The Impact of Adverse Childhood Experiences on the Utilization of Cervical Cancer Screening

Jennifer Mings
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Abstract

Background: Adverse childhood experiences (ACEs) are prevalent for many women, and have been proven to lead to an increase in chronic diseases including cancer. While the mechanism behind this is not completely understood, the literature suggests that it may be partially due to decreased utilization of cancer screening. Due to the widespread nature of cervical cancer, this literature review seeks to investigate the relationship between ACEs and cervical cancer screening.

Methods: An exhaustive literature search of MEDLINE-PubMed, Web of Science, Public Health Database, and PsycINFO was performed. The keywords used in the search include: adverse childhood experiences, childhood trauma, cervical cancer screening, Pap test, Papanicolaou test, and cancer screening. Each of the selected studies were evaluated via the GRADE system.

Results: Out of the 46 articles that were found in the literature search, only 4 met inclusion criteria for this literature review. Two of the studies were cross sectional surveys, 1 was a prospective cohort study, and the other was a case-control study. Childhood physical and sexual abuse were most commonly found to be correlated with a decrease in correct utilization of cervical cancer testing. Domestic violence in the home was found in 1 study to be correlated with a higher likelihood of ever obtaining a Pap smear, but there was not a statistically significant relationship with correct utilization of the screening test.

Conclusion: Decreased utilization of cervical cancer screening is associated with a history of childhood physical and sexual abuse, as well as several other ACEs that were identified by researchers. It is important for providers to not only continue researching this relationship, but to also develop interventions to help identify patients with a history of ACEs that have not obtained cancer screening.

Keywords: Adverse childhood experiences, childhood trauma, childhood physical abuse, childhood sexual abuse, Pap smear, Pap test, Papanicolaou test

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Degree Name
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Keywords
Adverse childhood experiences, childhood trauma, Pap smear, children, cancer screening, Papanicolaou test

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The Impact of Adverse Childhood Experiences on the Utilization of Cervical Cancer Screening

Jennifer Mings

A Clinical Graduate Project Submitted to the Faculty of the

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Faculty Advisor: Dr. Patrick Boyle

Clinical Graduate Project Coordinator: Annjanette Sommers, PA-C, MS
Biography

Jennifer Mings was raised in Albuquerque, NM, and attended the University of Arizona for her undergraduate degree. She graduated in December 2013 with her degree in Physiology and a minor in Spanish. After graduation, she worked at an inpatient psychiatric hospital and the university hospital as a certified nursing assistant for 3 years. Additionally, she obtained her Master’s degree in Public Health at the University of New Mexico, graduating in May 2017.
Abstract

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Conclusion: Decreased utilization of cervical cancer screening is associated with a history of childhood physical and sexual abuse, as well as several other ACEs that were identified by researchers. It is important for providers to not only continue researching this relationship, but to also develop interventions to help identify patients with a history of ACEs that have not obtained cancer screening.

Keywords: Adverse childhood experiences, childhood trauma, childhood physical abuse, childhood sexual abuse, Pap smear, Pap test, Papanicolaou test
Acknowledgements

I would like to thank my friends and family for their continued support throughout the PA school process. In particular, I would like to thank my boyfriend Adrian for always being there for me when times were tough. I am so thankful to have such a strong support system.
Table of Contents

Table of Contents

Biography..............................................................................................................2
Abstract.............................................................................................................3
Acknowledgements.............................................................................................4
Table of Contents.................................................................................................5
List of Tables and Abbreviations..........................................................................6
BACKGROUND.....................................................................................................7
METHODS............................................................................................................9
RESULTS...........................................................................................................10
DISCUSSION.......................................................................................................18
CONCLUSION....................................................................................................22
References.........................................................................................................23
Table 1...............................................................................................................25
Table 2...............................................................................................................27
List of Tables

Table 1: Quality Assessment of Reviewed Studies
Table 2: Summary of Findings

List of Abbreviations

ACEs       Adverse Childhood Experiences
Pap        Papanicolaou
BRFSS      Behavioral Risk Factor Surveillance System
The Impact of Adverse Childhood Experiences on the Utilization of Cervical Cancer Screening

