate her intentions more accurately based upon known constraints and future plans. However, such improved precision could also supersede the abilities of the Theory of Reasoned Action to predict intention. Replicating this investigation and increasing the time between survey and follow-up could address this issue.

Whereas the hypothesis regarding Theory of Reasoned Action components and intention was not verified, the theory that Pap smear history would accurately predict intention was confirmed. Respondents who had never received a cervical examination asserted they were less likely to obtain one prior to follow-up than those with at least one previous Pap smear. These results emulate those reported by Seow, Wong, Smith, and Lee in 1995, and support the importance of past experience (without distinction as to the quality or frequency of the event) to Pap test planning. It also appears that attitudes and social norms may have less influence on cervical exam intentions than does experience.

Furthermore, both women's Pap smear history and their stated intention for a future test were predictive of obtaining an examination within the allotted amount of time. Participants who claimed they had a greater intention to get a Pap test and those
with a past smear were also more likely to have received one preceding the follow-up contact. To increase the number of college women who received regular Pap smears, it may be beneficial for educational efforts to focus on women who have yet to initiate this health behavior. Further investigation to discover other factors that affect prediction of Pap testing intention is a valuable objective for future research.

To determine which participant characteristics external to the Theory of Reasoned Action would best predict the behavior of cervical smear acquisition, multiple variables were examined in relation to this action. The elements that were assessed for this exploratory investigation included knowledge about HPV and Pap testing, Pap exam history, risk factors for HPV, barriers to cervical examinations, miscellaneous demographic information, reported stage of change regarding current Pap smear behavior, and intention to obtain a Pap test.

Statistical analysis identified two factors as the most useful in Pap behavior prediction: oral contraceptive use and Pap smear intention. This established that women with stronger intentions to procure an examination and who used oral contraceptives were the most likely to have obtained a Pap smear between the two study phases. Not surprisingly, intention once more demonstrated its effect on behavior performance and corroborated related hypotheses.

Women who were taking oral contraceptives for birth control would also be more likely to have an examination simply because of the yearly requirement to obtain a new prescription. Although women whose last Pap smear was required for birth control were intentionally excluded from hypotheses testing, this characteristic was part of another
question regarding all types of birth control used by the subject and analyzed for its potential as an HPV risk factor.

Because it is possible that those women who endorsed using oral contraceptives obtained their most recent test for reasons other than prescriptions, such as abnormal bleeding or abdominal pain, the elimination criterion and the use of oral contraceptives were not necessarily equivalent. The ambiguity of the question utilized for exclusion, ‘Was your last Pap smear required to obtain birth control?’ allows for interpretations other than oral contraceptives. Physicians and other health care providers customarily fit diaphragms and instruct women about usage; the Norplant contraceptive must be inserted by a health professional. Since these women are either currently or potentially sexually active, a cervical exam is routinely required. Phrasing the exclusionary question with more clarity should prevent misinterpretation, conflicting information, and allow for better differentiation.

Whereas the responses of women with required examinations were excluded from hypotheses testing, they were considered in post hoc analyses. When compared to all other subgroups, women whose last exam had been required were shown to have the strongest levels of intention for Pap examinations. Although this rudimentary evaluation does not attest to statistical significance, it does express basic support for the original hypothesis of a positive relationship between required Pap smears and greater levels of intentions.

Since only a small fraction of women reported an abnormal result from their most recent Pap examination, hypothesis testing for this population’s level of intention and behavior was not performed. While such a low number of abnormalities is reassuring,
given the large percentage of women who have never been tested, there could be a significant number of female students with abnormalities that have yet to be diagnosed. Also, because accurate Pap test interpretation is dependent upon the abilities of the person reading the slide, the potential for human error is always a factor in the reliability of a woman’s Pap smear results.

The hypothesis that the number of barriers reported by respondents would affect their level of intention to acquire a Pap smear was supported by analysis. As the number of barriers to getting a cervical exam increased, participants’ intentions of performing this behavior decreased. And, when all subjects were examined, women without a prior Pap smear endorsed, on average, a higher number of barriers than those with a positive history. Removing barriers to cervical testing through education by eliminating misperceptions and addressing concerns may improve intentions in this population of women. Especially important would be targeting those women who have yet to obtain an exam.

When comparing all subgroups, the highest proportion of women who noted feeling embarrassed or uncomfortable about getting a Pap test was those who had never before experienced an examination. This subgroup of women without a prior Pap smear also chose the “embarrassed/uncomfortable” barrier most frequently in relation to all other potential barriers. Given their lack of experience with the exam, it may be helpful to determine the source(s) of this negative impression and direct interventions toward the origin(s).

Knowledge about cervical examinations was also related to intention and behavior, as was theorized. Participants who received lower scores on the knowledge
portion of the questionnaire displayed a lesser intention to get a Pap smear and fewer of them subsequently completed that task compared to higher scoring subjects. Post hoc analysis showed that women with at least one prior examination also demonstrated superior knowledge about this test than women who without a prior Pap test.

The combination of inferior knowledge, inexperience, and perceived barriers seems consistent with poorer intentions and obtainment of the first Pap test. If the element of cervical smear history was isolated and further scrutinized, it is possible that even one experience of an examination would play a larger role than previously considered in a woman’s decision. Once a woman has completed the examination, her prior beliefs will either be confirmed or negated, but the fear of the unknown should no longer be an impediment. Of special interest would be whether the survey responses of those participants without a previous examination would change after having the test performed and could be the focus of an interesting future study.

Despite the correlations of Pap smear knowledge with both intention and behavior and a strong, positive relationship between Pap and HPV knowledge, no association was observed between HPV knowledge and either intention or behavior. This lack of interaction may be the product of a floor effect created by the disappointingly low scores observed on the HPV knowledge section, where scores ranged from 0 to 83 on a 100-point scale, with an average of 28. These figures suggest very limited knowledge of HPV overall.

If subjects were better informed about HPV, as seems necessary, the result could be significant knowledge-intention and knowledge-behavior interactions. Future research could address this issue using a natural groups design based on subjects who have and
have not previously heard of HPV, implement an HPV cutoff score for division into groups, or randomly assign participants either to a group who receives education about HPV or to a control group, comparing both baseline knowledge and Pap smear intentional levels and behavior performance.

Even though the hypothesis was verified that as the number of barriers increases, subjects’ level of intention decreases, no relationship was found between the number of barriers to procuring an examination and subsequent Pap testing behavior. This contradiction of the hypothesis and inconsistency with the results of related measures is unexpected and lacks simple explanation. The original hypothesis of barrier endorsement and behavior would seem to be supported by the demonstrated exploratory analysis results of Pap-obtaining participants selecting fewer barriers than their Pap-abstaining counterparts. Yet, upon closer inspection, even this difference was very modest.

Such lack of evidence for a barrier-behavior interaction does not eliminate absolutely the existence of a relationship. Although positive, the non-linear relationship between levels of intention and behavior performance may have been a factor in their disparate interactions with barriers. A much greater proportion of women who did not acquire a cervical examination considered themselves to be neutral regarding their intentions. This endorsement may also be deemed as ambivalence toward the exam, creating an outcome such as the one observed.

Issues affecting statistical power may have also contributed to these results, as well as those of other analyses. Although this study can claim an eighty-nine percent response rate for subjects meeting experimental criteria, that translates into data for only 123 women. More than three hundred women were surveyed, yet over one-third were
disqualified because recent cervical examination would preclude the need for testing prior to study follow-up. Slightly fewer women stated their last examination had been required for birth control, and were thus eliminated. Additional participants were removed due to missing data or were unable to be contacted again.

While some excluded subjects fit the criteria of more than one of the first three categories, greater than fifty percent of total respondents were not incorporated into hypotheses analysis. Of those subjects who were included, a twofold disparity in population size was observed between Pap-obtainers and Pap-abstainers.

