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Gender Roles, Social Control and Digital Piracy: A Longitudinal Analysis of Gender Differences in Software Piracy Among Korean Adolescents

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GENDER ROLES, SOCIAL CONTROL AND DIGITAL PIRACY: A LONGITUDINAL ANALYSIS OF GENDER DIFFERENCES IN SOFTWARE PIRACY AMONG KOREAN ADOLESCENTS

By

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This manuscript has been read and accepted for the Graduate Faculty in Criminal Justice in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

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Abstract

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In order to improve our understanding of juvenile delinquency and of the factors that can affect it, researchers may need to examine the new forms of crimes emerging in the cyber world. There is still a large knowledge gap regarding the etiology of cybercrime. In particular, very little research on gender differences in cybercrime and the explanatory power of gender based theories and Hirschi's social bond theory in cybercrime has been undertaken. The current study attempts to fill some of the gaps in the criminological literature on this modern form of crime by examining the explanatory power of traditional theories of crime on digital piracy, as well as by exploring the developmental trajectories in male and female cyber delinquency through adolescence. Moreover, the scope of the analysis was expanded to include more traditional forms of youth delinquency (status delinquency and serious delinquency). Using a nationally representative sample of Korean adolescents (n= 3,449) from the Korean Youth Panel Survey (KYPS), structural equation modeling (SEM) was employed to examine the effect of traditional gender role beliefs on online and offline youth delinquency and the mediational effects of social bonds in the relationship between gender roles and online and offline youth delinquency. In addition, group based trajectory modeling (GBTM) was applied to understand the development of boys' and girls' involvement in cyber delinquency and traditional delinquency and to identify co-occurring trajectories of online and offline delinquency. The findings of the study provide only partial evidence that gender roles directly or indirectly affect youth delinquency. For instance, higher levels of masculinity were associated with higher

involvement in male digital piracy and male status delinquency. On the other hand, social bonds were a significant mediator of only male status delinquency. Results also suggest that similarities exist between male and female developmental trajectories of delinquency and developmental trajectories of digital piracy and status delinquency.

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

Computers and the Internet have become inescapable elements in most people's lives. As a result, there has been increasing attention across different disciplines on this new phenomenon and the consequences of this technological revolution. Criminologists have been interested in the *dark side* of the Internet and its emergence as a new locus for criminal activity (Jaishankar, 2011; Kim, Jeong, Kim, & So, 2011). Nevertheless, while criminological research on computer crime is developing a foundation from which our knowledge of the phenomenon can be expanded, we still know very little about computer crime. For example, one of the aspects related to computer crime that has received minimal attention concerns the gender gap in cybercrime. Although in general empirical research confirms that males' involvement in computer crime exceeds that of females, other studies could not find a significant relationship between gender and cybercrime (Acılar, 2010; Moores & Chang, 2006; Morris, Johnson, & Higgins, 2009; van der Byl & Van Belle, 2008). The possibility that the gender gap in cyberspace may not be as pronounced as that typical of traditional crime may not come as a surprise considering that recent studies have confirmed a general narrowing of the overall gender gap related to crime and delinquency over the last half century (Gartner, & McCarthy, 2014; Lauritsen, Heimer, & Lynch, 2009). Nevertheless, still very little is known as criminological studies specifically investigating male and female involvement in cybercrime are very limited (Chiang & Assane, 2009; Moon, McCluskey, McCluskey, & Lee, 2013). Moreover, compared to criminal actions in the real world, the online environment provides opportunities to commit crime that differs from those of the physical environment (e.g. anonymity, lack of parental supervision). A plethora of studies has also looked into cyber delinquency and the potential generalizability of criminological theories to this new form of crime (e.g. Higgins, 2004; 2006; 2007; Hinduja, 2007; Skinner & Fream, 1997), but previous research tends to suffer methodological and substantive limitations, such as the use of non-representative and cross-sectional samples. Furthermore, previous research has been mainly

conducted in the United States context, leaving a large gap in terms of its applicability to a global phenomenon like cybercrime.

Using data from the Korean Youth Panel Survey (KYPS), the current longitudinal study will analyze the trends of participation in digital piracy of a nationally representative sample of male and female Korean adolescents. Furthermore, the study will also attempt to investigate how socialization into different gender roles (masculine vs feminine) could provide a better understanding of the dominance of male (cyber-) crime and potential changes in female crime and delinquency as opposed to a simply biological delineation of individuals as male or female.

LITERATURE REVIEW

Computer & Internet

Computers and the Internet have become an unreplaceable element of modern life. The use of new technologies can range from business activities to leisure and cultural activities, and the age of those who make use of computers or other devices that allow users to connect to the Internet is getting lower and lower as children start to utilize those devices in their first years of life. In the United States, access to computers and Internet begins as early as in nursery school with about 67% of the children having access to the former and 23% of the children having access to the latter (DeBell, 2005). The participation rate in computer and Internet use increases over time and teens appear to be the age group with the largest participation rate (DeBell, 2005). As highlighted in the data from the Pew Internet and American Life Project, adolescents are more likely to use a computer and be connected to the Internet relative to older users, with more than 90% of American adolescents having access to a computer (93%) or going online (95%). Moreover, over the last two decades, the possibility for American children and teenagers to have access to a computer from home, school or other locations has rapidly increased (Roberts, Indermaur, & Spiranovic, 2005). According to a recent study on media accessibility by 8 to 18 years old American users, there is clear evidence that youths have become more likely to have access to computer and Internet in multiple locations, including those outside their own home (Rideout, Foehr, & Roberts, 2010). Moreover, it should also be noted that adolescents' use of cell phones and smartphones has also affected the way internet users go online. Teenagers seem to be the group that mostly makes use of mobile internet-connected devices, especially when compared to older age groups. Among smartphone owners, 50% of teens "mostly" connect through their mobile device (Madden, Lenhart, Duggan, Cortesi, & Gasser, 2013).

Interestingly, figures of computer ownership and internet use do not vary greatly between the United States and other developed countries (Straker, Pollock, & Maslen, 2009). Based on the results of

a recent study conducted on American youths (8-18 years) the daily average time spent in front of a computer screen is 1.29 hours with most of the time spent on social networks (22 m) followed by gaming (17 m) and watching videos (15 m) (Rideout et al., 2010). Youths in Italy aged 12-20 years reportedly use the home computer for an average of 2.8 hours per day (Bricolo, Gentile, Smelser, & Serpelloni, 2007). Similarly, also Hong Kong adolescents (12-16 years old) use the computer for an average of 2.5 hours on a typical day (Ho & Lee, 2001). On the other hand, the average hours spent by Australian children aged 8-13 years old was about 1.2 hours per day (Hesketh, Wake, Graham, & Waters, 2007).