BACKGROUND
Adverse childhood experiences (ACEs) are traumatic events that occur to an individual anytime during their childhood. ACEs can range from psychological, physical and sexual abuse to household dysfunction including living with a parent with mental illness or substance abuse issues, a parent who is incarcerated, parents who are divorced, or living in a household that has domestic violence.\(^1\) ACEs are not uncommon, with a study performed by the CDC showing that 59.4% of individuals have experienced at least one or more ACE.\(^2\) These events are not only damaging to the children at the time of the traumatic event, but have also been proven to be linked to increased incidence of chronic diseases, alcohol/drug abuse, mental illness, cancer, and impaired cognitive and social functioning as the children mature into adults.\(^3\) The mechanism for why this happens is not fully understood, but theories include alterations in the brain’s structure and neurobiological stress response system,\(^4\) increased engagement in risky health behaviors,\(^3\) and decreased access to healthcare.\(^5\)

Research investigating the link between ACEs and incidence of cancer has only recently been studied, and results have shown that while risky health behaviors such as tobacco use have a strong relationship with an increased incidence of cancer, the relationship cannot solely be
explained by this risk factor.\textsuperscript{6} Another theory hypothesizes that the increased rates of cancer among individuals with ACEs may be due to decreased utilization of cancer screening.\textsuperscript{7-10} While there are several studies looking at individuals with a history of ACEs and their utilization of colorectal screening and mammography, this literature review will investigate the studies that specifically look at cervical cancer screening.

Cervical cancer is a deadly cancer, with approximately 12 000 new diagnoses each year, as well as 4000 deaths.\textsuperscript{11} This death rate has dropped dramatically recently, largely in part to increased utilization of Pap smears.\textsuperscript{12} However, it is well demonstrated in the literature that many women do not obtain Pap smears as recommended by the United States Preventative Task Force.\textsuperscript{13} The recommendations say that a woman should obtain a Pap smear every 3 years when she is over the age of 21, or alternatively she may obtain a Pap smear every 3 years between the ages of 21-30, and then start to obtain an Pap smear/HPV co-test when she is over the age of 30.\textsuperscript{14} In 2015, the CDC found that only 72.9\% of women (without a hysterectomy) over the age of 18 had obtained a Pap smear within the recommended 3 years. This rate was even lower among racial minorities, women with lower levels of educational attainment, and women of low socioeconomic status.\textsuperscript{13}

The clinical question that this literature review addresses is: Do women that have a history of adverse childhood experiences utilize

- 8 -
cervical cancer screening less frequently than women without a history of adverse childhood experiences? This research is important because cervical cancer can be treated when caught early, and death can be avoided if screening tools are utilized correctly. For that reason, it is important for providers to identify any and all barriers that are preventing women from obtaining Pap smears, including a history of adverse childhood experiences. By identifying these barriers, providers can create interventions that target these women as an attempt to help them overcome these barriers.

**METHODS**

An exhaustive online literature search was performed using MEDLINE-PubMed, Web of Science, Public Health Database and PsychINFO databases. The keywords used in the search include: adverse childhood experiences, childhood trauma, cervical cancer screening, Pap test, Papanicolaou test, and cancer screening. The necessary inclusion criteria that were present in each of the studies were that each study must compare women with a history of adverse childhood experiences with women who did not have a history of adverse childhood experiences, and these women must all be over the age of eighteen. The quality of the four eligible articles included in this review was analyzing using the Grading of Recommendations, Assessment, Development, and Evaluation system.\textsuperscript{15}
RESULTS

The online literature search of the 4 major databases yielded 46 articles, but only 4 of the articles were relevant to the clinical question. All 4 of these studies collected data via self-reported surveys. Two of the studies were cross-sectional survey studies,\textsuperscript{8,16} 1 was a prospective cohort study,\textsuperscript{17} and the other was a case-control study.\textsuperscript{7} (See Table 1.) Of note, the 2 cross-sectional survey studies were performed by the same primary author, Héctor Alcalá. However, the data were collected from 2 different populations, with 1 study performed in Tennessee, and the other study performed in Kansas.\textsuperscript{8,16}