Exploratory analyses incorporated the responses from all surveyed participants for a more comprehensive and potentially more accurate description of this population of college women. Analyses included assessment of possible disparities between knowledge and risk behaviors, as well as other sexual health and practice information with the potential to assist in campus education efforts.

The HPV-related knowledge and behavior of women who had previously heard of this STD were examined utilizing several survey questions. The decision to remove participants without an awareness of HPV was the result of an attempt to filter those responses that were more likely to be based on speculation, not true knowledge.

Several results of these comparisons were encouraging, yet improvements in crucial knowledge and behaviors are still needed. Although the vast majority stated they currently received a yearly Pap test or intended to do so, only a little more than one-half of women knew cervical examinations could detect HPV. A similar percentage (greater than 50%) of participants knew that condoms helped prevent HPV and either used
condoms “almost always” or “often”. However, approximately one-fifth of respondents stated they never used condoms during sexual intercourse.

About two-thirds of participants knew their risk for HPV was increased by other sexually transmitted diseases and nearly as many stated they had been tested for STD’s. That such a large proportion of women have had an STD test is both encouraging and concerning. From one perspective, it shows that women are acting upon knowledge and fulfilling responsibility for their health. Conversely, it may represent a subject’s personal assessment of her STD risk based on her participation in risky behaviors.

Cigarette smoking was found to be common and knowledge about its risks was discovered to be poor. More than 40% of women stated that they currently or formerly smoked regularly and less than half that number knew this behavior increases their risk for HPV. This large proportion of women who smoke is an unwelcome statistic, as is the lack of knowledge. If the connection of cigarettes and HPV was publicized, there is potential for reducing these numbers. Where traditional anti-smoking rhetoric seems to have failed, HPV information may succeed in changing behavior.

More than 80% of women knew that the risk of HPV increased as their number of sexual partners grew, and over 18% stated they had only one partner until that point. The combination of these facts appears reassuring. In comparison to those participants, more than twice that amount reported between two and four sexual partners, and women with five to ten partners also exceeded that group. The only smaller group was those women who noted having more than ten partners, and this difference was slight. After reassessment, approximately equal proportions of women were aware of this risk and had
two or more sexual partners. If the numerical estimate of each lover's other partners were included, the disparity between knowledge and behavior would rapidly increase.

Finally, the majority of women were unaware that HPV risk was affected by her age at first sexual intercourse. A plurality of women reported their first experience of sexual intercourse was at age sixteen, and the ages of fifteen and between thirteen and fourteen years were noted in comparable proportions. In view of these facts, educational efforts need to begin much earlier than college.

To further understand trends in sexual practices and HPV risk behaviors, response and demographic data from this investigation was compared to similar research populations over a period of three decades, from 1975 to 1998. To judge the generalizability of these responses to other populations of similar age, contemporaneous studies were also considered.

Forty percent of participants in this study described themselves as current or past regular cigarette smokers. Although the earlier studies asked only about current usage, the association between smoking and HPV has been observed with both existing and prior use (Burger et al., 1993; Kataja et al., 1993; Kenney, 1996; Ley et al., 1991; Sikstrom et al., 1996). These results call attention to the large proportion of female cigarette smokers at The University of Montana, which is greater than both their contemporaries and predecessors. Given that other health risks of cigarettes are commonly known, yet seem to be ignored by this population, the correlation to HPV may be another instrument in the fight against smoking on campus.

The use of oral contraceptives, another risk factor for HPV, showed a trend similar to that of cigarette smoking over the three decades. The use of these pills does
not, however, rule out concurrent condom use, which would likely negate the HPV risk increase. While reexamination of the data from the current study could easily address this concern, the lack of necessary information on birth control coincidence from earlier studies prevents the interpretation of any trends.

Over the twenty-four year period, the percentage of women who acknowledged they were no longer virgins remained fairly constant. However, 10% fewer of The University of Montana participants reported experiencing previous sexual intercourse. Since this study surveyed a high proportion of freshman students, the age-related differences of these women may be due to the shorter time they have lived away from home, which likely reduces the number of opportunities for sexual intercourse.

The percentage of women with a lifetime number of six or more sexual partners displayed an increase between the 1980's and 1990's. However, so did the proportion of women who claimed having only one partner up to that point. Therefore, while some women were having sexual intercourse with a larger number of partners, the percentage of women in a monogamous relationship was also growing. Even after accounting for potential differences caused by dissimilar categorization, the reliability of the monogamy data did not change.

A very positive HPV-protective behavior regarding the use of condoms was observed in the current study, with nearly one-half of respondents claiming regular usage. This also represents a high point in utilization over a period of three decades. In addition, it is twice the percentage of women reported by a contemporary survey (Douglas, et al., 1997). While this is an encouraging statistic, it also shows that a nearly equal number of women did not regularly use condoms when having sexual intercourse, leaving them
exposed to the transmission of not only HPV, but also many other sexually transmitted diseases.

The need for traditional cervical examinations in HPV detection and the prevention of cervical cancer may soon be irrelevant. This year, the Washington Post reported that a new genetic test, Hybrid Capture, could replace the Pap smear. The test, which can be performed using the same cell samples as that of the Pap smear, has already been approved as a secondary test when Pap results are inconclusive (approximately 7%). Instead of looking for abnormal cells, it detects the presence of HPV by searching for its DNA. The private corporation that created this test claim it is more accurate and believes it will become the new standard of care ("DNA Test," 2001).

Other recent research studies examined the potential for self-sampling using such a second-generation HPV test, eliminating the need to even visit a physician for testing. In an experiment published by the Journal of the American Medical Association (Wright, Kuhn, Pollack, & Lorincz, 2000), subjects were given specific instructions on how to collect their own samples using vaginal swabs for HPV testing. Although the results were similar to those of conventional cytology (HPV test detected 66% of cervical cancer, 68% by physician administered Pap smear), the implications of such a test are enormous.

Certain barriers to obtaining a Pap smear observed in the current study may be removed if the results reported above can be replicated and self-sampling is approved for standard use. This would be especially helpful to those women who are too busy for an appointment, find the standard examination too painful, are uncomfortable due to prior
unpleasant exams, sexual experiences, or feelings of vulnerability, or women who are too anxious or embarrassed to see a physician.

Such a test may also increase the availability of precautionary testing to women who cannot afford an office visit or allow organizations such as Planned Parenthood to offer large-scale testing to underserved populations. The possibility exists that one day women will be able to test themselves for HPV with the same convenience and anonymity as the blood pressure machines available in most pharmacies.

Given the findings of the present investigation and the unlikelihood that the test described above will be implemented in the near future, other methods for increasing cervical examinations currently exist. The effectiveness of two reminder interventions to increase the use of Pap tests was examined using members of a large HMO (Somkin, Hiatt, Hurley, Gruskin, Ackerson, & Larson, 1997). Participants with no record of a Pap smear in the preceding twenty-six months were randomly assigned to one of three groups: those who received a letter inviting them to make an appointment, those who received the same letter plus a reminder note was placed in their medical chart to alert providers of a patient's need for screening, and those who received no change from their usual care.

The results noted that women who received the letter were more likely to obtain a cervical exam in the six months following the letter than those without a letter (19.5% vs. 9.1%, respectively). Those women with both the letter and chart reminder were more likely to receive a Pap test than those with only the letter, although the difference was minimal (22.8% vs. 19.5%, respectively). The authors noted that further research was necessary to identify a cost-effective reminder system. Although this does not address all
the barriers identified by the current study, nearly one-third of all subjects noted they had delayed having a cervical examination because they had forgotten to make an appointment.