Internet in the Korean context

Recently, the number of individuals having access to the Internet has experienced a rapid growth in South Korea like in most of the developed countries in the world. Between 2007 and 2012 the world's Internet population has doubled, passing from 1.15 billion to 2.27 billion, with more than half of the users living in the Asian continent (www.internetworldstats.com). This trend is particularly evident in the Republic of Korea. The Korean Internet market has been one of the fastest growing in the world, and according to the Organization for Economic Co-operation (2010) over 80% of households have access to the fastest internet connections in the world (Sutter, 2010). Such general increase in the number of Internet users is particularly evident in the 6-to-19 age segment that between 1999 and 2002 has increased from around 50% to more than 90% (Kim, Ryu, Chon, Yeun, Choi, Seo, & Nam, 2006).

South Korea has undergone great social and economic changes over the last 50 years, following the devastation brought by a half-century of Japanese occupation and the destruction caused by the Korean War (Tudor, 2013). Since the 1970s, the South Korean economy has been on a track of fast economic growth, and currently the country has a per capita GDP of $30,000 and, according to a report by Kang Jung-gu of the LG Economic Research Institute, the Korean GDP could even surpass the Japanese GDP

by 2020 (the country had a per-capita GDP of less than $100 in 1953). The Korean miracle is not only an economic one, but also a technological one. During the last years Korea has witnessed the rise of some of the world's largest technology companies, and computers, smartphones and access to the Internet have become essential elements of the Korean life. Internet usage has steadily increased over the last decade, and according to the 2013 Statistics on Internet Usage by the Korea Internet and Security Agency (KISA, 2013) the number of internet users has almost doubled since 2001 from around 24 million to 40 million. Furthermore, almost all Korean households possess a computer (80.6%) and have access to an Internet connection, including mobile connection (98.1%). The use of the Internet is not limited to the younger age segment of the Korean population, but also older citizens are slowly learning how to use and embrace these new technologies. About 80% of Korean children between 3 and 9 years old use the Internet, while the rate is almost 100% for the age group between 10 and 49 years old. Moreover, also people in their 60s (41.8%) or 70s (11.3%) are increasingly going online compared to the previous years. The average number of hours spent weekly online is 13.8 hours, with males apparently spending slightly more time surfing the Internet (15.3 hours) than their female counterparts (12.4 hours). People mainly connect to the Internet from their homes. However, in the case of teenagers and young adults, schools and commercial Internet facilities appear to be locations that provide easy Internet access to this age group. The reasons for using the Internet appears to differ between age groups and across gender. For example, women engage more in Internet shopping while usage rate of the Internet for Software download and upgrade is higher for males. On the other hand, the main purposes of using the Internet for teens and people in their 20s and 30s are getting information and data, leisure activities and communicating (KISA, 2013)

Internet anonymity

One of the central characteristics of the Internet is to offer to Internet users the possibility to remain relatively anonymous in the context of social interactions which occur through the Internet medium. Specifically, with anonymity we should refer not only to the possibility to remain nameless in online communication, but also to the possibility that users have to conceal, or disguise, personal information such as age, gender, and ethnicity (Lapidot-Lefler, & Barak, 2012). According to the conceptualization of anonymity by Marx (1999), an individual cannot be identified when 7 broad types of identity knowledge cannot be accessed by unauthorized persons: legal name, locatability, pseudonyms that can be linked to legal name and/or locatability, pseudonyms that cannot be linked to other forms of identity knowledge, pattern knowledge, social categorization, and symbols of eligibility/non-eligibility.

Internet users can have different reasons to seek online anonymity. According to the 2013 survey by the Pew Research Center's Internet & American Life Project (Rainie, Kiesler, Kang, Madden, Duggan, Brown, & Dabbish, 2013), as many as 81% of the surveyed Internet users reported having tried to keep their identity anonymous online, even though more than half of subjects (59%) believed that complete anonymity is impossible. Fear of having personal information stolen by criminals is one of the main concerns of people who took steps in order to conceal their identity online (33% of the subjects). In addition, advertisers (28%), close friends (19%) and people from the past (19%) were considered major circles from whom internet users wanted to conceal their identity. A recent study by Kang, Brown and Kieler (2013) found that besides privacy and security concerns, previous negative experiences influenced their decision to conceal their identity online. For example, one of the subjects decided to completely anonymize all her online activities after becoming a victim of cyberstalking. Furthermore, there may be the desire to draw a line between different social groups and environment, both online and offline, with whom they might have shared their views and personal opinions. Based on the results of their study, Asian

interviewees were more likely to express their positive view of anonymity as a way to facilitate keeping boundaries between different social spheres (Kang et al., 2013).

Part of the recent discussion on the effects of anonymity on the Internet has revolved around its ability to equalize power relationships between individuals. Unlike communication that occurs face-to-face, computer-mediated-communication would make differences based on gender, social status or physical appearance irrelevant, thus fostering a less unequal social environment. In an early study about issues and consequences raised by the advent of computer mediated communication, Kiesler, Siegel and McGuire (1984) found that when groups were meeting online rather than face-to-face, power relationships were more equal, while they appeared to be more hierarchical when individuals were communicating offline. Even when certain individuals showed more authority in both communication formats, their dominance was lower when participating in online communication (Kiesler et al., 1984). Kiesler's work, as well as findings of more recent studies (e.g. Dubrovsky, Kiesler, & Sethna, 1991; Hollingshead, & McGrath, 1995; Straus, & McGrath, J. 1994) contributed to the elaboration of the concept "equalization effect": As status characteristics become unidentifiable in online interactions, socially ascribed attributes are less likely to play a significant role in online discussion compared to when people meet face-to-face (Dubrovsky, et al., 1991; Hollingshead, 2001; Kiesler, 2014). Studies that explored such a claim have nevertheless failed to provide unanimous support to the idea that power relations occurring in the virtual environment are more equal (e.g. Berdahl, & Craig, 1995; Raman, Tan, & Wei, 1993; Spears, & Lea, 1992; Weisband, Schneider, & Connolly, 1995).

Even though the analysis of online trends between 1990 and 2000 suggests that gender differences have disappeared, the gender gap in the frequency and intensity of internet use has not decreased significantly (Ono, & Zavodny, 2003). Moreover, some scholars have criticized the idea that gender power relations in the online environment would substantially empower women and advance gender equality

(Herring, 2008). The imbalance that characterizes gender power dynamics in offline relations does not seem to have been undermined in the web space, but rather gendered power dynamics are perpetuated on the Internet. In the male dominated cyberspace, men continue to maintain their control over Internet resources, infrastructure, and contents (Herring, 2008). Internet pornography, for instance, has been indicated as an example of the transplantation of elements of traditional male dominance into the web environment (Ess, 1996; Heider, & Harp, 2002; Herring, 2008). Rather than blurring gender differences and fostering gender equality, based on the analysis of pornography websites the authors concluded that "these sites reinforce traditional constructions of men's power over women in the forms of hierarchy, objectification, submission, and violence" (Heider & Harp, 2002, p. 297). In addition, the analysis of gender power dynamics in contexts such as conversations on Internet bulletin boards as well as academic discussion groups provide further support to the claim of a male dominated Internet space. Women appeared to be less likely than male Internet users to participate in conversations, or, eventually, more likely to face hostility or sexual harassment (Heider & Harp, 2002).