Alcalá et al (2017)

The data for this cross-sectional study\textsuperscript{8} came from the 2009 Behavioral Risk Factor Surveillance System (BRFSS), which is a survey that is conducted via telephone. This study used data from the Tennessee BRFSS, as in 2009 it was the only state that asked participants questions about both ACEs and cervical cancer screening. A total of 1971 participants were questioned, of which 1967 were over the age of 21 years. Out of those participants over the age of 21 years, 1527 participants were included, as the remainder of the participants did not complete the survey in full and were therefore excluded. The study utilized yes and no answers in order to dichotomize whether the participant had experienced the event or not. While the BRFSS asked
participants many questions, the researchers focused on the questions asked about ACEs and cervical cancer screening utilization. The cervical cancer screening utilization questions included whether the participant had ever obtained a Pap smear and whether they had obtained a Pap smear within the past 3 years.⁸

The ACEs that the BRFSS asked about are: physical, sexual, or emotional abuse as a child; living with someone who was mentally ill; living with a problem drinker; living with a drug user; living with someone who was jailed; having parents divorced or separated; and living with adults who treated each other violently. The researchers collected descriptive statistics about the prevalence of each of these ACEs and found that 14.13% of participants experience physical abuse as a child, 18.62% experienced sexual abuse, 27.93% experienced emotional abuse, 17.96% lived with someone who was mentally ill, 25.99% lived with a problem drinker, 9.43% lived with a drug user, 6.92% lived with someone who was jailed, 26.47% had parents who were divorced or separated, and 17.58% had adults in the household who treated each other violently. Overall, 6.45% of all study participants had never had a Pap smear, and 14.56% had not obtained a Pap smear within the past 3 years.⁸

Utilizing those descriptive statistics, researchers then ran logistic regressions to determine whether there were any relationships between
specific ACEs and utilization of cervical cancer screening. They found that women who had experienced violent adults in their childhood household were more likely to have obtained a Pap smear than women who experienced other ACEs and women who had no history of ACEs (OR=2.04) and when all confounders were controlled for, this odds ratio increased to 2.36. However, when researchers analyzed the relationship between ACEs and whether a participant had received a Pap smear within the past 3 years they found that women who had experienced physical and sexual abuse as a child were more likely to have not been compliant, in comparison to women experiencing other ACEs and women with no history of ACEs (OR=0.54 and 0.49, respectively). When confounders were controlled in this analysis, only the ACE of childhood sexual abuse had a statistically significant relationship with a decreased likelihood of obtaining a Pap smear within the past 3 years (OR=0.55). However, when the study controlled for all confounders including all other ACE measures, the odds ratio became statistically insignificant due to the upper limit of the confidence interval being over one. The confounders that the researchers included in their analyses include: age, gender, race/ethnicity, educational attainment, current insurance status, hysterectomy status, and other ACE measures. 

Alcalá et al (2018)
The data for this cross sectional survey study came from the 2014 Kansas BRFSS, which was also conducted via telephone. The researchers did not disclose why Kansas was chosen as the state to analyze. A total of 13,356 individuals were surveyed, and of those individuals 11,794 fully completed the survey and were included in the study. Unlike the first study, there were men that were included in this research, with 4,975 participants identifying as male and 6,819 participants identifying as female. All individuals included in the study were over the age of 21. Unlike the Alcalá study done in 2017, this study investigated the relationships between ACEs and multiple different types of cancer screening, which is why male participants were included. However, because this literature review is focused on the utilization of cervical cancer screening, those results will not be further discussed in this research.