One potential and seemingly inexpensive method of reminding women about Pap testing is already in use on the Internet, and is easily adaptable for use by the university's Curry Health Center. The College of American Pathologists manages a site that allows women to register using an email address to receive a Pap testing reminder on a date they determine themselves (http://www.papsmear.org). This message will include a prompt to call their health care provider and schedule an appointment. At that point, a woman can re-register to receive another reminder in the following year.

Such a reminder system may be a useful and cost-effective tool for the student health service on this campus. Email accounts are offered without cost to all registered students, and the number of email users continues to increase. By programming a computer system to dispatch reminders, the use of secretarial or administrative time, as well as costly postage expenditure is avoided, while Pap testing acquisition may be improved.

Several Internet sites also offer helpful information about cervical examinations that may be especially valuable to college women. The College of American Pathologists' site provides information on the benefits of having a Pap smear and other general information about the test (http://www.cap.org/html/public/pap_broc.html). One portion of the JAMA Internet site, the Women's Health Sexually Transmitted Disease Information Center, provides suggestions on how to talk to a physician about HPV and sexually transmitted diseases (www.ama-assn.org/special/std). Another website
provided by the Gynecologic Cancer Foundation assists women in assessing their personal risk for gynecologic cancer (www.wcn.org/risk/default.asp).

These Internet resources address several barriers noted by participants, including the general anxiety caused by the examination, the concern about a prior or potentially poor result, and the belief that a Pap test is not important or is unhelpful because nothing could be abnormal. The anonymity of the Internet may also be particularly helpful to those college women who are too shy or embarrassed to talk to their health care provider about HPV and other STD’s. By including links to these Internet sites in email reminders or promoting these sites with advertising, students may be both better prepared for their cervical examination and better patients with whom to work.

Suggestions for the extension and improvement of the current investigation have been noted throughout this section, yet the potential for future study seems endless. Given the opportunity to expand upon current study parameters, one addition may be a potentially rich source of information, as well as function as a possible intervention. Participants’ estimates of their personal risk for contracting HPV could be compared to their actual risk by evaluating their responses to the current study’s corresponding HPV knowledge and risk questions.

Although the current study attempted to accomplish similar comparisons of knowledge and behavior using post hoc analyses, it did not ask participants about perceived risk, nor did it generate individual assessments. With the inclusion of a personal risk estimation measure, more robust information about disparities between knowledge and risk behaviors may be produced. A helpful potential consequence of this
information is the ability to create more accurate interventions to address such discordance.

Additionally, using the personal risk estimation tool, subjects could receive feedback regarding their self-determined risk as compared to their reported behaviors. As a result, discrepancies between these variables could be addressed on an individual level, misinformation and knowledge deficiencies attended to, and more reliable risk assessments prepared. Given the possibility that the survey in the current study served as an intervention and increased the likelihood that women without prior knowledge of HPV would obtain a Pap smear, it is also possible that further information, able to be tailored to address specific deficiencies, would have an even greater impact on cervical examination intentions and procurement.

Including a control group and a time-limited follow-up component to determine the program’s efficacy regarding Pap testing intentions and behavior could also enhance future research. The information generated by this process could also be valuable in the development of intervention strategies generalizable to larger campus populations. Eventually, an intervention program could be made available to the general student population through the Curry Health Center or a health-related section on the university’s Internet site.

Institutions of higher education are an important setting for reaching this at-risk population, not only in terms of population density, but also in the role of educator. They are in a unique position of encouraging large numbers of young people to begin a lifelong habit of preventive health. The high rate of HPV within cohorts, the amount of risk-related behavior on this campus, and the low level of knowledge about HPV or even its
existence supports the need and opportunity for this university as well as others to improve the dissemination of information about this infection and its life-threatening potential.

Until a vaccination against HPV is developed and made available to all women, a yearly Pap smear holds the most promise in the prevention of cervical cancer. By proving that intention to obtain a Pap smear can predict the subsequent performance of this behavior, an important tool for health education has been validated. Although this study did not verify the utility of the Theory of Reasoned Action in its entirety, methodological errors and statistical power constraints are such that a decisive analysis cannot be made regarding attitudes and social norms. Therefore, the Theory of Reasoned Action, in general, appears beneficial to the goals of health education and disease prevention, especially in relation to cervical screening within this college population.
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Papanicolaou smear screening in a large health maintenance organization. *Archives of Internal Medicine, 157*(15), 1658-1664.


APPENDIX A

Questionnaire

The following questions are asked for the purpose of designing future health education programs. Some of the questions are very personal. Your answers will be kept in the strictest confidence. Please do not put your name anywhere on the questionnaire. Please answer each question honestly and to the best of your ability. Thank you for your help.

PLEASE CIRCLE OR FILL IN THE BLANK

1) Age: _______________ years old

2) Marital Status
   a) Single - not in a relationship
   b) Single - in a relationship
   c) Partnered
   d) Married
   e) Divorced or separated
   f) Widowed

3) Sexual Orientation
   a) Heterosexual
   b) Homosexual/Lesbian
   c) Bisexual
   d) Other________________________

4) Race
   a) Caucasian
   b) Native American
   c) Asian/Pacific Islander
   d) Hispanic
   e) African-American
   f) Other________________________

5) Year in School
   a) Freshman
   b) Sophomore
   c) Junior
   d) Senior
   e) Other________________________
6) How long have you been living away from home?
   a) Less than 6 months
   b) 6 months to 1 year
   c) Between 1 and 2 years
   d) More than 2 years
   e) Living at home currently

7) Of what religious affiliation do you consider yourself to be?
   a) Protestant
   b) Catholic
   c) Jewish
   d) Native religion
   e) Buddhist
   f) Muslim
   g) Other ___________________________

8) Do you currently, or have you ever, smoked cigarettes regularly?
   a) Yes
   b) No

9) Do you believe you have a problem with alcohol or drugs or have been told you do?
   a) Yes
   b) No

10) How old were you when you had your first menstrual period?
    __________(fill in the blank)

11) Have you ever had sexual intercourse?
    a) Yes
    b) No (If no, skip to question #22)

12) At what age did you first have sexual intercourse?
    __________(fill in the blank)

13) With how many different partners have you had sexual intercourse in your lifetime, even if it was only one time?
    a) Never had sexual intercourse
    b) One only
    c) 2-4 partners
    d) 5-10 partners
    e) More than 10 partners
14) Estimate the number of other people each of your sexual partners have had intercourse with before you. Add them together for a total number.
___________________(fill in the blank with your best estimate)

15) How many partners have you had sexual intercourse with only once?
___________________(fill in the blank with your best estimate)

16) How many times have you had sexual intercourse with more than one partner within a week?
___________________(fill in the blank with your best estimate)

17) To your knowledge, have you ever had sexual intercourse with an uncircumcised man?
   a) Yes
   b) No

18) How often do you use condoms when having sexual intercourse?
   a) Never
   b) Rarely
   c) Sometimes
   d) Often
   e) Almost Always

19) How often are you under the influence of drugs or alcohol when having sexual intercourse?
   a) Never
   b) Rarely
   c) Sometimes
   d) Often
   e) Almost Always

20) How often do you engage in anal intercourse?
   a) Never
   b) Rarely
   c) Sometimes
   d) Often
   e) Almost Always
21) Please circle all of the following types of birth control you currently use:
   a) Birth control pills
   b) Diaphragm
   c) Condom
   d) Norplant
   e) Intrauterine device (IUD)
   f) Contraceptive sponge
   g) Cervical cap
   h) Sterilization
   i) Withdrawal
   j) Rhythm method
   h) Other (please list) ________________________________
   i) None, I do not currently use birth control when having sexual intercourse

22) Have you ever been tested for a sexually transmitted disease?
   a) Yes
   b) No

23) Have you ever been diagnosed with a sexually transmitted disease?
   (If you are unsure, please refer to the list following the next question.)
   a) Yes
   b) No