Computer, Internet and Crime

The use of personal computers and access to fast internet connections have created new crime opportunities. Over the last two decades the cybercrime phenomenon has increasingly become an object of extensive criminological research, but it has also received attention from media and law enforcement agencies. However, there is not a commonly agreed definition of cybercrime (Fafinski, 2009; Hunton, 2009). For example, the U.S. Department of Justice (DOJ) uses the term computer crime to broadly define 'any violations of criminal law that involve a knowledge of computer technology for their perpetration, investigation, or prosecution.' Many scholars have also attempted to define cybercrime. For example, Thomas and Loader (2000) stated that cybercrime includes those "computer-mediated activities which are

either illegal or considered illicit by certain parties and which can be conducted through global electronic networks" (p. 3). Similarly, Wall (2007) conceptualized cybercrime as “the transformation of criminal or harmful behavior by networked technology” (p. 10). These last two definitions, in particular, highlight the nature of the environment where computer crimes occur. Such ‘virtual’ environments, which the US federal government defined as “the interdependent network of information technology infrastructures, and includes the Internet, telecommunications networks, computer systems, and embedded processors and controllers in critical industries” (National Security Presidential Directory-54, 2008, p. 3), stand in contrast to the ‘real’ space where interactions, and also traditional crime, commonly take place. On the other hand, Grabosky (2001) argued that although many computer crimes greatly differ in the way they manifest themselves compared to traditional crime, “the crime is fundamentally familiar” and the principal difference is the type of medium that is used to commit the (cyber-) crime. To a certain extent, the confusion about the nature of computer related crimes could be a consequence of the fact that while several types of crime fall under the umbrella of the concept of cybercrime, two distinct categories of computer crimes are recognizable (Burden & Palmer, 2003; Gordon & Ford, 2005; Kim et al., 2011). On the one side of the cybercrime spectrum there are crimes that have a marked technological element and would not exist outside of the online environment. This category of cyber offenses has been defined as “true” cybercrime, or technology-centric crime, and it includes, but is not limited to, computer related crimes such as hacking, dissemination of viruses, denial of service attacks and domain name hijacking. The other category, “e-enabled” crimes or non-technology centric crimes, are characterized by the stronger human component of this type of cybercrimes, which were mainly committed in the “real” world before the Internet became the privileged locus for the perpetration of this typology of crime (Burden, & Palmer, 2003; Kim et al., 2011). The latter category of cybercrimes includes, among others, cyberbullying, misuse of credit cards, aiding crime, cyber pornography, and defamation.

The public has also become increasingly aware of this phenomenon, as the number of cases of people who have reported a case of computer crime has been steadily increasing over recent years. Such exploding computer crime victimization trends are confirmed by the Internet Crime Complaint Center (IC3) that allows actual victims of a computer enabled crime (or third parties) to file a complaint which is successively processed by IC3. The number of complaints of computer crimes reported in 2013 in the U.S. was 262,810, which represents a slight decrease if compared to the peak reached in 2009 when 336,660 complaints were processed by IC3. Nevertheless, this still represents a large increase from the 16,840 complaints firstly processed in 2000. Furthermore, despite the small decrease in the number of complaints since 2009, the actual cost of the damage resulting from cybercrime has kept on rising since 2001 when the annual loss for complaints referred from IC3 was 17.8 million dollars. The amount of monetary damage caused by computer related crimes in the U.S. grew to 559.7 million dollars in 2009 and 781.84 million U.S. dollars in 2013, thus possibly meaning that the seriousness of the cyber-attacks was greater despite the fact that their number exhibited a decrease in absolute occurrences between the same time points. Likewise, a similar trend is recognizable in the United Kingdom where surveys on computer crime and abuse have been administered by the UK Audit Commission (Audit Commission 1990; 1994; 1998). Over the 15 year period when data were collected (1984-1998) there was a sharp increase in the number of reported incidents for different types of computer crime such as fraud, viruses, hacking and theft. Parallel to the increase of cases reported, the overall loss experienced because of computer crime increased from £1,133.487 in 1984 to £ 3,288,647 in 1998. Despite the usefulness of both the IC3 and UK Audit Commission data for the purpose of examining cybercrime victimization trends, such statistics are far from being an exhaustive representation of the real extent of computer related crimes and the damage that computer related crimes cause to individuals as well as to businesses. Underreporting is a common issue in computer crimes since they may either go undetected or cybercrime victims might be unwilling to report

it to law enforcement authorities (Brenner, 2007; Kshetri, 2006). Even companies that have been victims of cyber-attacks are likely not to report the event to the authorities in order to avoid bad publicity (Sukhai, 2004). Furthermore, even in the event that computer related crimes are detected, it can be very hard to make an accurate estimate of the total losses and damages sustained by individuals or companies (Nycum & Parker, 1990).

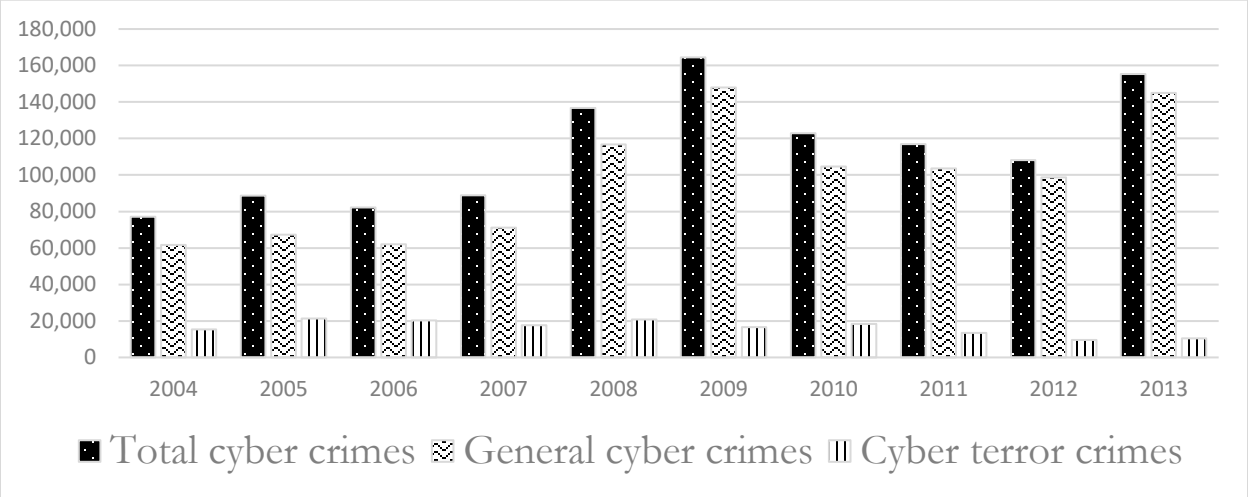
Parallel to the rapid growth of access to computers and cheaper and faster internet connection, the public has become considerably more concerned about the possibility of becoming a victim of a form of computer related crime (Wall, 2003). Although it has been argued that fear of cyber-victimization may be significantly overestimated relative to the actual danger posed by cybercrime (Wall, 2008), several studies conducted in English-speaking countries seem to confirm that a large portion of the population is very worried about this problem. As computer crime opportunities increase along with increasing reliability of daily activities such as banking and shopping to the online environment, the fear of possible online victimization may influence people's decision to use the internet or continue to engage in legitimate online activities. A recent study by the Pew Internet and American Life Project (Fox & Lewis, 2001) found that a large portion of the American population is concerned with online crime. Child pornography and credit card theft proved to be the main concerns with respectively 90% and 87% of Americans stating that they are concerned about it. Moreover, similar high levels of fear of online victimization were found in relation to other forms of online criminal activities such as cyberterrorism (82%), Internet fraud (80%), cyber hacking of government computer networks (78%) or of business networks (76%), and computer viruses (70%). Specifically, among the Americans surveyed, women, African-Americans and those with a high school diploma or less were more likely to be "very concerned" about Internet Crime (Fox & Lewis, 2001). Similarly to the findings of the US survey, a poll conducted in the United Kingdom (ICM Research, 1999) found that 81% of UK Internet users were concerned that their children might be exposed to pornographic

