Gender Differences in Software Piracy: The Mediating Roles of Self-Control Theory and Social Learning Theory

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Abstract

To date, researchers have shown that males are more likely to pirate software from the Internet than females (Hollinger, 1993; Hinduja, 2001, 2003). The purpose of this paper is to determine if low self-control or social learning theory can reduce the gender gap in software piracy. Using a nonrandom sample of college students, in four individual structural equation models, this study provides important results. First, gender differences do exist in software piracy from the Internet. Second, low self-control reduces the gender differences in software piracy. Third, social learning theory reduces the gender gap in software piracy. Fourth, the gender differences in software piracy disappear when low self-control and social learning theory are in the same model. Therefore, the main conclusion of this study is that low self-control and social learning theory are necessary in the study for a complete understanding of software piracy.

Introduction

The prolific use of personal computers has built a demand for intellectual property (e.g., software). Unfortunately, as the use of computers has grown, so has software piracy. Sims, Cheng, and Teegan (1996) defined software piracy as the illegal copying of computer software. This definition includes software that is stored on business computer hard drives, floppy disks, CD-ROMS, and the Internet, as well as software on personal computers. Software piracy is an emerging criminal behavior that is occurring at severe rates. For instance, the Business Software Alliance (2003) point out that most of the computer software on personal computers has been pirated. Further, the Business Software Alliance notes that several thousand jobs and several billion dollars in wages have been lost due to software piracy. Some have argued that these types of losses may reduce the incentive to develop, research, and produce new and innovative software, because pirates are able to misuse the software without any cost to themselves (Luckenbill & Miller,1998).

Because software is a form of intellectual property, it falls under the protections of United States copyright laws (Luckenbill & Miller, 1998). Specifically, the Copyright Act of 1976 provided the basic framework for the current copyright laws (Im & Koen, 1990).

This piece of legislation made copyright violations a federal misdemeanor offense, with stiff penalties for repeat offenders. In 1982, the Piracy and Counterfeiting Amendment Act made mass copyright violations of movies and music a felony. The Copyright Felony Act of 1992 made the reproduction of software and copyright violations involving ten or more copies a felony (Koen & Im, 1997). The No Electronic Theft (NET) Act made distributing copyrighted materials over the Internet a felony offense (Koen & Im, 1997). Hagan and Kay (1990) argued that the copying of computer software fits under the umbrella of white-collar crime because it causes social injury in the form of lost income and profit and comes with the threat of criminal justice penalty. Therefore, software piracy is a form of white-collar crime that has been actively prosecuted in the United States (see Motivans, 2004, for reviews of these laws).

Researchers have indicated that a gender gap in software piracy is present (Hollinger, 1993; Sims et al., 1996; Hinduja, 2003). The purpose of this study is to advance our understanding of software piracy by determining if self-control theory and social learning theory can account for the gender gap in software piracy, using structural equation modeling. This study is unique in that no study to date has used these two theories to examine this gender gap. Further, this study will provide specific evidence that suggests the plausibility of both theories to explain male and female crime.

To make this advance, the study outlines the gender gap in software piracy. It then presents self-control theory and its literature, and followed by social learning theory and its literature. The methods used for the study and the results come next. A discussion of the implications of findings concludes the study.

Gender Gap and Software Piracy

At least since Adler (1975) and Simon (1975), the gender variation of criminal behavior has been an important area for criminologists. Researchers have shown that males commit more violent and property types of offenses than females (Blumstein, Cohen, Roth, & Visher, 1986; Steffensmeier & Allan, 1996; Greenfeld & Snell, 2000). This is the case whether data are collected using self-reports or official crime data (Heimer & DeCoster, 1999). These issues suggest that females and males are quite disparate in their offending.

The issue of gender differences in crime is relevant in white collar-crime due to the definition of white-collar crime. White-collar crime is sometimes viewed as an offense-related behavior and, in other instances, as an offender-specific behavior (Geis & Goff, 1983; Simpson, 2002). Daly (1989, p. 770) suggested, “If the offender-specific approach is used, Medicaid fraud by a doctor is viewed as a white-collar crime, but it is not a white-collar crime if a citizen performs the behavior. However, if the offense-specific behavior approach is used the Medicaid fraud is a white-collar crime no matter who performed the behavior.”

The definition of white-collar crime shapes the focus of gender in this area. Generally, few lines of research examine this issue. The first line of research involves official statistics. Because of limited information (i.e., the Uniform Crime Reports does not track white-collar crime statistics), Durose and Langan (2004) indicated that the gender gap in fraudulent offending that includes embezzlement, fraud, and forgery is closing. However, even when considering the second line of research that involves the actual examination of gender differences in white-collar crime offending, little research is able to offer a definitive answer of this form of female criminality. In the end, these two lines of research suggest very different trends for gender in white-collar crime. The offense-specific approach suggests that women's commission of white-collar crime is rising, whereas, the offender-specific approach suggests that women are not committing white-collar crime as often as men.

One form of white-collar crime that seems to be consistent with the findings of the offender-specific approach is software piracy (but this form is viewed by the government under the offense-specific approach). That is, a gender gap is present in software piracy. Hagan and Kay (1990) noted that copying computer software is more likely to be done by males than by females. Hollinger (1993) used a nonrandom sample of college students to show that males are more likely than females to have received or given a copy of commercially sold "pirated software" to someone else. Specifically, Hollinger reported that three males to every one female are likely to engage in software piracy behavior. Further, gender differences increased when the frequency of software piracy increased.