Like the first Alcalá study, researchers gathered descriptive statistics about the prevalence of ACES among their participants. The researchers utilized the same descriptors of ACEs as they did in the 2017 study, and found that 15.54% of participants experienced childhood physical abuse, 11.67% experienced childhood sexual abuse, 32.55% experienced childhood emotional abuse, 15.44% lived with someone who was mentally ill, 22.12% lived with someone who was a problem drinker, 9.29% lived with a drug user, 6.19% lived with someone who was jailed
or incarcerated, 25.60% lived with parents who were divorced or separated, and 15.03% lived with adults in the household who treated each other violently.\textsuperscript{16}

Again using logistic regression, researchers determined whether there were any relationships between whether a history of ACEs had an impact on whether she had obtained a Pap smear ever or within the past 3 years. Researchers found that there were no specific ACEs that had a statistically significant impact on whether a woman had ever had a Pap smear. However, the analysis investigating the link between a history of ACEs and having obtained a Pap smear in the past 3 years showed many statistically significant relationships.\textsuperscript{16} The ACEs that showed a correlation with a decrease in utilization of Pap smears within the past 3 years are childhood physical abuse (OR=0.63), childhood emotional abuse (OR=0.84), living with someone who was mentally ill (OR=0.79), and living with a problem drinker (OR=0.79). In addition, the analysis found that with each additional ACE experienced by an individual there was an extra decrease in compliance (OR=0.94).\textsuperscript{16}

The logistic analysis in this study was also adjusted for confounders, including age, educational attainment, insurance status, race/ethnicity, language of survey administration, and cancer status.\textsuperscript{16}

\textit{Mouton et al}
This study is a prospective cohort study that utilized surveys over time to collect data. This study was conducted in twelve Southern states, including Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia. Participants were between the ages of 40-75 years old. These participants for the study were mostly recruited at community health centers, but some were also recruited from the general population. Participants were given an initial baseline survey, and 2 shorter follow up surveys. Each survey questioned the participants about the prevalence of ACEs in their lives, as well as questions about health status, risky health behaviors, and utilization of cancer screening. As this literature review is focused on ACEs and their relationship with cervical cancer screening, that data is what will be discussed. The study had 22,379 participants that finished all of the study’s surveys, and 22,227 were included in the study, as these participants had fully completed the surveys. Similar to the 2 Alcalá et al studies, this study collected descriptive statistics on the specific ACEs that each participant had experienced. The study breaks down these prevalences into male and female, but as this literature review is pertaining to females and cervical cancer screening, only the data of the female participants will be discussed. The specific ACEs that the survey asked participants about were the same ACEs that were asked about in the Alcalá studies, except they added a category for verbal
abuse and neglect. Researchers found that 21% of female participants experienced childhood verbal abuse, 18% experienced physical abuse, 20% experienced sexual abuse, 21% experienced emotional abuse, 8% experienced neglect, 33% had parents who were separated or divorced, 14% had violence towards mother in the home, 25% lived with an alcoholic or drug user, 16% had mental illness in the household, and 12% had a household member in prison.17

Researchers performed a logistic regression to determine whether there was a relationship between number of ACEs and whether the female participant had obtained a Pap smear in the past four years. Unlike the Alcalá studies,8,16 they did not run a logistic regression on whether the participant had ever had a Pap smear. The results showed that with increased number of ACEs, the participant was less likely to have obtained a Pap smear within the past four years. This data show a dose-response relationship, with individuals with one ACE having an OR of 1.02, two ACEs with an OR of 0.84, three ACEs with an OR of 0.67, and four or more ACEs with an OR of 0.74. This study did not analyze the effect that each specific ACE had on the likelihood of obtaining a Pap smear. The logistic regression controlled for many confounders, including age, gender, race, education, income, marital status, smoking status, alcohol consumption, and obesity.17

Farley et al
This case control study\textsuperscript{7} collected data using self-report mailed surveys. These participants were all patients in the Kaiser Permanente healthcare system in California and were recruited by Kaiser via mail. Researchers from Kaiser randomly chose 1314 women who had obtained Pap smears in the past two years and 2897 women who had not. The researchers decided to oversample the women who had not obtained a Pap smear in the past 2 years as they had found in previous research that women who were noncompliant with mammographies were less likely to answer mailed surveys.\textsuperscript{18} Ultimately, the study ended up with 364 respondents who had obtained a Pap smear within the past 2 years and 372 respondents who had not. This study states that researchers utilized a “Trauma History Questionnaire” to assess childhood traumas, and they asked participants about childhood physical abuse, physical neglect, sexual abuse, emotional abuse, emotional neglect, witness of a natural disaster, and news of a death or injury. However, the prevalence of these ACEs was not listed fully in the study, and only the rates of witness to a natural disaster (13\%), sexual abuse (18.4\%), and news of a death or injury (10\%) were given.\textsuperscript{7}