materials when using the Internet. The 2005/2006 British Crime Survey, which also included questions on fear of credit card fraud, found that 57% of those surveyed, who owned credit cards were either fairly or very concerned about becoming a victim of credit card fraud. In particular, those who had been victims of credit card fraud in the past were most likely to report higher levels of fear for this type of crime than those who had not been victimized (Hoare & Wood, 2007). At a continental (European) level, the results of the 2012 Eurobarometer which, among other questions, asked European citizens several questions about their concerns about cybercrime, found that the majority of the respondents are afraid of cybercrime. Bohme and Moore (2012) estimated that 63.3% of the Europeans interviewed were concerned about identity theft, while a slightly lower number of respondents were also concerned about – Phishing/advance-fee fraud spam (50.2%), and e-commerce fraud (51.7%). Finally, analogous results with regard to fear of crimes that are enabled by the use of new technologies can be observed also in the 2007 Australian Survey of Social Attitudes (AuSSA), which did not only include items related to physical crimes such as physical attacks or sexual assault, but also about two forms of internet crime (identity that and credit card fraud). In their analysis of the 2007 AuSSA survey data, Roberts (2013) noticed that respondents reported levels of worry for the illegal use of credit cards over the Internet (23% 'very worried', 27.9% 'fairly worried') and for identity theft (15.9% 'very worried', 24.4% 'fairly worried') that were either matching or exceeding those showed for traditional physical crimes. As the findings from these various surveys demonstrate, concerns about cybercrime are widely spread in the population and these fears can have strong negative repercussions on the online behaviors of internet users. In their analysis of the 2012 Eurobarometer data, Bohme and Moore (2012) found that the likelihood of online participation decreases when people are more concerned about online victimization, even in the cases in which the respondents were not previously victims of any form of cybercrime.

Internet crime in the Korean context

Given the extent of the expansion of the access to fast internet connections, a strong increase in cybercrime has become a matter of concern in South Korea. The data collected by Korea's Cyber Police Agency (KCPA) between 2004 and 2013 seem to confirm that cyberspace has established itself as a new locus for criminal behavior (Figure 1). In particular, it appears that youths have been taking particularly advantage of the possibilities offered by new technologies to engage in unconventional activities in such virtual environments. According to KCPA statistics (2014), the total number of cybercrime incidents, including both cases of "general" cybercrime and terrorism- related cybercrime, increased by about 100% between 2004 (77,099 incidents) and 2013 (155,366 incidents), with the peak in the year 2009 when 164,536 cybercrime incidents were recorded.

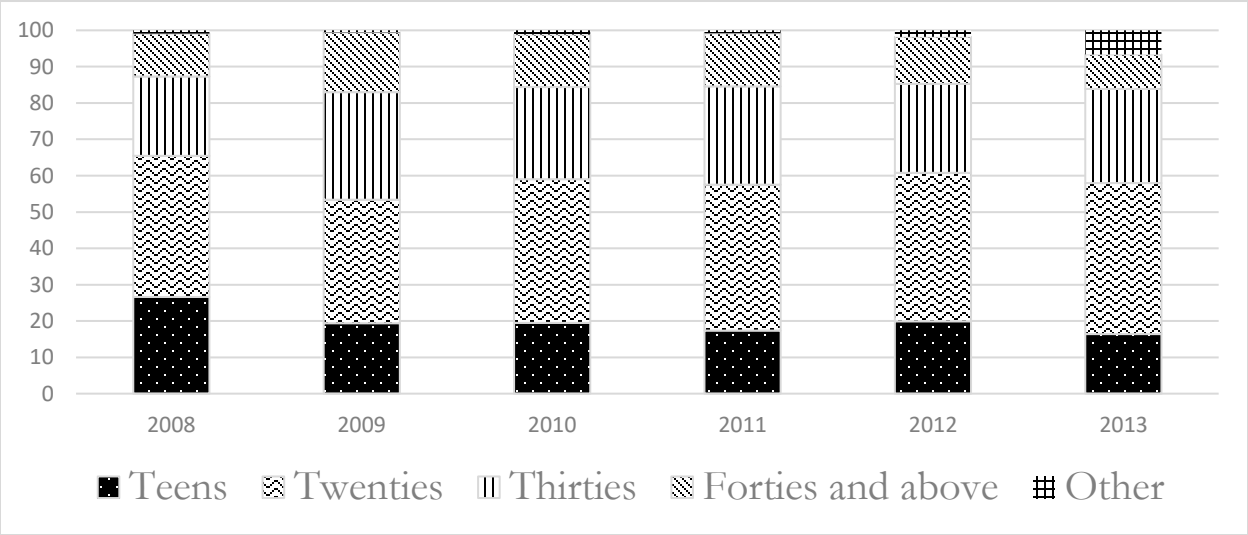
Figure 1 Status for cybercrime arrest in Korea (Dec. 31, 2013) (http://www.police.go.kr/eng/index.jsp)



Besides the total number of cybercrime incidents, KNPA statistics on cybercrime also include information about the type of cybercrime and the age of the individuals who were involved in the cybercrime incidents (Figure 2 and Figure 3). With regard to the age of the cyber offenders, about 40% of

those individuals that engaged in computer related crimes between 2008 and 2013 were in their twenties. People in their thirties accounted for about 25% of the cybercrimes recorded by the police, and teenagers for almost 20% of them. Even though the high incidence of youth cyber delinquency appears self-evident from a first analysis of the KCPA statistics, we are not able to further examine the phenomenon by assessing the link between the age of the offender and the typology of cybercrime committed.