Sims et al. (1996) used a nonrandom sample of college graduate and undergraduate students majoring in business to develop a profile of software pirates. Using a t-test, they found that males pirated software more frequently than females. Sims et al. argued that this finding is consistent with the academic dishonesty literature (see Lobel, 1993; Whitley et al., 1999, for reviews of gender differences in academic dishonesty).

Hinduja (2003) used a nonrandom sample of college undergraduate students majoring in a variety of disciplines to examine the trends and patterns of their software piracy. Hinduja used the following six items to examine software piracy: "I have uploaded/downloaded at least one piece of software to/from someone"; "how frequently do you pirate per week?"; "Number of mediums used to pirate software"; "degree of hardcore pirate"; "How often in the last month have you pirated software?"; and "How often in the last year have you pirated software" (p. 54). The results indicated sex differences in the frequency and intensity for software piracy. Specifically, Hinduja found that men were more likely to engage in software piracy with greater frequency and intensity than women. Therefore, given this evidence, the present study expects to find a gender gap in software piracy.

While the gender gap is of interest to criminologists, a central challenge to criminologists is to provide theoretical explanations of criminal behavior. New or

redeveloped theories must devote some attention to this issue. As new and redeveloped theories have done so (see Gottfredson & Hirschi, 1990; Akers, 1998), criminologists have debated these and other theoretical explanations of the gender gap. Specifically, the generalizing of many major crime theories has been called into question because they may not adequately take female issues into account (Daly & Chesney-Lind, 1988; Berger, 1989; Chesney-Lind, 1997; Naffine, 1997). However, other criminologists disagree with this and argue that general theories of crime use measures that are important to criminal behavior regardless of gender (Sutherland, 1949; Merton, 1975; Hirschi, 1969; Cernkovich & Giordano, 1979; Smith, 1979; Smith & Paternoster, 1987; Hickman & Piquero, 2001).

In the case of software piracy, Hagan and Kay (1990) used power-control theory to examine violations of patents and copyrights including the copying of computer software without copyright permission. Specifically, they used a sample of adolescents to show that parental controls and attitudes toward risk-taking were not able to eliminate the effect that gender has on copyright violations. While Hagan and Kay advanced the understanding of this form of white-collar crime, their study has limits. The Internet was not widely available at the time of their article and was not their focus. Further, they were unable to use a fully developed measure of low self-control or a more complete version of social learning theory because these were not developed at the time of their publication. The present study advances the understanding of gender and software piracy by using Gottfredson and Hirschi's (1990) theory and Akers's (1998) social learning theory to explain the gender gap in software piracy.

Self-Control Theory

Gottfredson and Hirschi's (1990) theory assumes that individuals are rational decision makers who weigh the potential pleasure of an act against the potential pain of an act. When the potential pleasure of an act outweighs the potential pain of an act, Gottfredson and Hirschi also assume that individuals will choose and perform pleasurable acts over painful acts. Crime is a potentially pleasurable act of force or fraud that an individual may pursue in self-interest. In Gottfredson and Hirschi's view, crimes are characterized as being short-lived, immediately gratifying, simple, easy, and exciting. These acts are attractive to individuals who have an inability to restrain themselves (i.e., individuals who possess low self-control). Individuals with low self-control are characterized as impulsive, insensitive, physical rather than mental, risk-takers, nonverbal, and attracted to simple and easy tasks. Individuals with low self-control do not need any special form of motivation to commit a crime. All that is necessary is an evaluation of the act being more pleasurable than painful. In this decision-making process, the level of self-control affects this evaluation. Gottfredson and Hirschi (1990, p. 95) state: "… the dimensions of self-control, are in our view, factors affecting calculation of consequences of one's acts. The impulsive or shortsighted person fails to consider the negative or painful consequences of his acts;

the insensitive person has fewer negative consequences to consider; the less intelligent person also has fewer consequences to consider (has less to lose)." In other words, individuals with low self-control are likely to see the potential for immediate benefit (i.e., pleasure) from crime rather than the potential for long-term consequences for themselves or for others. Individuals with low self-control are usually the products of poor or ineffective parenting.

In Gottfredson and Hirschi's view, parents are supposed to effectively and efficiently perform four tasks to develop proper levels of self-control in their child. First, parents are to develop an emotional bond with their child. Second, parents are to monitor their child to gather behavioral information. Third, parents are to analyze the behavioral information to determine if it is deviant. Fourth, if the behavior is found to be deviant, parents are to apply non-corporal discipline to correct the behavior. Parents who are unable to perform these tasks consistently and effectively will instill low self-control in their child, thereby increasing the likelihood that their child will evaluate a crime as being pleasurable rather than painful.

Gottfredson and Hirschi's theory has implications for the gender gap. That is, they would expect parents to apply the parental management tasks differently for males and females. In their view, out of fear for their child's future, parents are more likely to monitor their female child's behavior, thereby providing more behavioral information for the female child than for the male child. Because parents have more behavioral information for the female child, parents are more likely to recognize deviant behavior and apply punishment. Thus, the female and the male child are likely to have different levels of self-control. While Gottfredson and Hirschi assert that the mechanism for criminal behavior is the same for males and females (i.e., low self-control), they are clear in their assertion that criminal behavior and self-control levels will be different for males and females.