24) If yes, please circle all that you have you have ever been diagnosed with:
   a) Chlamydia
   b) Genital herpes
   c) Genital warts/Human papilloma virus (HPV)
   d) Syphilis
   e) Gonorrhea
   f) Chancroid
   g) HIV/AIDS
   h) Pubic lice/crabs
   i) Trichomoniasis
   j) Other (please list) _____________________________
   k) Never diagnosed with a sexually transmitted disease

25) To your knowledge, have you ever had sexual intercourse with a partner who had genital warts?
   a) Yes
   b) No

26) Have you ever been sexually abused?
   a) Yes
   b) No
27) Have you ever been sexually assaulted?
   a) Yes
   b) No

28) Have you had a hysterectomy?
   a) Yes
   b) No

29) Have you ever had a Pap smear?
   a) Yes
   b) No (If no, skip to question #38)

30) If yes, how many times have you had a Pap smear?
   a) Once
   b) Twice
   c) Three times
   d) Four times
   e) Five or more times

31) How often do you have a Pap smear?
   (If you have had only one, how often do you plan to have a Pap smear?)
   a) Every 2 years
   b) Every year
   c) Every 6 months
   d) More than once, but not regularly

32) How old were you when you had your first Pap smear? ___________ years old

33) Who accompanied you to your first pap smear?
   a) Mother
   b) Sister
   c) Friend
   d) Father
   e) Other female relative
   f) Other male relative
   g) No one/I went alone
   h) Other

34) When was your last Pap smear?
   a) Less than 6 months ago
   b) 6 months to 1 year ago
   c) Between 1 and 2 years ago
   d) More than 2 years ago
35) Where was your last Pap smear performed?
a) Private physician's office
b) University of Montana Student Health Services
c) Planned Parenthood
d) Other (please list) ________________

36) Was your last Pap smear required to obtain birth control?
a) Yes
b) No

37) Were the results of your last Pap smear abnormal?
a) Yes
b) No

38) How old were you when you first learned about Pap smears?
____________ years old

39) How did you learn about Pap smears?
a) Never heard of them before today
b) Parent
c) Doctor/Nurse
d) Friend
e) T.V./radio/magazine/or newspaper
f) School personnel
g) School course
h) Other____________________

40) Does your mother get Pap smears regularly? (If your mother is deceased, did she get Pap smears regularly?)
a) Yes
b) No
c) Don't know

41) If you haven't had a Pap smear in the last 6 months, do you intend to have one before April 1999 (_______ months)?
(Women with a Pap smear in the last_______months, skip to question #42)

Please rate the strength of your intention by circling the corresponding number.

Extremely Likely Neutral Extremely Unlikely
1 2 3 4 5
42) Have any of the following reasons ever influenced your decision to avoid or delay having a Pap smear? (Circle all that apply below or fill in the blank)

a) I have never delayed or avoided having a Pap smear.  
   (If so, skip to question #44)

b) Forgot to schedule one.

c) Too busy.

d) Too anxious.

e) Uncomfortable or embarrassed about having the test.

f) It hurts.

g) I worry that the results will show something bad.

h) Test is too expensive, I don't have any money or insurance.

i) Don't know a doctor and/or don't know where to go.

j) I know there's nothing wrong with me so why bother?

k) I don't feel comfortable with my doctor.

l) Female doctor wasn't available/my doctor is a male.

m) Feel too vulnerable.

n) Don't think it's important.

o) My family doesn't want me to have the test.

p) My doctor said I don't need one.

q) Unpleasant past sexual experiences.

r) Don't want my parents to know I'm sexually active.

s) The results of my last Pap smear were bad.

t) I had an unpleasant experience in the past during a test. (Please explain)

u1) Other (Please explain) ________________________________

u2) Other (Please explain) ________________________________

u3) Other (Please explain) ________________________________

u4) Other (Please explain) ________________________________

- 77 -
43) Rank the top five reasons in order of importance by writing in the corresponding letter from the previous question.

My most influential reason for avoiding or delaying a Pap smear __________
__________
__________

My least influential reason for avoiding or delaying a Pap smear __________

Personally, I think having a Pap smear is:

44) A good thing Neutral A bad thing
1 ______________ 2 ______________ 3 ______________ 4 ______________ 5

45) Not degrading at all Neutral Very degrading
1 ______________ 2 ______________ 3 ______________ 4 ______________ 5

46) A smart thing to do Neutral A stupid thing to do
1 ______________ 2 ______________ 3 ______________ 4 ______________ 5

47) Not embarrassing at all Neutral Very embarrassing
1 ______________ 2 ______________ 3 ______________ 4 ______________ 5

48) Helpful Neutral Harmful
1 ______________ 2 ______________ 3 ______________ 4 ______________ 5

49) Pleasant Neutral Unpleasant
1 ______________ 2 ______________ 3 ______________ 4 ______________ 5

- 78 -
I think Pap smears are:

50) Easy Neutral Difficult for me
   1 2 3 4 5

51) Not painful Neutral Very at all painful
   1 2 3 4 5

52) Not frightening Neutral Very frightening at all
   1 2 3 4 5

53) Completely Neutral Completely Unreliable Reliable
   1 2 3 4 5

54) A very important Neutral Not an important preventive health measure preventive health measure at all
   1 2 3 4 5

55) Likely to provide Neutral Unlikely to provide helpful information helpful information
   1 2 3 4 5

56) Going to tell me Neutral Going to tell me something I want something I don't to know want to know
   1 2 3 4 5

Rate your level of agreement with the following statements by circling the most appropriate answer.

57) Pap smears:
   a) Test for the presence of cancer of the uterus. Strongly Not Strongly Agree Agree Sure Disagree Disagree
   b) Test for the presence of cancer of the cervix. Strongly Not Strongly Agree Agree Sure Disagree Disagree
Cervical Screening and College Women

c) Test for the presence of any female cancer.  
   Strongly Agree Agree Not Sure Disagree Strongly Disagree

d) Test for the presence of cancer of the bladder.  
   Strongly Agree Agree Not Sure Disagree Strongly Disagree

e) Are 100% reliable.  
   Strongly Agree Agree Not Sure Disagree Strongly Disagree

f) Are only useful for non-virgins.  
   Strongly Agree Agree Not Sure Disagree Strongly Disagree

g) Are only useful for women after menopause.  
   Strongly Agree Agree Not Sure Disagree Strongly Disagree

h) Are only useful for women who have had children.  
   Strongly Agree Agree Not Sure Disagree Strongly Disagree

i) Are only useful for women who are not married.  
   Strongly Agree Agree Not Sure Disagree Strongly Disagree

j) Require a local anesthetic.  
   Strongly Agree Agree Not Sure Disagree Strongly Disagree

k) Require an overnight stay in the hospital.  
   Strongly Agree Agree Not Sure Disagree Strongly Disagree

l) Also test for STD's.  
   Strongly Agree Agree Not Sure Disagree Strongly Disagree

m) Will tell me if I'm pregnant.  
   Strongly Agree Agree Not Sure Disagree Strongly Disagree

n) Should normally be performed twice a year.  
   Strongly Agree Agree Not Sure Disagree Strongly Disagree

o) Should normally be performed once a year.  
   Strongly Agree Agree Not Sure Disagree Strongly Disagree

p) Should normally be performed every other year.  
   Strongly Agree Agree Not Sure Disagree Strongly Disagree

q) Should only be performed when problems occur.  
   Strongly Agree Agree Not Sure Disagree Strongly Disagree

r) Can be obtained at Student Health Services.  
   Strongly Agree Agree Not Sure Disagree Strongly Disagree

s) Can be obtained at Student Health Services without insurance coverage at low cost.  
   Strongly Agree Agree Not Sure Disagree Strongly Disagree
Rate your level of agreement with the following statements by circling the most appropriate answer.