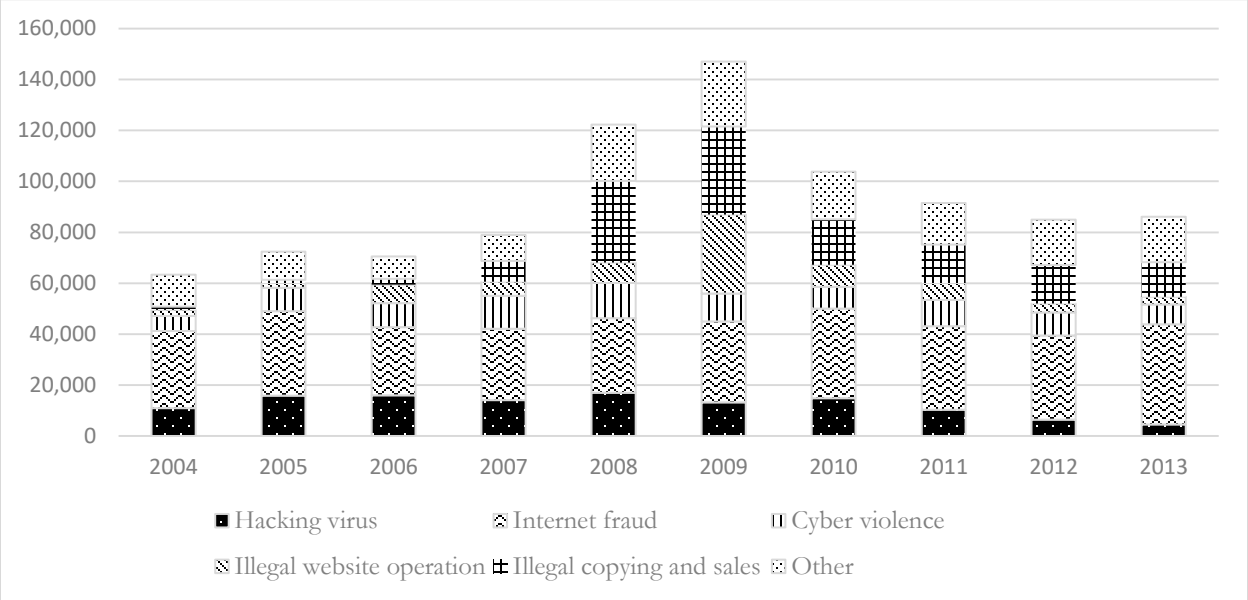
Figure 2 Cybercrime statistics by age in Korea (Dec. 31, 2013) (http://www.police.go.kr/eng/index.jsp)



The KCPA statistics distinguish between six typologies of cybercrimes (I. hacking/virus, II. internet fraud, III. cyber violence, IV. illegal website operation, V. illegal copying and sales, and VI. Other) each of which can be examined for trends for the period 2004-2013. Internet fraud is the type of cybercrime that was committed with the highest frequency since the data have been reported while there was a sharp decrease of about 60% in the number of cases of hacking and the use of computer viruses. However, the illegal copying and sales of copyrighted materials appears to be the type of cybercrime with the highest increase over time. The number of cases of illegal copying and sales of copyrighted materials increased exponentially from 2004 (1,244 cases) to reach a peak in 2009 (34,575 cases), and although the number

of copyright infringements have almost halved since then, the number of cases of illegal copying and sales in 2013 was still very high (13,567 cases).

Figure 3 Cybercrime statistics by type in Korea (Dec. 31, 2013) (http://www.police.go.kr/eng/index.jsp)



From an international perspective, the extent of the cybercrime issue seems to be particularly alarming and does not show evident signs of slowing down. As evidence, the Symantec Global Internet Security Threat Report (2010) for the Asian-Pacific region also observed that in 2009 South Korea occupied a prominent position with regard to several forms of Internet security threats, both at regional and global levels. The highest percentage of phishing URLs in the Asian-Pacific region were hosted in South Korea (43%), with about 90% of the phishing URLs targeting the financial services sector. Moreover, globally, South Korea comes second after the United States for number of phishing URLs identified. For other types of Internet threats, South Korea ranked third in the Asian-Pacific region for malicious activity on the Internet and fourth for Internet attacks carried out against targets in the Asian-Pacific region and for bot-infected computers. Finally, the Symantec report noted that South Korea is

responsible for 21% of Internet spam shared in the Asian-Pacific region and 4% of the internet spam shared globally.

Korean Internet users are definitely aware of the potential risks related to the use of the Internet. However Internet fraud, which according to the KCPA is one of the cyber threats with the largest number of cases recorded, does not seem to be a matter of concern when compared to numerous other internet related social problems. According to the 2013 KISA survey, for only 13.4% of the Internet users 'financial loss as a result of wire fraud' was a matter of worry, while instead they reported to be more concerned about risks related to the use of 'Malicious comments' (46.6%), 'Leakage of personal information and identity theft' (43.6%), 'Verbal abuse or overuse of slang' (43.1%), and 'Misuse of personal information' (42.6%).

Issue of illegal downloading

Among the different forms of crime that have been made possible by the advent of the Internet, digital piracy is one of the most common (Bently, Davis, & Ginsburg, 2010). Gopal, Sanders, Bhattacharjee, Agrawal, and Wagner (2004) defined digital piracy as the "the illegal act of copying digital goods, software, digital documents, digital audio (including music and voice), and digital video – for any reason other than backup, without explicit permission from and compensation to the copyright holder" (p. 90) According to a 2014 report of the International Federation of the Phonographic Industry (IFPI), music piracy is still rampant especially in developing markets and in Asia. Moreover, IFPI (2010) estimates that the yearly costs in which the music business incur because of music piracy were around $4.6 billion per year and a decrease in revenue from 2004 to 2009 of about 30%. However, these piracy loss estimates may be reductive considering that they only account for losses caused by physical piracy. Also the movie industry has sustained major losses because of piracy, and although the phenomenon of movie copy and

distribution can date back to the advent of VHS commercialization, digital piracy has further burdened the movie industry due to its ease and accessibility. For example, according to a study commissioned by the Motion Picture Association of America (MPAA) in 2004 the losses for the industry as a direct consequence of movie piracy were about $6.1 billion. Asian countries, especially China, and former Soviet Union countries turned out to be responsible both for the consumption of pirated movies as well as for their distribution to the European and American markets (Yar, 2005). Losses in the software industry are even higher and could dwarf those of the music and movie industry combined since software piracy cost to the industry about $59 billion, almost doubling the losses experienced since 2003. Similar to piracy for other digital goods, higher rates of piracy are registered in the case of software piracy in developing markets, especially in former Soviet Union countries, and African and Middle Eastern countries (BSA, 2011).

Despite attempts to quantify the financial losses from digital piracy, these estimates may be far from providing a comprehensive picture of the real losses faced by its direct and indirect victims. Siwek (2007) argued that movie piracy costs the U.S. economy more than $6.1 billion, and that movie piracy has a negative impact also on U.S. consumers and taxpayers. Besides the financial harm for movie producers, movie piracy also translates in loss of earnings for workers in the movie industry and other U.S. industries, loss in tax revenue, and loss of jobs that would have been created without movie piracy. Also in the case of software piracy, costs go well beyond financial losses for the software industry, but can also negatively affect software users. A joint study conducted by the National University of Singapore and International Data Corporation (IDC) shows that PCs with pirated software installed are more likely to be exposed to malware threats than computers that run original software copies. IDC estimated that in order to deal with the problems created by malware, consumers will spend about $25 billion and companies about $500 billion (IDC, 2014). Besides these costs that will burden consumers and companies that installed pirated

software, some software companies might also justify an increase in the costs of their products as a consequence of the lost revenues caused by software piracy (Perelman, 1995).