To date, most of the researchers who have examined Gottfredson and Hirschi's theory have focused on low self-control. In fact, most researchers have shown that low self-control has a link with several deviant behaviors, including alcohol and drug use (Gibbs & Giever, 1995; Arneklev, Grasmick, Tittle & Bursik, 1993; Forde & Kennedy, 1997; Winfree & Bernat 1998), skipping class (Gibbs, Giever and Martin 1998), physical aggression (Avakame, 1998), academic dishonesty (Tibbetts & Myers, 1999; Gibbs & Giever, 1995; Bichler-Robertson, Potack, & Tibbetts, 2003; Cochran, Wood, Sellers, Wilkerson, & Chamlin, 1998), traffic violations (Keane, Maxim, & Teevan, 1993; Piquero & Tibbetts, 1996; Tibbetts, 1997), bullying (Unnever & Cornell, 2003), and shoplifting (Piquero & Tibbetts, 1996; Tibbetts, 1997). This research has culminated in a meta-analysis of more than 20 studies that has shown low self-control to have a moderate link with crime.

While Gottfredson and Hirschi have been criticized for their theory's stance on gender (see Miller and Burack, 1993, for a review), researchers have used low self-control to address the gender gap in offending. Keane et al. (1993) examined the drinking and driving among adults, using seat belt use as a measure of self-control. They found that seat belt use had a negative link with drinking and driving. Importantly, Keane et al. found that female drivers were less likely to use seat belts and that when female drivers did not use seat belts, they were more likely to drink and drive. They interpreted these findings as support for Gottfredson and Hirschi's contention that low self-control could be used to explain both male and female drinking and driving. Burton, Cullen, Evans, Alarid, and Dunaway (1998) used a community sample to show that low self-control could account for the gender gap in crime. However, when major variables (e.g., strain, differential association, and definitions) from other theories were introduced into their models, the self-control effect became insignificant.

Longshore, Turner, and Stein (1996) used a sample of offenders to show that low self-control did not account for the gender gap in offending and that the link between low self-control, gender, and crime was not yet resolved. Others used the same data to arrive at different findings (see Piquero & Rosay's [1998] and Longshore & Turner's [1998] comments). LaGrange and Silverman (1999) provided the first examination (using 2000 Canadian high school students) that showed low self-control could reduce, but not eliminate, the gender gap. Further, LaGrange and Silverman showed that the specific characteristics of low self-control could be used to explain male and female delinquency. Tittle, Ward, and Grasmick (2003) used a community data set to show that low self-control (i.e., using a behavioral measure) was able to account for the gender gap. Blackwell and Piquero (2005) used a community data set to show that low self-control explained male and female criminality.

While the researchers have found mixed results with regard to low self-control explaining the gender gap, the results appear to be more stable concerning the link it has with software piracy. Higgins and Makin (2004a) used a sample of college students to show that low self-control had a link with software piracy. Consistent with the recommendations from Pratt and Cullen (2000) and Evans, Cullen, Burton, and Benson (1997) that a test of self-control without social learning theory variables is misspecified, they were able to show that the effect of low self-control was exacerbated by social learning theory. In a follow-up study, Higgins and Makin used a sample of college students and showed that low self-control again had a link with software piracy. However, unlike Higgins and Makin (2004a), Higgins and Makin (2004b) found that only association with deviant peers exacerbated the link that low self-control had with software piracy. Higgins (2005) used a sample of college students that confirmed the findings from Higgins and Makin, that low self-control has a link with software piracy that is exacerbated by associating with deviant peers. Unfortunately, the literature is

not clear about whether low self-control can account for the gender gap in software piracy. However, given Gottfredson and Hirschi's view that the theory can account for everyone's criminality, this study hypothesizes that low self-control will eliminate the gender gap in software piracy.

Social Learning Theory

Social learning theory is perhaps the most popular crime theory in criminology. Akers's (1998) version of the theory contains four individual-level concepts: differential association, definitions, imitation, and reinforcement. Differential association refers to an individual's exposure to criminal behavior and criminal attitudes through association with others who are involved in crime (e.g., being exposed to others who pirate software). Definitions refer to an individual's positive or negative attitudes toward criminal behavior, which are rationalizations and neutralizations about the attributes of the criminal behavior (e.g., positive attitudes toward pirating software). Differential reinforcement refers to the rewards that come from the criminal behavior (e.g., an individual may gain popularity among his or her peer group for pirating software). Imitation refers to an individual modeling his or her behavior after another individual's behavior (e.g., the individual may use the same techniques to pirate software as another person after watching the individual).

In Akers's (1998) presentation of these concepts, the causal logic is quite complex. Akers's theory requires that each concept be measured, taking into account the causal logic. This undertaking is well beyond the scope of the present study. However, Akers was very clear that support for any of the social learning theory measures is overall support for the theory.

Akers's theory also takes into account gender differences in offending. In a general sense, the gender gap is based on differences in socialization. Akers assumes that socialization is different for females. That is, girls and women are subjected to more conforming-inducing social control. Under this view, males are seen to have more deviance or crime producing patterns of association than females, ranging from involvement with gangs to associating with peers who have deviant attitudes or behaviors. In short, social learning theory holds that the difference between male and female crime is due to differences in the social learning theory ratios. In other words, social learning theory can be used to examine the differences in crime by examining the differences in males' and females' social learning experiences, environments, and situations conducive to crime rather than conformity. As Akers put it, "If an individual female scores higher on these [social learning] variables in the deviance-prone direction for a particular type of behavior than an individual male, she will have a higher probability than he will of committing the deviant act" (1998, p. 339). This should not be taken to imply that the social learning theory variables are hypothesized to completely mediate that link between gender and crime. In fact, social learning theory variables are

hypothesized to account for a substantial portion of individual variations and stabilities in crime and to mediate a substantial portion of the effects of structural variables (e.g., gender) on crime. Akers stated,

> If substantial portions of the variations (by normally accepted standards in social science) are accounted for by the variables in the theory, then it is confirmed. Weaker relationships can still be taken as support for the theoretical model in its weak form … adequate and acceptable tests of the theory, then, do not need to demonstrate absolute confirmation or falsification, but on the preponderance of credible evidence . . . Are the direction and relative magnitude of the relationships in support of or counter to the theory? (1998, p. 340-341)

Therefore, Akers suggests that, realistically, social learning theory can account for some portion of the variation and stability in crime and mediate some portion of the link between gender and crime.