Similar to the other 3 studies,\textsuperscript{8,16,17} researchers ran a logistic regression to determine the relationship between ACEs and utilization of Pap smear testing within the past two years. They discovered that individuals with a history of childhood sexual trauma were more likely
than individuals with no history of any childhood trauma to have not obtained a Pap smear within the past 2 years (OR=0.56). The study states that the rest of the ACEs were also analyzed but none of them had statistically significant results. However, the study does not list any of the ORs except for experiencing natural disaster, which had an OR of 0.78 but the upper limit of the 95% CI crossed one. The logistic regression controlled for confounders including clinic location, demographic characteristics, attitudes about Pap screening, and PTSD diagnosis. 

**DISCUSSION**

As proven by the logistic regressions of the four studies, a history of ACEs decreases the likelihood of the utilization of Pap smears as is recommended by the United States Preventative Task Force. The ACEs that were found most commonly among the studies to be impactful were childhood physical and sexual abuse. Additionally, Alcala et al (2018) determined that several other ACEs ranging from abuse to household dysfunction affected the correct utilization of Pap smears. Interestingly, Alcala et al (2017) also found that having a history of domestic violence in the family led to an increased incidence of ever having a Pap smear, but none of the other studies found statistically significant findings between the lifetime prevalence of obtaining a Pap smear and a history of ACEs. The study performed by Mouton et al did not investigate the relationships between specific ACEs and the utilization of Pap smears, but instead determined whether the number of ACEs that
someone has experienced had any differing impact on the utilization of Pap smears. This research found that with an increasing number of ACEs, the likelihood of having obtained a Pap smear within the past 4 years decreased in a linear-like fashion.\textsuperscript{17} This pattern is similar to a dose-response relationship, although for an unexplained reason the individuals with 4 ACEs had a slightly higher likelihood of obtaining a Pap smear than the individuals with 3 ACEs.\textsuperscript{17}

As childhood physical abuse and sexual abuse were the most common ACEs found to have an effect on utilization of Pap smears, it must be hypothesized as to why this result was found. First, there has been research done showing that childhood physical and emotional abuse leads to antisocial behaviors later in life.\textsuperscript{19} This antisocial behavior may make it difficult for individuals with this background to make and keep appointments, and may even lead individuals to become withdrawn. Secondly, it has been proven that maltreated children have increased risky health behaviors, which could possibly be linked to ambivalence about their health status. Third, with the history of physical and sexual abuse it is likely that the women may have an aversion to being touched. Pap smear exams are very personal exams, and could be considered as overwhelming and violating to someone who experienced trauma to the genital area at a young age. Lastly, as ACEs are shown to be linked to a higher incidence of chronic disease and mental illness,\textsuperscript{1} it is also possible
that the individuals with a history of childhood physical and sexual abuse are also physically and mentally unable to make, keep, or attend these cervical cancer screening appointments.

While childhood physical and sexual abuse were shown to decrease the likelihood of compliant utilization of Pap smears, it should also be discussed that in one study a history of domestic violence in the home was shown to increase the likelihood of ever having a Pap smear. One theory for why this might occur is that these women may have initially had contact with a healthcare provider due to follow up from domestic abuse injuries, who they then subsequently stopped seeing after reaching adulthood and moving away their abuser. As this relationship was only seen in 1 study, it is also possible that the relationship was an anomaly in the data.

Each of the studies in this literature review has limitations, and this literature review itself also has limitations that must be discussed. First, all 4 of the studies\textsuperscript{7,8,16,17} are at risk for recall bias, as they all gathered data via self-report surveys. Not only were the events being questioned about sensitive topics that some individuals may not want to recall, but they were also events that happened to individuals in the past that they may have purposefully blocked out of their memory. Secondly, the Mouton et al study\textsuperscript{17} was problematic because while it claimed to be a prospective cohort study, the researchers did not include all of the data.
from each of the 3 surveys. It is unknown whether participants changed or added answers over the years, and a comparison of the answers as well as an analysis of the change in participants’ answers is needed to fully analyze the study. Third, the Farley et al study\textsuperscript{7} was difficult to interpret because the researchers did not fully include all of the descriptive statistics for the prevalence of ACEs among the participants, nor did they include all of the ORs for their logistic regression.