Criminology & Cybercrime

Despite the recent growth of the body of criminological literature about computer crime over the last two decades, the study of the etiology of cybercrime is still in its early stages. Most of the initial research on computer crime focused on the victims of computer crime, and only few studies were conducted on cyber criminals (Skinner & Fream, 1997). Hollinger's study on software piracy and unauthorized account access was one of the first empirical criminological studies to be conducted on cyber offenders (Hollinger, 1993). Using a sample of 1,766 students, Hollinger examined the extent to which college students engage in two typologies of computer crime, software piracy and illegal access to someone else's computer system, and found that 10% of the respondents engaged in the former and about 3% in the latter form of computer related crime. Moreover, being male, Hispanic or Asian, and 22 years of age and older, seniors and graduate students were found to be associated with higher rates of involvement in computer crime. More importantly, Hollinger also found that friends' involvement in computer related crime showed a strong significant correlation with increase participation of software piracy of the individual subject. Another pioneering research project on computer deviance perpetrators was conducted by Skinner and Fream (1997). The nonrandom sample of university students included 581 undergraduate students from Arts and Sciences, Business and Economics and Engineering colleges, which according to Hollinger's findings appeared to be the college (Engineering) with the highest rates of students' involvement in computer related crime. Skinner and Fream's study found that 34% of the respondents in their sample had engaged in software piracy in the previous year, and, according to their estimates that would correspond to a loss in revenue for the software industry of about $90,000-$450,000.

Similarly to Hollinger's results, differential association with friends who were involved in computer crime was also found to be a strong predictor of participation in digital piracy. Finally, with regard to the gender of the respondents, male students were found to be two to three times more likely to engage in piracy or other forms of computer crime compared to the female respondents.

Numerous studies have tested the applicability of traditional sociological and criminological theories to different types of computer related crimes, providing some support for the extendibility of those theories to non-traditional forms of crime (Bossler & Burruss, 2010; Harris & Dumas, 2009; Hay et al., 2010; Higgins, 2004; 2006; 2007; Higgins, Wilson, & Fell, 2005; Higgins and Makin, 2004; Hinduja, 2007; Lee, Lee, & Yoo, 2004; Malin and Fowers, 2009; Moon, McCluskey, & McCluskey, 2010; Morris & Higgins, 2010; Patchin and Hinduja, 2010; Skinner and Fream, 1997).

A number of empirical studies have tested whether criminological theories can explain the phenomenon of digital intellectual property theft. For example, the findings of several criminological studies provide support for Hirshi and Gottfredson's self-control theory of crime in relation to its applicability to digital piracy (Higgins, 2004; Higgins et al., 2008; Malin and Fowers, 2009; Moon et al., 2010). In a recent study Higgins (2004) examined whether low self-control could explain higher rates of software piracy among students. The study found support for such a link, but also found that the measures of social learning that were included in the analysis provided support of the predictive power of social learning theory in the explanation of the behaviors of digital pirates.

Similarly, several studies have attempted to demonstrate the explanatory value of social learning theory in explaining digital piracy (Hinduja & Ingram, 2009; Morris & Higgins, 2010; Skinner & Fream, 1997). Hinduja and Ingram (2009) used a sample of about 2000 university students to examine the role of offline and online peer learning sources on music piracy. Both types of peer influences were found to be significant predictors of participation in music piracy. The research also demonstrated that besides real

life peers, online learning sources in the form of online media, online peers, and popular media can also help to explain students' involvement in digital piracy. A recent study by Morris and Higgins (2010) also provided support for the explanatory value of social learning theory in explaining digital piracy.

Criminological studies have also explored the applicability of Sykes and Matza's neutralization theory to the explanation of illegal downloading of different types of digital goods, and the findings from both quantitative and qualitative studies provide moderate evidence that techniques of neutralization are used by individuals that engage in digital piracy (Higgin, Wolfe, & Marcum, 2008; Hinduja, 2007; Moore & McMullan, 2009; Ulsperger, Hodges, & Paul, 2010). In a study using a small convenience sample of 44 university students who admitted to be file sharers Moore and McMullan (2009) found that the respondents utilized at least one or more techniques of neutralization. The technique of neutralization that appeared to be the most commonly used by digital pirates was the denial of injury, followed by the denial of the victim, and the claim of entitlement. According to the authors one of the main possible explanations for why those that engage in digital piracy mainly use the technique of neutralization 'denial of injury,' is to be found in the apparent faceless nature of the Internet where interactions between offender and victim, a musician and the music industry in the case of music piracy, are near nonexistent. Furthermore, digital pirates may also believe that by illegally downloading music they are not damaging the musicians since by sharing music files the musician is eventually introduced to consumers who might decide to purchase more CDs or DVDs by that artist in the future. A longitudinal study by Higgins, Wolfe and Marcum (2008) explored the relationship between the changes in neutralization and illegal downloading of music, finding a significant direct influence between the initial level and change of neutralization and the initial level and change in music piracy. The use of techniques of neutralization by the respondents who engaged in music piracy allowed them to "take a 'holiday' from social controls […] [and] pirate music without developing a pirating identity." On the other hand, in a recent study Hinduja (2007) found that only four of the nine

techniques of neutralization that were included in the study were significantly associated with online piracy, and overall there was little support for the link between the use of techniques of neutralization and online software piracy. However, Hinduja also pointed out that the moral acceptability of software piracy did not seem to be generally questioned by the respondents in his study. Therefore, neutralizations and rationalizations may not be necessary to reconcile the illegal online behavior with societal expectations since the actions in which digital pirates engage do not appear to be incompatible with their belief system.

Gender and Digital Piracy

Despite the divergences that criminologists have reported in the discussion concerning the etiology of male and female crime, they would agree that the analysis of both official and self-reported crime data confirms that men are more criminal and violent than girls. Although the academic debate has been dominated by the study of male crime, the book *Sisters of Crime* (1975) by Freda Adler represented one of the main turning points in the discussion on female crime and its increase as a consequence of the women's liberation movement and the increased *masculinization* of women crossing the line between what traditionally were accepted as defined masculine and feminine categories (Adler, 1975). Adler's argument generated a heated discussion on female delinquency, the extent of male and female involvement in crime, and the reasons for the narrowing of the gender gap. For example, some researchers argued that women involvement in crime had not equally increased for all types of crime (violent offenses and property crime), but only for minor property crimes (Simon, 1975; Steffensmeier, 1993), whereas the results of a different body of research seems to confirm a general increase in female arrests also for some typologies of violent crime (Heimer, 2000; Steffensmeier, Zhong, Ackerman, Schwartz, & Agha, 2006). The discussion of gender gap also revolves around the issue of the nature of the increased female crime, with some researchers arguing that the increased number of arrests of female offenders is not a

consequence of an increasing female participation in crime but because of changes in the attitude of the criminal justice system and the general public toward female offenders (e.g. Steffensmeier & Schwartz, 2004). However, Lauritsen, Heimer and Lynch (2009) argued that their statistical analyses of National Crime Survey (NCS) and NCVS data clearly demonstrate that "changes in gender gaps […] are real and not artifacts" (pp. 361-362).