58) Human Papilloma Virus (HPV):
   a) Is the virus responsible for AIDS.
      Strongly Agree Not Sure Disagree Strongly Disagree
   b) Can be prevented by wearing condoms.
      Strongly Agree Not Sure Disagree Strongly Disagree
   c) Is indicated by the presence of genital warts.
      Strongly Agree Not Sure Disagree Strongly Disagree
   d) May have no symptoms.
      Strongly Agree Not Sure Disagree Strongly Disagree
   e) Is not curable.
      Strongly Agree Not Sure Disagree Strongly Disagree
   f) Can cause infertility.
      Strongly Agree Not Sure Disagree Strongly Disagree
   g) Is treated with penicillin.
      Strongly Agree Not Sure Disagree Strongly Disagree
   h) Can cause cancer of the cervix.
      Strongly Agree Not Sure Disagree Strongly Disagree
   i) Can cause cancer of the bladder.
      Strongly Agree Not Sure Disagree Strongly Disagree
   j) Can be detected in a Pap smear.
      Strongly Agree Not Sure Disagree Strongly Disagree
   k) Is increased in terms of risk by smoking.
      Strongly Agree Not Sure Disagree Strongly Disagree
   l) Is increased in terms of risk by having multiple sexual partners.
      Strongly Agree Not Sure Disagree Strongly Disagree
   m) Is increased in terms of risk by having sexually transmitted disease.
      Strongly Agree Not Sure Disagree Strongly Disagree
   n) Is increased in terms of risk by having intercourse at an early age.
      Strongly Agree Not Sure Disagree Strongly Disagree

59) Before today, had you ever heard of human papilloma virus (HPV)?
   a) Yes
   b) No
60) Most people who are important to me think I should have a regular Pap smear.

<table>
<thead>
<tr>
<th>Absolutely True</th>
<th>Neutral</th>
<th>Absolutely Untrue</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

61) My mother/sister/grandmother/daughter thinks I should have a regular Pap smear.

<table>
<thead>
<tr>
<th>Absolutely True</th>
<th>Neutral</th>
<th>Absolutely Untrue</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

62) My partner thinks I should have a regular Pap smear.

<table>
<thead>
<tr>
<th>Absolutely True</th>
<th>Neutral</th>
<th>Absolutely Untrue</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

63) My close friends think that I should have a regular Pap smear.

<table>
<thead>
<tr>
<th>Absolutely True</th>
<th>Neutral</th>
<th>Absolutely Untrue</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

64) My doctor thinks I should have a regular Pap smear.

<table>
<thead>
<tr>
<th>Absolutely True</th>
<th>Neutral</th>
<th>Absolutely Untrue</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

65) Medical opinion in general is that I should have a regular Pap smear.

<table>
<thead>
<tr>
<th>Absolutely True</th>
<th>Neutral</th>
<th>Absolutely Untrue</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
66) Generally speaking, I want to do what my mother/sister/grandmother/daughter wants me to do.

Absolutely True Neutral Absolutely Untrue
1 2 3 4 5

67) Generally speaking, I want to do what my husband/partner/boyfriend wants me to do.

Absolutely True Neutral Absolutely Untrue
1 2 3 4 5

68) Generally speaking, I want to do what my close friends want me to do.

Absolutely True Neutral Absolutely Untrue
1 2 3 4 5

69) Generally speaking, I want to do what my doctor wants me to do.

Absolutely True Neutral Absolutely Untrue
1 2 3 4 5

70) Generally speaking, I want to do what is recommended by the medical profession.

Absolutely True Neutral Absolutely Untrue
1 2 3 4 5

71) What do you think about Pap smears?

(Please explain) ____________________________________________

________________________________________________________

________________________________________________________

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72) How could the experience of having a Pap smear be improved?
(Please explain) ____________________________________________
_________________________________________________________
_________________________________________________________
_________________________________________________________

73) Which of the following best describes your current practice?
After reading through all the choices, choose one (1) that describes you best
And make a check mark next to it:

__________ I have not had a Pap smear in the last year and have no intention of getting
a Pap smear in the next six months.

__________ I have not had a Pap smear in the last year but I am thinking about getting
one in the next six months.

__________ I have not had a Pap smear in the last year but I have an appointment
scheduled to have one in the next month.

__________ I have had a Pap smear in the past year, but my practice has not been
consistent before that.

__________ I have regular, yearly Pap smears.

PLEASE TURN TO THE NEXT PAGE
APPENDIX B

Locator Information

The following information is requested so that we may contact you for a brief follow-up questionnaire in six months. Your answers will be confidential and your name will not appear on any of your response forms. Thank you for your assistance with this study.

AFTER YOU HAVE COMPLETED THE FOLLOWING INFORMATION, PLEASE DETACH THIS FORM FROM THE PREVIOUS PAGES

PLEASE PRINT

NAME _____________________________________________

CURRENT ADDRESS ________________________________

Street Number

City

State                Zip Code

CURRENT PHONE NUMBER ________________________________

PERMANENT ADDRESS ________________________________

Street Number

City

State                Zip Code

PERMANENT PHONE NUMBER ________________________________
Since (date of Time 1 questionnaire) have you had a Pap smear?

(Please circle one)

a) Yes

b) No
APPENDIX D

Informed Consent Form

"Pap Smear Questionnaire"

Principal Investigator: Lori Armstrong, M.A.
Under the direction of Professor Christine Fiore, Ph.D.
The University of Montana

I understand that by signing my name below, I give my informed consent to participate in this study.

1. The procedures to be followed include completing a survey today and a brief follow-up survey in 6 months. The total time for participating in this study is between 45 and 60 minutes, which includes time for your debriefing after your participation is completed.
2. All information will be kept confidential. Your name will not be associated with any of the data collection and only a subject number will be used to identify your data.
3. Psychology 100 students will receive 2 experimental credits for participating in this study.
4. This survey contains questions about health and sexual history, as well as demographics. As such, the information you provide is very personal. Although no undesirable consequences are expected to occur, if you experience discomfort from the survey you may request assistance from the survey administrator, leave the room, and be debriefed about the experiment to such an extent that it does not contaminate the remaining pool of subjects. You may remain under his/her observation until you feel recovered. Should you need further assistance, you will also be given the primary investigator's phone number. In addition, a resource list identifying local mental and physical health services has been included with the survey packet.
5. You may refuse to participate or discontinue participation at any time, without prejudice to you and without jeopardy to any credits you're entitled to.
6. You may contact the Principal Investigator, Lori Armstrong, at 243-4523 to answer any questions you may have about the study. Dr. Christine Fiore is the Faculty Supervisor for this project and may be contacted at 243-4521. Due to confidentiality, no information can be provided to you about any other participating individual.

In the event that you are injured as a result of this research you should individually seek appropriate medical treatment. If the injury is caused by the negligence of the University or any of its employees, you may be entitled to reimbursement or compensation pursuant to the Comprehensive State Insurance Plan established by the Department of Administration under the authority of M.C.A. Title 2, Chapter 9. In the event of a claim for such injury, further information may be obtained from the University's Claims Representative or University Legal Counsel. (Reviewed by University Legal Counsel, July 6, 1993)

I HAVE READ AND UNDERSTAND THE ABOVE AND HEREBY AGREE TO PARTICIPATE IN THIS STUDY.

Participant's signature   Date

Experimenter's signature   Date
APPENDIX E

Institutional Review Board Proposal

Predicting cervical screening in college women: A test of the Theory of Reasoned Action
Investigator: Lori Armstrong, M.A.

1. **Purpose of the Research Project**
The goal of the proposed research project is to survey female college students about their pap smear history, experiences, knowledge, risk factors, attitudes, social norms, and intention to have one in the following six months. This study will also determine their performance of a pap smear in a follow-up questionnaire, therefore testing the efficacy of a popular theory.