Akers presents a substantial literature review of the empirical studies on social learning theory linking the theory to drug use, tobacco use, and alcohol use. In regards to gender, Jensen (2003) used a sample of students to show that social learning theory is able to account for the gender gap in most forms of offending. Lee, Akers, and Borg (2004) used a sample of adolescents to examine the structural effects on alcohol and marijuana use. The study found that one gender having scores higher than one on the social learning theory variables for alcohol and marijuana use increases the probability of gender having a link with this behavior. Further, social learning theory was able to partially mediate the link between gender, alcohol, and marijuana use as was expected by the theory.

Skinner and Fream (1997) showed that social learning theory variables (i.e., associating with deviant peers and definitions) had a link with software piracy, which they interpreted as support for Akers's theory. Recently, Higgins and Makin (2004) showed that social learning theory variables (i.e., associating with deviant peers and definitions) had a link with software piracy, and they, too, interpreted their findings as support for social learning theory. However, to date no study has determined that social learning theory can account for the gender gap in software piracy. Therefore, the present study expects that social learning theory will reduce the gender gap in software piracy.

Self-Control Theory and Social Learning Theory

Social learning theory has two important implications for self-control theory. First, because low self-control remains relatively stable, the dynamic measures of social learning theory may be suitable for policy development (see Arneklev et al., 1999, Turner & Piquero, 2002, for support of the relative stability hypothesis). Second, some

research recognizes that self-control theory and social learning theory may overlap and be connected in complicated ways (Agnew, 1995; Evans et al., 1997). For instance, Gottfredson and Hirschi (1987, 1990) anticipated that the effect of self-control depends to a large extent on various forms of opportunity and other constraints (e.g., deviant peer association). At its core then, self-control theory is inclusive and sensitive to the implications of measures that are attributed to social learning theory. That is, although Gottfredson and Hirschi (1987, 1990) and Hirschi and Gottfredson (1993, 1994) are clear that low self-control is the most important measure in the theory, the effect of low self-control on crime may not be independent of other influences. While Gottfredson and Hirschi (1987, 1990) and Hirschi and Gottfredson (1993) are not clear about the total number of the constraints and how these constraints may effect low self-control, the focus of the present study is limited to measures that come from the social learning theory: differential association (i.e., deviant peer association) and definitions (i.e., attitudes).

Differential Association

The role of differential association (i.e., deviant peer association) has been studied in great detail within criminology (Akers, 1998; Warr, 2002). The research on deviant peer association indicates that it has one of the most consistent and strongest links with criminal behavior (Agnew, 1995; Akers, 1998; Sellers et al., 2000; Warr, 2002). Some have argued that the strong support for the link between deviant peer association and crime occurs because the measure captures all of the aspects of the social learning process (Akers, 1998; Krohn, 1999)--thus, Akers's claims that the strong support for deviant peer association is support for social learning theory.

Gottfredson and Hirschi (1987, 1990) recognized substantial support for the link between deviant peer association and crime by stating, that "people acquire the propensity to delinquency, find delinquent friends, and then commit delinquent acts, including serious criminal acts" (p. 597). This view suggests a process of acquiring a self-control level, followed by delinquent friendships and delinquency. Gottfredson and Hirschi (1990) later argued

> . . . adventuresome and reckless children who have difficulty making and keeping friends tend to end up in the company of one another, creating groups made up of individuals who tend to lack self-control. The individuals in such groups will therefore tend to be delinquent, as will the group itself. (p. 158)

This view implies that groups themselves may facilitate or reduce the difficulty for crime to occur. In the empirical literature, Wright, Moffitt, and Caspi (1998) showed that the link between low self-control and delinquency can be moderated by deviant peer association. Gibson and Wright (2001) showed that high associations with delinquent peers interact with low self-control for a better explanation of co-worker delinquency.

Higgins and Makin (2004) showed that differential association moderated the link between low self-control and software piracy. Longshore, Chang, Hsieh, and Messina (2004) used longitudinal data and structural equation modeling to show that drug-using peers mediated the link between low self-control and drug use.

Definitions.

Akers (1985, 1998) suggested that peer groups not only shape self-control, but through deviant peer association they shape an individual's definitions of crime (i.e., attitudes for crime). The shaping of an individual's attitudes toward crime occurs through a subtle peer influence process where peers reinforce definitions toward behavior.[2] That is, definitions are learned in a process of exposure to others--deviant peer association--in the socialization process. Once learned, these definitions motivate the individual to commit or refrain from law violations (Akers, 1998).

Gottfredson and Hirschi (1990) do not directly account for attitudes toward crime. However, they do argue that individuals do not learn lack of self-control in groups. Gottfredson and Hirschi (1990) implied that the process of deviant group membership they outlined earlier still applied. In other words, low self-control is acquired first, then is followed by the other pieces of social learning theory.