The analysis of female offending and the gender gap, however, has focused on typologies of crime committed in the physical world, thus neglecting, mainly because of a lack of generalizable and reliable data, the investigation of female and male offending in cyberspace. Several studies have suggested that a gender gap exists for digital piracy, and that male computer users are more likely to engage in digital piracy compared to female users (Bhattacharjee, Gopal, & Sanders, 2003; Chiang & Assane, 2008; Hinduja, 2003; Hollinger, 1993; Moon et al., 2012). Chiang & Assane (2008) provided one of the first analyses specifically addressing the role of gender in explaining the likelihood and extent of music piracy. Indeed, file-sharing was more common among male students who were also more likely to possess a larger music collection made of music downloaded online. Instead, female students were found to be more likely to choose legal alternatives in order to get their music, and more likely to be deterred by the possibility of being detected and punished for illegal music downloading. Although most of the studies seem to suggest that males are more likely to pirate than their female counterparts, some studies did not find a significant relationship between gender and digital piracy (Acılar, 2010; Moores & Chang, 2006; Morris, Johnson, & Higgins, 2009; van der Byl & Van Belle, 2008). For instance, based on the results of a study conducted among 585 university students, Morris, Johnson and Higgins (2009) found that gender was not significantly predictive of digital piracy. Similar findings were observed in a study by Acilar (2010) using a sample of Turkish freshman college students and van der Byl and Van Belle's study (2008) using a small sample (88 respondents) of South African students and employed respondents. Finally, a recent study by

Moon and colleagues (2012) specifically addressed the gender gap in computer crime among Korean students, finding significant differences not only with regard to the extent to which boys and girls engage in software piracy or illegal use of others' Resident Registration Number (RRN) online but also discovered significant differences in computer use patterns across male and female students. The analysis found that the level of involvement in both types of cybercrime was higher for male students, and contrary to the results in numerous previous studies, gender was found to have a direct significant effect on computer crime behaviors even after including self-control, computer related opportunity factors (hours of computer use, computer use at home, member of cyber club), and their interactions.

In the Korean context of the Moon and colleagues' (2012) study, self-control was also found to be a significant predictor of computer crime but only of illegal use of RRN while, while with regard to the opportunity indicators included in the examination, their association with illegal downloading and illegal use of RRN clearly differs across gender and between the two types of computer crime. All three opportunity measures included in the examination were found to be significant predictors of illegal downloading but only for males. On the other hand, the effect of hours of computer use and being a member of a cyber-club on illegal use of RRN was statistically significant as a predictor of increased cyber-related crime only for female respondents. The authors argued that these differences across gender might be a consequence of the social context in which these behaviors occur; in fact female access to computers mainly occurs in the home environment where parental supervision might be higher than for the male counterparts.

Study of Cybercrime in Korea

The use of new technologies and of the Internet is an inseparable component of Korean society where access to at least one computer and Internet is available in more than 80% of Korean households,

and in relation to the younger segment of the population with almost 100% of Korean teenagers and young adult going online (KISA, 2014). Over the last few years the interest in the consequences of this technological revolution has spread in the field of criminology, with several studies examining the phenomenon of cyber delinquency and its causes/consequences in the Korean context (Jang, Song, & Kim, 2014; Lee, 2005; Kong & Lim, 2012; Moon et al., 2010; Moon et al., 2012). For example, using data collected from a sample of 2,751 Korean middle school students, Moon, McCluskey and Perez McCluskey (2010) tested the applicability of Gottfredson and Hirschi's general theory of crime on two forms of computer crime (illegal downloading of software and use of another's registration number or identification number). The study found that both low levels of self-control and criminal opportunity were significant predictors of computer related crimes. Specifically, among the measures of criminal opportunity in the context of cybercrime which were included in the analysis, hours of computer usage and membership in cyber clubs were found to play a central role in the explanation of certain forms of computer crime. Finally, significant differences were found across gender, with male students more likely to engage in both types of cybercrime. Differences between male and female youths were observed also in the previously mentioned study by Moon and colleagues (2012) which explored gender differences in participation in computer crime and computer crime opportunity. With a sample of 2844 Korean elementary students, Kong and Lim (2012) examined the longitudinal influence of parent-child relationship and depression on cyber delinquency. Specifically, in their study they created a measure of cyber delinquency using six different items measuring respondents' participation in different typologies of crimes and antisocial behaviors in cyberspace (circulation of false information on an Internet board, illegal software downloading, use of other people's Internet ID or resident registration number without permission, lie about your sex or age when chatting, hacking and use of curses when chatting). The study found positive parent-child relationship was associated with lower levels of involvement in cyber delinquency, and that

youth participation in cyber delinquency diminishes as parent-child relationships become better over time. The study also confirmed that depression had a significant longitudinal influence on cyber delinquency. Finally, the authors noted how frequency of involvement over time in crimes in cyberspace appeared to show some resemblance with that of traditional crime since involvement in cybercrime "tended to rapidly increase in elementary school, peak in the first year of middle school, and subsequently decrease." Jang, Song and Kim (2014) also observed a decreasing trend in participation in cyber delinquency over time. Participation in cyber-bullying had its peak in wave 1, when 43% of the Korean students (who were attending the 2nd year of middle school at the time of the first assessment) reported some type of participation of bullying in cyberspace and then showed a rapid decrease over the following 4 assessments, and in wave 5 only 7% of the students were still engaging in cyber-bullying. The study also found that bully victimization in the real world is the source of strain among those analyzed (financial strain, study strain and parental strain) that was more likely to prompt a coping response in the form of bullying in cyberspace.

Theoretical Framework

The current dissertation will seek to better understand gender differences in involvement in digital piracy as well as in other forms of delinquency performed in the physical world. Boys and girls that exhibit stronger masculine traits are expected to be more likely to engage in delinquent behavior. The study will also draw on Hirschi's social bond theory which emphasizes the role of strong bonds to family, school, and peers in explaining why individuals would refrain from committing crime.

The masculinity-crime link

The literature on the link between gender and crime and delinquency can be traced back to the works of some of the earliest sociologists and criminologists. In one of the earliest statistical analyses of arrest statistics Quetelet (1842) noticed that illegal behavior is typically a male problem. Quetelet argued that females may be provided with fewer opportunities to get involved in criminal behavior since the level of supervision to which they are subject is higher than that for boys.

Early studies mainly focused on biological and physical characteristics in order to explain the limited involvement of women in criminal and antisocial behavior and sex differentials in the typology of crime in which males and females engage. The research conducted by Lombroso in the mid-1800s focused among others also on the phenomenon of female criminality (Lombroso and Ferrero, 1895), and like his early work on the *delinquent man* the author relied on a biological approach to explain crime, thus focusing on physical and moral elements of the individual to investigate the etiology of female criminality. Based on the analysis of bones, skulls and other physical traits, Lombroso argued that the female *born criminals* possessed some characteristics that differentiated them from non-criminal women. According to Lombroso female offenders presented several physiological masculine traits such as cranium that resembled that of men rather than that of average women, general body hairiness, receding forehead and baldness, and tattoos (Lombroso and Ferrero, 1895).