2. **Description of Subjects**
Two hundred female college students at The University of Montana will serve as subjects. Subjects in Psychology 100 classes will receive experimental credit for participation.

3. **Recruitment of Subjects**
Subjects will be recruited via an experimental credit sign-up for Psychology 100 and other courses.

4. **Location of the Study**
Surveys will be administered to groups in a classroom reserved for this purpose.

5. **Activities the Subjects Will Perform**
Subjects will complete a questionnaire at the time of administration and a brief follow-up six months later.

6. **Benefits of the Research**
Human Papilloma Virus (HPV) is the most common sexually transmitted disease and a growing epidemic on college campuses. The best way to prevent this infection from developing into cervical cancer is through regular pap smears. The information gathered may be used to design health education programs directed at this high-risk population.

7. **Risks and Discomforts**
No undesirable consequences are expected to occur as this is not an at-risk population.

8. **Correction of Undesirable Consequences to Subjects**
In the event that a subject experiences discomfort he/she will be allowed to leave the room, be debriefed about the experiment to such an extent that it does not contaminate the remaining pool of subjects, and remain under observation until such time that he/she indicates full recovery. He/she will also be given the primary investigator's phone number should he/she need further assistance. In addition, a resource list identifying local mental and physical health services will be included with the survey packet.

9. **Protection of Confidentiality**
The sheet with the subject's contacting information will be detached from the survey immediately following its completion and collected by the administrator. This sheet will have been previously encoded with a number that corresponds to the survey. This number will be the only identifying information on the survey itself. The completed surveys will be kept in a locked file cabinet in the office of the faculty supervisor, separate from the contact sheet. Only the investigator and her research assistant(s) will have access to this information.

10. **Written Consent Form**
A copy of the form to be used for obtaining informed consent is included in this proposal.

11. **Waiver of Informed Consent**
Not applicable.
### APPENDIX F

**Resource List**

**Missoula Area Resources**

<table>
<thead>
<tr>
<th>Service</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Montana Student Health Services</td>
<td>243-2122</td>
</tr>
<tr>
<td>University of Montana Counseling and Psychological Service</td>
<td>243-4711</td>
</tr>
<tr>
<td>Western Montana Regional Community Mental Health Center</td>
<td>728-6817</td>
</tr>
<tr>
<td>Rape &amp; Child Sexual Abuse Counseling</td>
<td>542-1944</td>
</tr>
<tr>
<td>Domestic Violence Crisis Line</td>
<td>542-1944</td>
</tr>
<tr>
<td>AIDS Hotline</td>
<td>1-800-233-6668</td>
</tr>
<tr>
<td>Blue Mountain Clinic</td>
<td>721-1646</td>
</tr>
<tr>
<td>Planned Parenthood</td>
<td>728-5490</td>
</tr>
<tr>
<td>Herpes Hotline</td>
<td>1-919-361-8488</td>
</tr>
<tr>
<td>Sexually Transmitted Disease Hotline</td>
<td>1-800-227-8922</td>
</tr>
<tr>
<td>First Call For Help</td>
<td>549-5555</td>
</tr>
<tr>
<td>Mental Health Association of Montana</td>
<td>442-4276</td>
</tr>
<tr>
<td>Supporters of Abuse-Safe Environments (SAFE)</td>
<td>363-4600</td>
</tr>
<tr>
<td>YWCA Crisis Line</td>
<td>542-1944</td>
</tr>
<tr>
<td>St. Patrick Hospital</td>
<td>543-7271</td>
</tr>
<tr>
<td>Community Hospital</td>
<td>728-4100</td>
</tr>
</tbody>
</table>

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### APPENDIX G

#### Tables

**Table 1**

Survey Questions Utilized for Analyses

<table>
<thead>
<tr>
<th>Category</th>
<th>Question Number(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic Information</td>
<td>1-7</td>
</tr>
<tr>
<td>Pap Smear History</td>
<td>29-35, 37-40</td>
</tr>
<tr>
<td>Cervical Screening Knowledge</td>
<td>57*</td>
</tr>
<tr>
<td>HPV Knowledge</td>
<td>58*, 59</td>
</tr>
<tr>
<td>Reasons for Avoiding/ Delaying Pap Smears</td>
<td>42*</td>
</tr>
<tr>
<td>Stage of Change</td>
<td>73</td>
</tr>
<tr>
<td>Intention to Have Pap</td>
<td>41</td>
</tr>
<tr>
<td>Risk Factors</td>
<td>8-23, 24*, 25-27</td>
</tr>
<tr>
<td>Behavior of Having Pap</td>
<td>Follow-up</td>
</tr>
</tbody>
</table>

*expressed as a condensed score for analyses

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Table 2

Means, Standard Deviations, and Intercorrelations for Subjects' Intention to Obtain a Pap Smear and Theory of Reasoned Action Predictor Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>N</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intention to Obtain Pap Smear</td>
<td>3.57</td>
<td>1.3</td>
<td>123</td>
<td>.30**</td>
<td>0.44**</td>
</tr>
<tr>
<td>Predictor Variable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Attitude Score</td>
<td>71.91</td>
<td>10.25</td>
<td>123</td>
<td>---</td>
<td>.348**</td>
</tr>
<tr>
<td>2. Social Norm Score</td>
<td>72.57</td>
<td>13.89</td>
<td>123</td>
<td>---</td>
<td>---</td>
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</tbody>
</table>

**p<.01. Note: N = 123

Table 3

Summary of Linear Regression Analysis for Theory of Reasoned Action Variables Predicting Intention to Obtain Pap Smear

<table>
<thead>
<tr>
<th>Predictor Variable</th>
<th>B</th>
<th>SEB</th>
<th>β</th>
<th>R²</th>
<th>ΔR²</th>
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</thead>
<tbody>
<tr>
<td>Social Norm Score</td>
<td>.03527</td>
<td>.008</td>
<td>.377**</td>
<td>.215**</td>
<td>.215**</td>
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<tr>
<td>Attitude Score</td>
<td>.02139</td>
<td>.011</td>
<td>.169</td>
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</table>

*p<.05. **p<.01. Note: N = 123

Table 4

Summary of Logistic Regression Analysis Predicting Pap Smear Obtainment: Intention

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE</th>
<th>Exp(B)</th>
<th>Wald Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intention to Obtain Pap Smear</td>
<td>.883</td>
<td>.220</td>
<td>2.419</td>
<td>16.056**</td>
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</tbody>
</table>

**p<.01. Note: N = 123
### Table 5

Pap Smear History by Level of Intention to Obtain a Pap Smear

<table>
<thead>
<tr>
<th>Level of Intention</th>
<th>Prior Pap</th>
<th>History</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td></td>
<td>24</td>
<td>52.2</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td>8</td>
<td>17.4</td>
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<td>2.2</td>
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<td>Total</td>
<td></td>
<td>46</td>
<td></td>
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</tbody>
</table>

- Total n = 46

<table>
<thead>
<tr>
<th>Level of Intention</th>
<th>No Prior Pap</th>
<th>History</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td></td>
<td>17</td>
<td>22.1</td>
</tr>
<tr>
<td></td>
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<td>Total</td>
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</table>

- Total n = 77
Table 6

Summary of Logistic Regression Analysis Predicting Pap Smear Obtainment:
Pap Smear History and Intention

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE</th>
<th>Exp(B)</th>
<th>Wald Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pap Smear History</td>
<td>.971</td>
<td>.455</td>
<td>2.640</td>
<td>4.543*</td>
</tr>
<tr>
<td>Intention to Obtain Pap Smear</td>
<td>.770</td>
<td>.220</td>
<td>.463</td>
<td>12.212**</td>
</tr>
</tbody>
</table>