In an attempt to clarify this process, Bolin (2004) examined the roles of self-control, attitudes, and perceived opportunity in the context of academic dishonesty. Using a national sample of 853 university students, Bolin showed that the effect of self-control on academic dishonesty was mediated by attitudes. This finding was interpreted to mean that attitudes favorable to academic dishonesty provide an individual with low self-control and an opportunity to behave impulsively. Unfortunately, Bolin's study was limited in that it did not use a measure of deviant peer association to account for the group process and it did not frame the study as an integration between self-control theory and social learning theory.

While social learning theory and self-control theory differ about the use of deviant peer associations and the development of definitions, Gottfredson and Hirschi (1987, 1990) and Bolin (2004) suggest a process for studying deviant peer association and attitudes in self-control theory. Higgins and Makin (2004) found that definitions and differential association were moderated by the link between low self-control and physical media piracy. However, no study, to the author's knowledge, has examined the mediating qualities of social learning theory for the link that low self-control has with digital piracy. Because Akers (1998) suggested that support for any of the social learning theory variables would be support for his theory, an expectation here is that a combined model that contains both social learning theory and self-control theory will eliminate the gender gap in software piracy.

The Present Study

The purpose of the present study was to determine whether self-control theory and social learning theory can account for the gender gap in software piracy. This study expected that gender would have a link with software piracy, specifically that males pirate more than females. It also expected that self-control theory can eliminate this gender gap in software piracy and that social learning theory can reduce the gender gap in software piracy. Finally, this study expected that self-control theory and social learning theory in a single model can eliminate the gender gap in software piracy.

The results of this study broaden our understanding of software piracy. Further, the results from this study will help criminologists understand how self-control theory and social learning theory can reduce or eliminate the gender gap in software piracy. The results will provide a possible framework for reducing the instances of software piracy.

Method

This section presents the sample, procedures, and measures that were used in this study.

Sample and Procedures

After obtaining Institutional Review Board and Human Subject Protection Review, the researchers gave a self-report questionnaire to college students at an eastern university in the United States in the fall 2004 semester.* The students for this study came from four classes that were open to all majors and three classes that were open only to Justice Administration majors. All of the classes were housed in the College of Arts and Sciences (i.e., Liberal Arts). The researchers asked the students who were present the day of questionnaire administration to take part in the study. The researchers told the students of the voluntary nature of the study and that all responses were anonymous and confidential. This set of procedures produced 392 completed questionnaires.

The sample was an average 21.37 years old (+/- 2.27). The sample was 61 percent females and 39 percent males. The average major for the sample was business administration. Finally, the average class rank for the sample was sophomore.

The nature of the sample may be questioned based on population and cross-sectional design. The nature of digital piracy dictates that a university sample--like the one used in the present study--is warranted. Hinduja (2001, 2003) has identified that the individuals most likely to perform digital piracy from the Internet are in college, as opposed to those not in college or those in the working world. Further, the cross-sectional nature of the data may be problematic for some because the present study

expects a specific causal logic. Two points speak to this concern. First, Gottfredson and Hirschi (1987, 1990) argued that cross-sectional data was most appropriate to examine their theory. Second, the present study will examine alternative models. With these arguments in mind, the cross-sectional sample of university students is suitable for the present study.

Measures

The measures for this study included low self-control, differential association, definitions, software piracy, and gender (see Appendix A for the items used in this study).

Software Piracy. The software piracy measure is Hinduja's (2001, 2003) measure of on-line pirating behavior. This measure has five items that are used as independent indicators in the structural equation model. The first item was coded as 0 to 31 or more times per week. For instance, to determine the number of mediums used to pirate software the students were asked to indicate how many ways they transferred files. These mediums included: Web browser, to/from the Usenet newsgroups, using instant messaging program, using a chat program, logging into a file server to upload/download to/from others, and setting up a file server to allow others to do the same. The students indicated which medium they used, with a 0 for no and 1 for yes. For the degree of hardcore pirate measure, which measured how deeply entrenched the individual was in software pirating, the students responded to eight items. The eight items were: I know what warez is; I know what a .nfo is; I know what 0-day means; I have set up a FTP server on my computer system to allow others to log in and upload/download pirated software to/from me; the majority of my file transferring takes place at night (11 p.m. to 7 a.m.); I leave my computer on for extended periods of time (i.e., overnight) to transfer files; I have a personal account on one or more FTP sites; I can find almost any piece of commercial software I might need on the Internet either through friends or searching/browsing through file archives. If students had performed any of these tasks, the items were coded with a 0 for no and a 1 for yes. The fourth and fifth items of this measure were coded with values ranging from 0 to 36 or more times. These coding schemes are consistent with Hinduja (2001, 2003) who found a single item solution from factor analysis using a Varimax rotation and proper internal consistency.

Low Self-Control. The low self-control measure for this study was the popular 24-item Grasmick, Tittle, Bursik, and Arneklev (1993) scale. The scale is a second-order factor. That is, the 24-items of the scale coalesce into six subscales (i.e., impulsivity, simple tasks, risk-taking, physical, self-centered, and temper) and then form self-control (Tittle, Ward, & Grasmisk, 2003). The students marked their responses to the items using a four-point, Likert-type scale. The answer choices ranged from 1 (strongly disagree) to 4 (strongly agree). In this study, each subcomponent of the scale was used as an indicator of low self-control in the structural equation modeling analysis, similar to Longshore et al. (2004). Therefore, the psychometric properties of the subscales of the

scale become important. The impulsivity scale had an acceptable internal consistency of .73, a mean of 7.91, and a standard deviation of 2.08. The simple tasks scale had an acceptable internal consistency of .74, a mean of 8.01, and standard deviation of 1.90. The risk-taking scale had an acceptable internal consistency of .77, a mean of 9.51, and standard deviation of 2.15. The physical scale had an acceptable internal consistency of .78, a mean of 10.58, and a standard deviation of 2.39. The self-centered scale had acceptable internal consistency (.78), a mean of 7.46, and a standard deviation of 2.11. The anger scale had acceptable internal consistency (.80), a mean of 8.44, and a standard deviation of 2.45.