In terms of the limitations of this literature review, it is difficult to compare and summarize these studies accurately as each of the studies surveyed individuals of different age groups. Although they were all over the required age of 18, Mouton et al\textsuperscript{17} specifically surveyed individuals between the ages of 40-75 years old, which could likely lead to different survey answers than those between the ages of 18-40 years old. Additionally, the surveys had a different standard for what is considered compliant utilization of Pap smears. While the two Alcala studies\textsuperscript{8,16} asked participants if they had obtained a Pap smear within the past 3 years per United States Preventative Task Force recommendations, Mouton et al\textsuperscript{17} looked at compliance within the past four years and Farley et al\textsuperscript{7} used the timeline of two years. These differences in timelines may alter the results, but it is unknown.

\textbf{CONCLUSION}
Overall, the research shows that with an increased number of adverse childhood experiences, there is a decreased likelihood that a patient will utilize cervical cancer screening. In particular, the research shows that women who experienced childhood physical and sexual abuse are most at risk. Further research is necessary to identify what barriers these women are experiencing that are preventing them from obtaining these crucial healthcare services. Research further exploring the relationship between adverse childhood experiences and cervical cancer screening should also be performed to strengthen the evidence that has been discovered. In addition to further research on this topic, interventions should be implemented to identify women who have experienced adverse childhood experiences as well as interventions to identify women with known histories of adverse childhood experience who have not obtained a recent Pap smear. With this research and these interventions, it may be possible to increase the correct utilization of Pap smears and further decrease the prevalence of cervical cancer and/or cervical cancer deaths.
REFERENCES


### Table 1: Quality Assessment of Reviewed Articles

<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Downgrade Criteria</th>
<th>Upgrade Criteria</th>
<th>Quality</th>
</tr>
</thead>
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<tr>
<td></td>
<td></td>
<td>Limitations</td>
<td>Indirectness</td>
<td>Inconsistency</td>
</tr>
<tr>
<td>Alcala et al (2017)&lt;sup&gt;8&lt;/sup&gt;</td>
<td>Cross sectional survey study (2017)</td>
<td>Not serious</td>
<td>Not serious</td>
<td>Not serious</td>
</tr>
<tr>
<td>Mouton et al&lt;sup&gt;17&lt;/sup&gt;</td>
<td>Prospective cohort study,</td>
<td>Not serious</td>
<td>Not serious</td>
<td>Not serious</td>
</tr>
<tr>
<td>Farley et al.⁷</td>
<td>Case-control study</td>
<td>Not serious</td>
<td>Not serious</td>
<td>Not serious</td>
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a The study shows that women who experienced the ACE of physical abuse were 0.54 times less likely to have obtained a Pap smear within the past 3 years, while the women who had experienced the ACE of sexual abuse were 0.49 times less likely to have obtained a Pap smear. These odds ratios became larger when controlled for likely confounders, and increased once more when adjusted for all possible confounders, showing that the residual confounders being controlled resulted in an underestimation of the effect of ACEs on utilization of Pap smears.

b The study shows a dose response relationship between the number of ACEs that a woman experiences and the decreased likelihood that she will obtain a Pap smear. However there is no difference between 3 ACEs and 4 ACEs so the dose response is not profound over 3 ACEs.

c Researchers from the Kaiser Permanente healthcare system helped collected data, and the patients came from Kaiser facilities, but the study did not otherwise mention Kaiser, and did not benefit Kaiser in any way.

d The study shows that women who experienced the ACE of sexual abuse were 0.56 times less likely to have not obtained a Pap smear within the past two years but we did not feel as though this was significant enough to upgrade the study.
Table 2: Summary of Findings from Reviewed Articles