*p < .05.  **p < .01. Note: N = 123

Table 7

Intercorrelations, Means, and Standard Deviations for Pap Smear Knowledge,
HPV Knowledge, Intention to Obtain a Pap Smear, and Pap Smear Obtainment

<table>
<thead>
<tr>
<th>Variable</th>
<th>HPV Knowledge Score</th>
<th>Pap Intention</th>
<th>Pap Obtainment</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pap Knowledge Score</td>
<td>.346**</td>
<td>-.230*</td>
<td>.297**</td>
<td>58.24</td>
<td>15.85</td>
</tr>
<tr>
<td>HPV Knowledge Score</td>
<td>58.24</td>
<td>-.044</td>
<td>-.391*</td>
<td>27.65</td>
<td>22.48</td>
</tr>
<tr>
<td>Intention to Obtain Pap Smear</td>
<td>2.4</td>
<td>.28</td>
<td>.45</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .05.  **p < .01. Note: N = 123
Table 8

Logistic Regression Clusters

<table>
<thead>
<tr>
<th>Variables Entered As a Cluster</th>
<th>Question Number(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic Information</td>
<td>1-7</td>
</tr>
<tr>
<td>Pap Smear History</td>
<td>29-35, 37-40</td>
</tr>
<tr>
<td>Risk Factors</td>
<td>8-23, 24*, 25-27</td>
</tr>
</tbody>
</table>

*expressed as a condensed score for analyses

Table 9

Independent Variables in Second Phase Logistic Regression

<table>
<thead>
<tr>
<th>Category</th>
<th>Question Number(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationship Status</td>
<td>2</td>
</tr>
<tr>
<td>Cervical Screening Knowledge</td>
<td>57*</td>
</tr>
<tr>
<td>HPV Knowledge</td>
<td>58*, 59</td>
</tr>
<tr>
<td>Reasons for Avoiding/Delaying Pap Smears</td>
<td>42*</td>
</tr>
<tr>
<td>Stage of Change</td>
<td>73</td>
</tr>
<tr>
<td>Intention to Have Pap</td>
<td>41</td>
</tr>
<tr>
<td>Oral Contraceptive Use</td>
<td>21a</td>
</tr>
</tbody>
</table>

*expressed as a condensed score for analyses
Table 10

Summary of Logistic Regression Analysis Predicting Pap Smear Obtainment:
Best Predictor Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE</th>
<th>Exp(B)</th>
<th>Wald Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intention to Obtain Pap</td>
<td>.633</td>
<td>.253</td>
<td>1.883</td>
<td>6.264*</td>
</tr>
<tr>
<td>Oral Contraceptive Use</td>
<td>1.981</td>
<td>.892</td>
<td>1.862</td>
<td>4.928*</td>
</tr>
<tr>
<td>Relationship Status</td>
<td>-.458</td>
<td>.544</td>
<td>.632</td>
<td>.711</td>
</tr>
<tr>
<td>Pap Knowledge Score</td>
<td>.040</td>
<td>.022</td>
<td>1.041</td>
<td>3.495</td>
</tr>
<tr>
<td>HPV Knowledge Score</td>
<td>-.013</td>
<td>.015</td>
<td>.987</td>
<td>.735</td>
</tr>
<tr>
<td>Heard of HPV Prior to</td>
<td>.865</td>
<td>.655</td>
<td>2.375</td>
<td>1.744</td>
</tr>
<tr>
<td>Number of Endorsed</td>
<td>.134</td>
<td>.158</td>
<td>1.143</td>
<td>.713</td>
</tr>
<tr>
<td>Stage of Change</td>
<td>.426</td>
<td>.243</td>
<td>1.531</td>
<td>3.065</td>
</tr>
</tbody>
</table>

*p < .05. Note: N = 123

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Table 11

Five Most Common Reasons For Delaying or Avoiding Pap Smears

<table>
<thead>
<tr>
<th>Reasons</th>
<th>All Subjects</th>
<th>With Prior Pap</th>
<th>No Prior Pap</th>
<th>Pap by Time 2</th>
<th>No Pap by Time 2</th>
<th>Last Pap for Birth Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forgot to Schedule</td>
<td>29</td>
<td>45</td>
<td>36</td>
<td>28</td>
<td>22</td>
<td>31</td>
</tr>
<tr>
<td>Too Busy</td>
<td>47</td>
<td>56</td>
<td>36</td>
<td>36</td>
<td>44</td>
<td>56</td>
</tr>
<tr>
<td>Too Anxious</td>
<td>23</td>
<td>20</td>
<td>26</td>
<td>55</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Uncomfortable / Embarrassed</td>
<td>49</td>
<td>33</td>
<td>67</td>
<td>23</td>
<td>23</td>
<td>38</td>
</tr>
<tr>
<td>Too Expensive / No Money or Insurance</td>
<td>18</td>
<td>18</td>
<td>30</td>
<td>23</td>
<td>25</td>
<td>22</td>
</tr>
<tr>
<td>Know There's Nothing Wrong</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Don't Know Dr./Where to Go</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It Hurts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N = Total number of subjects

Note: Values represent percentage of subjects who endorsed barrier.
APPENDIX H

Figures

Figure 1

HPV-Cervical Cancer Relationship

MODERATING RISK FACTORS:
- Age at 1st sexual intercourse
- Multiple sexual partners
- Cigarette smoking
- Presence of other STD's
- Sexual partner with genital warts
- Casual sex
- Number of sexual partners' previous partners
- Oral contraceptive use
- Unsafe sexual practices: (no condoms, alcohol/drug use)
- Number of sexual partners per week
- Uncircumcised sexual partner

NO DISEASE PROGRESSION

HUMAN PAPILLOMA VIRUS

CERVICAL ABNORMALITY CONTINUUM

CERVICAL CANCER

OTHER UNIDENTIFIED CAUSES

NO INFECTION
Figure 2

HPV-Cervical Cancer Relationship with Pap Smear Intervention

MODERATING RISK FACTORS:
- Age at 1st sexual intercourse
- Multiple sexual partners
- Cigarette smoking
- Presence of other STD's
- Sexual partner with genital warts
- Casual sex
- Number of sexual partners' previous partners
- Oral contraceptive use
- Unsafe sexual practices: (no condoms, alcohol/drug use)
- Number of sexual partners per week
- Uncircumcised sexual partner

NO DISEASE PROGRESSION

HUMAN PAPILLOMA VIRUS

PAP TEST

CERVICAL ABNORMALITY CONTINUUM

OTHER UNIDENTIFIED CAUSES

CERVICAL CANCER

ABNORMALITY DETECTION, TREATMENT & MONITORING MAY PREVENT DISEASE PROGRESSION

NO INFECTION

NO INFECTION
Figure 3
The Theory of Reasoned Action

- INTENTION
- BEHAVIOR

- ATTITUDE TOWARD THE BEHAVIOR
- SUBJECTIVE NORM

- BEHAVIORAL BELIEFS
- EVALUATIONS OF BEHAVIORAL OUTCOMES
- NORMATIVE BELIEFS
- MOTIVATION TO COMPLY
Figure 4

Subjects' College Status

- 100 -
Figure 5

Length of Time Since Subjects Left Home

<table>
<thead>
<tr>
<th>% of Subjects per Time Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Subjects</td>
</tr>
<tr>
<td>All Experimental</td>
</tr>
<tr>
<td>With Prior Pap</td>
</tr>
<tr>
<td>No Prior Pap</td>
</tr>
<tr>
<td>Pap by Time 2</td>
</tr>
<tr>
<td>No Pap by Time 2</td>
</tr>
<tr>
<td>Last Pap for Birth Control</td>
</tr>
</tbody>
</table>

- Currently at Home
- More Than 2 Years
- 1 to 2 Years
- 6 Months to 1 Year
- Less Than 6 Months