Differential Association. The association with digital pirating peers (i.e., differential association) measure was a composite of six items from Krohn, Skinner, Massey, and Akers (1985). The items asked students the following: how many of their best (male/female) friends performed digital piracy from the Internet; how many of their friends (male/female) that they have known the longest have performed digital piracy from the Internet; and how many of their friends (male/female) whom they are around the most pirated digital media from the Internet. The students provided this information using five answer choices (1 = none, 2 = just a few, 3 = about half, 4 = more than half, and 5 = all or almost all). Higher scores on the scale indicated more differential association. Each male or female model had acceptable internal consistency (males = .97 and females = .98), and the mean of the male scale was 8.29 with a standard deviation of 3.92. The female scale had a mean of 6.39 and a standard deviation of 3.60.

Definitions. The measure of definitions was the students' attitudes toward software piracy in general, from Rahim, Seyal, & Rahman (2001). This scale captured definitions using eleven items. This measure was relevant because Rahim et al. (2001) hypothesized that the scale is a general measure of attitudes toward piracy that would account for all forms of this behavior. Further, the scale is designed to capture the beliefs that are favorable or unfavorable to software piracy, which is consistent with social learning theory. The students marked their responses using a four-point, Likert-type scale, using "strongly disagree" and "strongly agree" as anchors. Higher scores on the scale indicated stronger or more favorable attitudes toward software piracy. The scale had acceptable internal consistency (.85), and a scree test showed that the scale was unidimensional. The scale had a mean of 28.71 and a standard deviation of 5.77.

Analysis

The analysis for this study utilizes a variation of structural equation modeling. SEM (using Mplus 3.12) is used to test the hypothesized relations between sex, low self-control, social learning theory, and software piracy. SEM was performed for three reasons. First, SEM was used to simultaneously examine the pathways in the model. Second, SEM allows the examination of the links between the measures that are not

influenced by measurement error, providing the purest links between the measures. Third, the examination provides the use of maximum likelihood estimates that remain robust when the data depart from normality.

SEM analysis was carried out in several stages. The first stage was the development of a measurement model that used confirmatory factor analysis (CFA). The measurement model is concerned with how well the observed indicators measured the hypothesized latent variable. Thus, this model does not contain the gender measure. In the measurement model, using CFA, two types of validity are examined: convergent and discriminate (Kline, 2005). Convergent validity appears when the models have an adequate fit to the data (Hayduk,1987). The data are found to fit the model when the chi-square is not significant. However, Mueller (1995) has written that the chi-square is rarely not significant in practice. Therefore additional fit indices are examined (i.e., Comparative Fit Index [CFI], Root Mean Square Error of Approximation [RMSEA], and Standardized Root Mean Square Residual [SRMSR]). Hu and Bentler (1999) indicated through simulation studies that a CFI of .95 or above, RMSEA of .05 or below, and a SRMSR of .08 or below all indicate good model fit. Discriminate validity is found when the latent measures correlate, but not perfectly, or when the covariances are in the correct direction (Kline, 2005). Further, Kline indicated that factor loadings that are .50 and above indicated strong loadings and provided a quality measure of the latent variable. Following the measurement model, a series of structural models are developed to examine the hypotheses for the present study.

Results

Measurement Model

Appendix A contains the factor loadings for each observed indicator for the measurement model. In this measurement model, the six indicators (i.e., impulsivity, simple tasks, risk-taking, physical, self-centered, and temper) are hypothesized to link to low self-control. Differential association and definitions are hypothesized to link to social learning theory. Finally, the five items from Hinduja (2001, 2003) are hypothesized to link to software piracy.

In two of the latent measures (i.e., software piracy and low self-control), two observed indicators did not provide large factor loadings. For software piracy, two items fell below Kline's (2005) standard of .50 for large factor loadings. Specifically, "how frequently do you upload/download pirated software to/from others" and "degree of hardcore pirate indicators did not meet this standard." To be consistent with Hinduja (2001, 2003), these items were retained in the model and the analysis.

In the low self-control latent measure, two indicators did not provide factor loadings to meet Kline's standards. Specifically, the simple tasks measure and the physical

measure did not meet this standard. These measures were retained to be consistent with previous research in the area (Higgins, 2005; Higgins & Makin, 2004a, 2004b).

The measurement model was able to demonstrate proper convergent validity through adequate model fit. As Mueller (1995) predicted, the chi-square for the model was statistically significant, which indicated a poor fit of the model. However, when consulting the other fit measures (e.g., CFI = .96; RMSEA = .046; SRMR = .044), they indicated proper fit of the model. In addition, the measurement model was able to demonstrate proper discriminate validity through the latent measure correlations. Specifically, low self-control correlated with software piracy (.34); social learning theory correlated with software piracy (.71); and social learning theory correlated with low self-control (.55). The evidence from the measurement model suggests that the observed indicators provide a satisfactory fit of the data and are indicators of their latent measures.