<table>
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<tr>
<td>Number (n) of study participants</td>
<td>1527 women&lt;sup&gt;a&lt;/sup&gt;</td>
<td>4975 men; 6819 women&lt;sup&gt;b&lt;/sup&gt;</td>
<td>7196 men; 15 031 women&lt;sup&gt;c&lt;/sup&gt;</td>
<td>364 women (Pap); 372 women (no Pap)</td>
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<tr>
<td>Prevalence of abuse</td>
<td>Physical (PA)</td>
<td>14.13%</td>
<td>15.54%</td>
<td>18%</td>
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<td></td>
<td>Sexual (SA)</td>
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<td>Verbal (VA)</td>
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<td>21%</td>
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<tr>
<td></td>
<td>Emotional (EA)</td>
<td>27.93%</td>
<td>32.55%</td>
<td>21%</td>
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<tr>
<td></td>
<td>Neglect (N)</td>
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<td>--</td>
<td>8%</td>
</tr>
<tr>
<td>Prevalence of household dysfunction</td>
<td>Lived with someone who was mentally ill (MI)</td>
<td>17.96%</td>
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<td>16%</td>
</tr>
<tr>
<td></td>
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<td>25.99%</td>
<td>22.12%</td>
<td>25%</td>
</tr>
<tr>
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<td>Lived with a drug user</td>
<td>9.43%</td>
<td>9.29%</td>
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<td></td>
<td>Household member who was in jail</td>
<td>6.92%</td>
<td>6.19%</td>
<td>12%</td>
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<tr>
<td>Prevalence of parental relationship issues</td>
<td>Lived with divorced/separated parents</td>
<td>26.47%</td>
<td>25.60%</td>
<td>33%</td>
</tr>
<tr>
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<td>Domestic violence in house (DV)</td>
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<tr>
<td></td>
<td>17.58%</td>
<td>15.03%</td>
<td>14%</td>
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<tr>
<td>Other ACEs</td>
<td>News of death or injury</td>
<td>--</td>
<td>--</td>
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</tr>
<tr>
<td>Logistic Regression Results</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>More likely to obtain Pap Smear</td>
<td>DV: OR 2.04&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Less likely to obtain Pap Smear</td>
<td>PA: OR 0.54&lt;sup&gt;e&lt;/sup&gt;</td>
<td>SA: OR 0.49&lt;sup&gt;e&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PA: OR 0.63&lt;sup&gt;f&lt;/sup&gt;</td>
<td>EA: OR 0.84&lt;sup&gt;f&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MI: OR 0.79&lt;sup&gt;f&lt;/sup&gt;</td>
<td>Alc: OR 0.79&lt;sup&gt;f&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 ACE, OR = 1.02&lt;sup&gt;g&lt;/sup&gt;</td>
<td>2 ACEs, OR = 0.84&lt;sup&gt;g&lt;/sup&gt;</td>
<td>3 ACEs, OR = 0.67&lt;sup&gt;g&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup> Over the age of 21 years, in Tennessee  
<sup>b</sup> Over the age of 21 years, in Kansas (ACE prevalence results for male and female participants)  
<sup>c</sup> In the 12 of the Southern United States (ACE prevalence results for female participants only)  
<sup>d</sup> 364 women who had obtained a Pap smear in the past 2 years and 372 women who had not, all living in California  
<sup>e</sup> Confounders controlled for in regression analysis: Age, gender, race/ethnicity, educational attainment, current insurance status, hysterectomy status, and other ACE measures.  
<sup>f</sup> Confounders controlled for in regression analysis: Age, educational attainment, insurance status, race/ethnicity, language of survey administration, and cancer status.  
<sup>g</sup> Confounders controlled for in regression analysis: Age, gender, race, education, income, marital status, smoking status, alcohol consumption, and obesity.  
<sup>h</sup> Confounders controlled for in regression analysis: Clinic location, demographic characteristics, attitudes about Pap screening, and PTSD diagnosis.

Abbreviations: Adverse childhood experiences (ACEs); domestic violence in house (DV), emotional abuse (EA), lived with a problem drinker (Alc), lived with someone who was mentally ill (MI), odds ratio (OR), physical abuse (PA), sexual abuse (SA), verbal abuse (VA)