(N = 313) (N = 123) (N = 226) (N = 87) (N = 35) (N = 88) (N = 100)
Figure 6

Subjects in Relationships

% of Subjects per Subgroup

All Subjects N = 313
All Follow-up N = 123
With Prior Pap N = 226
No Prior Pap N = 87
Pap by Time 2 N = 35
No Pap by Time 2 N = 88
Last Pap for Birth Control N = 100

Figure 7

Subjects with Prior Sexual Intercourse Experience

% of Subjects per Subgroup

All Subjects N = 313
All Follow-up N = 123
With Prior Pap N = 225
No Prior Pap N = 87
Pap by Time 2 N = 35
No Pap by Time 2 N = 88
Last Pap for Birth Control N = 100
Figure 8
Sexually Abused Subjects

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Subjects</td>
<td>313</td>
</tr>
<tr>
<td>All Experimental</td>
<td>123</td>
</tr>
<tr>
<td>With Prior Pap</td>
<td>226</td>
</tr>
<tr>
<td>No Prior Pap</td>
<td>87</td>
</tr>
<tr>
<td>Pap by Time 2</td>
<td>35</td>
</tr>
<tr>
<td>No Pap by Time 2</td>
<td>88</td>
</tr>
<tr>
<td>Last Pap for Birth Control</td>
<td>100</td>
</tr>
</tbody>
</table>

Figure 9
Sexually Assaulted Subjects

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Subjects</td>
<td>313</td>
</tr>
<tr>
<td>All Experimental</td>
<td>123</td>
</tr>
<tr>
<td>With Prior Pap</td>
<td>226</td>
</tr>
<tr>
<td>No Prior Pap</td>
<td>87</td>
</tr>
<tr>
<td>Pap by Time 2</td>
<td>35</td>
</tr>
<tr>
<td>No Pap by Time 2</td>
<td>88</td>
</tr>
<tr>
<td>Last Pap for Birth Control</td>
<td>100</td>
</tr>
</tbody>
</table>

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Figure 10

Subjects' Sexually Transmitted Diseases By Diagnosis

Note: N = 28. Values for each STD are based upon the number of subjects who previously had received a diagnosis.

No subjects endorsed the diagnoses of syphilis, cancroid, HIV/AIDS, or any other type of STD that was not listed on the survey.
Figure 11

Subjects Whose Most Recent Pap Smear Was Abnormal

Note: All values based on subjects who previously had a Pap smear.
Figure 12

Frequency of Mothers' Cervical Exams

- I Don't Know About Mom's Pap Habits
- Mom Does Not Get Pap Regularly
- Mom Gets Pap Regularly

<table>
<thead>
<tr>
<th>Category</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Subjects</td>
<td>313</td>
</tr>
<tr>
<td>All Follow-up</td>
<td>123</td>
</tr>
<tr>
<td>With Prior Pap</td>
<td>89</td>
</tr>
<tr>
<td>No Prior Pap</td>
<td>123</td>
</tr>
<tr>
<td>Pap by Time 2</td>
<td>27</td>
</tr>
<tr>
<td>No Pap by Time 2</td>
<td>832</td>
</tr>
<tr>
<td>Last Pap for Birth Control</td>
<td>45</td>
</tr>
</tbody>
</table>

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Figure 13

Elapsed Time Since Subjects' Most Recent Pap Smear

- More Than 2 Years
- 1-2 Years
- 6 Months to 1 Year

% of Subjects per Time Period

All Subjects Pap by Time 2 No Pap by Time 2 Last Pap for Birth Control

N = 226 N = 21 N = 25 N = 100

Note: All values based on subjects who previously had a Pap smear
Figure 14

Site of Subjects' Last Pap Smear

<table>
<thead>
<tr>
<th>Category</th>
<th>% of Subjects per Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Subjects</td>
<td>100</td>
</tr>
<tr>
<td>With Prior Pap</td>
<td>80</td>
</tr>
<tr>
<td>Pap by Time 2</td>
<td>60</td>
</tr>
<tr>
<td>No Pap by Time 2</td>
<td>40</td>
</tr>
<tr>
<td>Last Pap for Birth Control</td>
<td>20</td>
</tr>
</tbody>
</table>

N = 226  N = 226  N = 21  N = 25  N = 100

Note: All values based on subjects who previously had a Pap smear.
Figure 15

Subjects Aware Pap Examinations Are Available at UM Curry Health Center

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Figure 17

Subjects' Knowledge of HPV Risk Factors Compared to Their Behaviors: Obtaining Pap Smears

Notes: N = 80. All values based on subjects who previously had a Pap smear, had sexual intercourse, heard of HPV, and did not have a diagnosis of HPV. Subjects who had only one prior Pap smear were asked how often they planned to have one in the future.

Figure 18

Subjects' Knowledge of HPV Risk Factors Compared to Their Behaviors: Condom Use

Notes: N = 96. All values based on subjects who previously had sexual intercourse, heard of HPV, and did not have a diagnosis of HPV.
Figure 19

Subjects' Knowledge of HPV Risk Factors Compared to Their Behaviors: Cigarette Smoking

% of Subjects

Smoking Increases HPV Risk (Correctly Answered)

Subjects Who Smoke

Notes: N = 96. All values based on subjects who previously had sexual intercourse, heard of HPV, and did not have a diagnosis of HPV.

Figure 20

Subjects' Knowledge of HPV Risk Factors Compared to Their Behaviors: STD Testing

% of Subjects

HPV Risk Increased by Diagnosis with Other STD's (Correctly Answered)

Subjects Tested for STD's

Notes: N = 96. All values based on subjects who previously had sexual intercourse, heard of HPV, and did not have a diagnosis of HPV.
Figure 21

Subjects' Knowledge of HPV Risk Factors Compared to Their Behaviors: Multiple Sexual Partners

Notes: N = 96. All values based on subjects who previously had sexual intercourse, heard of HPV, and did not have a diagnosis of HPV. The estimate of partners refers to the total number of previous sexual partner of each subject's total sexual partners.
Figure 22

Subjects' Knowledge of HPV Risk Factors Compared to Their Behaviors: Age at First Sexual Intercourse

Notes: N = 96. All values based on subjects who previously had sexual intercourse, heard of HPV, and did not have a diagnosis of HPV.
Figure 23

Level of Intention Regarding Pap Smear Behavior

- Extremely Likely (1)
- Extremely Unlikely (5)
- Neutral (3)
- Neutral (3)
- Neutral (3)
- Neutral (3)
- Neutral (3)
- Neutral (3)

N = 173  N = 123  N = 89  N = 85  N = 35  N = 88  N = 28
Figure 24

Level of Intention for Subjects Who Obtained a Pap Smear by Time 2

Figure 25

Level of Intention for Subjects Who Did Not Obtain a Pap Smear by Time 2
Figure 26

Stage of Change Regarding Pap Smear Behavior

- Maintenance (5)
- Action (4)
- Preparation (3)
- Contemplation (2)
- Precontemplation (1)
Figure 27

Historical Comparison: Lifetime Number of Sexual Partners

Note: 1998 study offered slightly different categories, which are represented in parentheses. The 1998 categories of 5-10 partners and more than 10 partners were combined for better comparison to the previous studies.
Figure 28

Historical Comparison: Subjects Who Smoke Cigarettes

Note: All subjects had previous sexual intercourse.

Figure 29

Historical Comparison: Subjects' Use of Condoms

Notes: All subjects had previous sexual intercourse. 1998 study categories of "Always/Almost Always" & "Often" and "Seldom/Never" were combined for better comparison to the previous studies' "Always/Almost Always" and "Seldom/Never", respectively.
Figure 30

Historical Comparison: Subjects Using Oral Contraceptives

Notes: All subjects had previous sexual intercourse. 1998 study asked for all forms of contraceptives used while previous studies requested subjects' usual method.