Structural Models

To address the expected links for this study, a series of structural models are developed and presented. In assessing the fit of the models, the same fit statistics as in the measurement model are calculated and presented. The standards for these fit statistics remain the same as in the measurement model.

The first expected link to be examined is the expectation that there is a gender gap in software piracy. Table 1 presents the structural model that directly links gender to software piracy. This link is statistically significant, with an unstandardized coefficient of 46.69 and a standardized coefficient of .24. The data fit this model quite well. That is, the chi-square statistic is not significant, suggesting a proper fit between the data and the model. Further, the CFI =.98, RMSEA=.046, and SRMR=.032 support the contention that the data fit the model. In essence, these results support the contentions from Hollinger (1993), Sims et al. (1996), and Hinduja (2003) that males and females pirate software at different rates, suggesting a gender gap does exist.

Table 1. Decomposition of Standardized Effects for Sex, Software Piracy, Low Self-Control, and Social Learning

	Endogenous Measure		
	Low Self-Control	Social Learning	Software Piracy
Sex			
Direct Effect	.30*	.64*	.24*
Indirect via Low Self-Control	---	---	.09*
Indirect via Social Learning theory	---	---	.11*
Indirect via Self-Control and Social Learning Theory	---	---	.003
Low Self-Control			
Direct Effect	---	---	.31*
Social Learning Theory			
Direct Effect	---	---	.17*

Table 1 also presents the results that examine Gottfredson and Hirschi's (1990) contention that low self-control can account for the gender gap in offending. That is, the present study expects that low self-control can eliminate the gender gap in software piracy. To address this expectation, a direct and indirect effects structural model was examined. Specifically, gender was linked directly to software piracy and gender was indirectly linked with software piracy through low self-control.

The model fits the data well. To that end, the chi-square statistic is statistically significant, suggesting the model does not fit the data (chi-square =90.615, df=.45; p-value=.00). However, additional fit statistics (CFI=.95, RMSEA=.05, SRMR=.04) suggest that the data fit the model very well. The attention now turns to the expected links in the model. Gender has a significant indirect link with software piracy through low self-control (unstandardized coefficient = 18.19 and standardized coefficient .09). This result does not eliminate the direct link that gender has with software piracy (unstandardized coefficient = 29.40 and standardized coefficient = .15). The results

from this model indicate that low self-control is unable to eliminate the gender gap in software piracy. This is incongruent with Burton et al. (1998), but is more in line with LaGrange and Silverman's (1999) results. That is, low self-control is not able to eliminate the gender gap in software piracy, but low self-control is able to reduce this gap. In short, this does not satisfy the expectations of this study.

Low self-control has a direct link with software piracy (unstandardized coefficient = .23.27 and standardized coefficient = .31). This result is consistent with Pratt and Cullen's (2000) result that low self-control will have a moderate effect with crime. This result further supports the link between low self-control and software piracy that is consistent with previous research (Higgins, 2005; Higgins & Makin, 2004a).

Table 1 also presents the results that examine Akers's (1998) contentions that social learning theory measures are able to account for some of the variation in gender and offending. Specifically, the present study expected that social learning theory would reduce the gender gap in offending because males and females were socialized into offending differently.

Similar to the low self-control model, a direct effects and indirect effects model were developed for this examination. However, the first issue is the fit of the data to the model. The fit statistics indicate a proper fit between the data and the model. Specifically, the chi-square is statistically significant (chi-square=34.82, df=22, p-value=.04), which does not suggest proper fit between the data and the model, but is consistent with the structural equation modeling literature that suggests this rarely will be nonsignificant (Mueller, 1995). Other fit statistics support the contention that these data fit this model (CFI=.98, RMSEA=.04, SRMR=.03).

In these data, gender has an indirect link with software piracy through social learning theory (unstandardized coefficient = 21.65 and a standardized coefficient = .11). This indirect effect is unable to eliminate the direct link between gender and software piracy (unstandardized coefficient = 26.82 and standardized coefficient = .14). However, the direct link in this model is reduced from the original gender-only model when comparing the standardized coefficients. This supports Akers's (1998) contention that social learning theory can reduce the gender gap in offending, and it meets the expectation of the present study. In addition to these links, social learning theory has a direct link with software piracy (unstandardized coefficient = 19.45 and standardized coefficient = .64). This is larger than the direct link that low self-control had with software piracy. This result supports previous research that showed social learning theory had a link with software piracy (Skinner & Fream, 1997; Higgins & Makin, 2004a).

Table 1 also shows a combined model that expects low self-control and social learning theory to mediate the link between gender and software piracy. In this model, the direct link between gender and software piracy is also examined. The fit statistics indicate that the data do fit this model. The chi-square, like many of the earlier models, does not

suggest that the data fit the model (chi-square = 200.26, df=78, p-value=.000). However, the additional fit statistics indicate that the data do fit the model. Specifically, the CFI=.95, the RMSEA=.05, and the SRMR=.07 do suggest that the data fit the model.

In this model, gender has a significant indirect effect on software piracy through low self-control (unstandardized coefficient = 8.41 and standardized coefficient = .04). However, gender does not have a significant indirect effect on software piracy through social learning theory (unstandardized coefficient = 18.69 and standardized coefficient = .10). These links are able to eliminate the direct link between gender and software piracy (unstandardized coefficient = 22.32 and standardized coefficient = .12). The results from this model indicate that social learning theory and self-control theory are able to eliminate the gender gap in software piracy. This supports the hypothesis that a complete test of self-control theory requires the inclusion of social learning theory (Evans et al., 1997; Pratt & Cullen, 2000).

Discussion

This study recognizes that a gender gap exists in software piracy, much like in other forms of crime. As of yet, researchers have not determined if self-control theory and social learning theory can account for this gap. In self-control theory, Gottfredson and Hirschi (1990) asserted that low self-control could account for the gender gap. Further, Akers (1998) has asserted that his theory can account for the gender gap. Therefore, the purpose of this paper was to establish a gender gap in software piracy and to determine if low self-control and social learning theory can account for this gap.

First, the analysis revealed that a gender gap exists in software piracy. This result is consistent with other researchers. For instance, Hollinger (1993) found that male and female college students in the liberal arts pirated software at different rates. Sims et al. (1996) demonstrated that male and female business students pirated software at different rates. Hinduja (2003) showed that male and female college students across all disciplines pirated software differently. Much like the present study, Hollinger (1993), Sims et al. (1996) and Hinduja (2003) found that males were more likely than females to pirate software. While additional research is necessary to firmly establish a gender gap in offending, researchers may be cautioned to view these results as suggestive of a gender gap.

Second, the results indicate that low self-control was able to reduce the gender gap in software piracy, but it was unable to eliminate the gender gap in piracy. These results appear to be congruent with LaGrange and Silverman, who found similar results. This result can be interpreted to mean that low self-control has an important role in the criminality decision-making process for males and that feminist theorists may be correct. That is, low self-control may be more focused on male issues, since males are

presumed to commit most of the crime. This is important for software piracy, as males are presumed to perform this behavior more than females. In either event, the results indicate that low self-control is better at explaining male software piracy than female software piracy.

Third, the results indicate that social learning theory was able to reduce the gender gap in software piracy. Akers (1998) is clear that social learning theory is not hypothesized to eliminate the gender gap in offending, but only to reduce this gap (although the elimination of the gender gap would be maximally supportive). These data indicate that the learning process for males and females in regards to software piracy is different, suggesting that males are more likely than females to be exposed to software pirating peers who hold software pirating attitudes. This result is consistent with Akers's (1998) assertion and the results from Lee et al. (2004) that social learning theory would reduce the gender gap. Therefore, social learning theory is able to reduce the gender gap in software piracy.

Fourth, in the final model, which empirically compares the main measures from the two theories, the results indicate that self-control theory and social learning theory completely eliminate the gender gap (i.e., the effect of gender on software piracy). Individually, gender maintains a significant link with software piracy through low self-control. The results indicate that the gender effect on software piracy is mediated by social learning theory. This result is supportive of social learning theory. That is, Akers (1998) does not believe that the social learning theory model will completely eliminate the gender gap, but he is not closed to the possibility. As stated earlier, Akers (1998) argued that social learning theory would substantially reduce the gender gap to nonexistence in some instances. While Akers (1998) did not anticipate this instance, the results from this study show that when self-control theory is present in the model, social learning theory is a better method of eliminating the gender gap in software piracy. This result is consistent with Burton et al. (1998), who found that low self-control lost its significant effect on criminal behavior for males and females when social learning type measures were introduced into the model. Because self-control theory was able to reduce, but not able to eliminate the gender gap in software piracy, and because social learning theory was able to reduce, but not able to eliminate the gender gap, together they can eliminate the gender gap in software piracy. These data support the contention that researchers should use both self-control and social learning theory in understanding software piracy.

While the present study has demonstrated that social learning theory is better at understanding male and female software piracy, because it appears to substantially reduce the gender gap, the study does have limits. First, the present study only used students from one university. The possibility exists that individuals from other universities may provide different results. Second, the study did not use longitudinal data. The possibility exists that these results may not hold over time. Third, additional

measures of social learning theory and self-control theory are necessary for future examinations.

Despite the limits of the present study, it does provide an understanding of the gender gap in software piracy. The result that a model containing self-control theory and social learning theory can eliminate the gender gap in software piracy is important for criminologists to understand. Nonetheless, multiple-site longitudinal studies that use different social learning and self-control theory measures will go a long way in facilitating our understanding of this issue. For now, the results from the present study indicate that a combination of low self-control and social learning theory can eliminate the gender differences in software piracy.

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Appendix A: Measurement Model Factor Loadings

Item	Factor Loading	
Software Piracy		
How frequently do you upload/download pirated software to/from others (on average)?	.32	
Number of mediums used to pirate software		.51
Degree of hardcore pirate		.31
How often in the past month have you pirated software?	.65	
How often in the past year have you pirated software?		.78
Low Self-Control		
Impulsivity	.52	
Risk-taking	.78	
Simple Tasks	.35	
Physical	.33	
Self-Centered	.71	
Temper		.53
Social Learning		
Differential Association /Male	.41	
Differential Association/Female	.60	
Definitions	.54	

Footnotes

[*] Researchers (Sims, Cheng, & Teegan, 1996; Eining & Christensen, 1991) have indicated that software piracy occurs more among college students. College students are likely to engage in this behavior because they have to use computers so often for their educational growth. In addition, the growth of the Internet has increased the potential for software piracy among this demographic. Further, in comparison to those individuals not in college or that are in the "working world", college students are more likely to engage in questionable behavior such as academic dishonesty (Agnew & Peters, 1996; Hinduja, 2001, 2003; Hollinger & Lanza-Kaduce, 1996; Tibbetts, 1997; Whitley, Nelson, & Jones, 1999). Therefore, the present study focuses on college students to understand this behavior. That is, a clear understanding of this behavior will allow for policy to be developed to raise the awareness of lawful computing that may spill over into other lawful behavior (Hinduja, 2001).