Besides those physical flaws that according to Lombroso could reveal the criminal nature of female offenders, masculine traits concerned also the morality of criminal women. Lombroso argued that from an evolutionary perspective women had evolved less than men, and found them to be “deficient in the moral sense,” childlike, and more prone to be jealous and revengeful. Lombroso and Ferrero stated that females tend to show a semi-criminal nature. However, this would be counteracted by "piety, maternity, want of passion, sexual coldness, weakness, and an undeveloped intelligence” generally possessed by

women. Nevertheless, in female offenders' masculine traits would come to light if those feminine traits of maternal feelings and piety are not present. While pointing out at the physical and moral masculine nature of female offenders, Lombroso also observed that the types of crimes typically committed by male and female offenders can be understood in light of their different biology. In fact, while criminal acts perpetrated by men tend to require "not only physical force, but a certain energy and a certain combination of intellectual functions," because of their nature women engage in crimes that require "a smaller degree of physical and intellectual force, and such especially are receipt of stolen goods, poisoning, abortion, and infanticide" (Lombroso and Ferrero, 1895).

Despite the criticism to Lombroso's research methods and the lack of empirical support of his results, his biological approach to the explanation of the etiology of female crime persisted in the following century. For example, the work *The Criminality of Women* by Otto Pollak (1950) in line with Lombroso's approach heavily relied on biological elements to explain female criminality. While stressing the importance of the impact of social and environmental factors (e.g. broken homes, poverty, delinquent peers), Pollak also stressed the significant link between psychological and biological factors and female criminality. Pollak argued that the deceitful and manipulative nature of women has a physiological explanation:

> *Not enough attention has been paid to the physiological fact that man must achieve an erection in order to perform the sex act and will not be able to hide his failure. His lack of positive emotion in the sexual sphere must become overt to the partner and pretense of sexual response is impossible for him, if it is lacking. Woman's body, however, permits such pretense to a certain degree and lack of orgasm does not prevent her ability to participate in the sex act.*
>
> *(Pollak, 1950, p. 10)*

Moreover, further explanations for female criminality could be attributed to hormonal and psychological factors linked to women's generative phases (menstruation, pregnancy, and menopause). Smart (1976) criticized Pollak's stereotypical description of women and his explanation of female criminality by stating that "*Pollak endows all women with the master-status of liars and deceivers because of their ability to conceal a lack of arousal*." Interestingly, in his analysis Pollak also addressed the

disproportional representation of men in the criminal justice system, and argued that women do not necessarily engage in criminal behavior at a lower rate. However, because of the nature of their crime and of the social context in which it occurs, crimes perpetrated by female offenders are less likely to be reported or detected, and the lenient criminal justice system would be less likely to arrest, prosecute and convict female offenders.

Early sociological research departed from a purely biological approach and shifted its focus on the role of socialization in order to explain the concepts of masculine and feminine roles, and their link to criminal behavior. In particular, a key figure in the development and popularization of the concepts of gender roles was the functionalist sociologist Talcott Parsons (Messerschmidt, 1993). According to Parsons and Bales (1955), biological and cultural reasons are at the basis of the evolution of two different roles for men and women in the society, and children are socialized into male and female sex roles at a very young age in the family. On the one hand, men perform an "instrumental role" while women carry out an "expressive role." The former role is the one performed by the man-husband, the head of the house who is required to support financially the family and perform other functions that facilitate the relationship between the family and the rest of the society. The latter role emphasizes the position of the woman-mother whose main duty is to develop the emotional sphere within the family, stay at home and bring up the children. By ensuring that such sex roles are transmitted from generation to generation, children are socialized into the society and this will guarantee the stability of the wider society (Boss, 1993; Messerschmidt, 1993). The greater propensity of male youths to engage in delinquent and antisocial behavior can be therefore explained in light of Parsons's analysis of gender distinct traits. Boys' antisocial behavior is one of the possible ways that male youths can employ to protect their identity from the risk of being identified with the feminine role, which usually is the only one available to them in the family environment since the paternal figure might not be present. Therefore, "compensatory compulsory

masculinity" in the form of delinquent behavior would allow boys to reject the feminine role in which they are initially socialized.

Parsons's exploration of masculine and feminine roles and socialization has been criticized for being rooted in biological assumptions (Messerschmidt, 1993; Walklate, 2007). In particular, Walklate (2007) criticized the idea that women are more suited than men to perform the expressive role because of their biological capacity to give birth. On the other hand, Walklate agrees with Parsons that the sex of a child affects the way that he or she is socialized into the society. For example, a recent study by Eccles, Jacobs and Harold (1990) focused on the role on parents' expectations for their children based on the child sex in the process of "socializing gender differences in children's self-perceptions, interests, and skill acquisition." Using math and sport as domain examples for their study, the authors argued that the boys' and girls' decision to be involved in those activities was affected by children's self-perceptions about their ability in those activities and the value that they attached to those activities. The study also found that parents' perceptions of their children's natural talent in certain activities partially mediated gender differences in their children's self-perceptions (Eccles et al, 1990).

Influenced by Parsons's analysis, the concept of masculinity was explored in the works of many early criminologists. Sutherland (1924) argued that boys are more likely to become delinquent if they are taught to be "rough and tough." Relevant to the criminological discussion of masculinity was also the work of several sub-cultural criminologists in the 1950/60s (Cohen, 1955; Cloward, & Ohlin, 1960; Miller, 1958). According to Cohen (1955) juvenile delinquency becomes a mode of behavior that allows youths to assert their masculinity and reject those conduct norms which can be associated with female status. On the other hand, girls are less likely to engage in criminal behavior, especially in the form of aggressive behavior, because of its masculine connotation. Engaging in criminal behavior would clash with the sex

role expectations to which girls have been socialized. The duality of the "male sex role" and "female sex role" was summarized in a passage of Cohen's *Delinquents Boys:*

> Because of the structure of the modem family and the nature of our occupational system, children of both sexes tend to form early feminine identifications. The boy, however, unlike the girl, comes later under strong social pressure to establish his masculinity, his difference from female figures. Because his mother is the object of the feminine identification which he feels is a threat to his status as a male, he tends to react negativistically to those conduct norms which have been associated with mother and therefore have acquired feminine significance. Since mother has been the principal agent of indoctrination of 'good' respectable behaviour, 'goodness' comes to symbolize femininity and engaging in 'bad' behaviour acquires the function of denying his femininity and therefore asserting his masculinity. This is the motivation to juvenile delinquency.
>
> (Cohen, 1955, p. 154)

Similarly, Cloward & Ohlin (1960) addressed the importance of the concept of masculinity in their differential opportunity theory. They argued that older males can be effective role models for young boys who can learn both legitimate and illegitimate behaviors from them. One aspect of the learning process also involves the learning of masculine forms of behaviors, which can include criminal behaviors that can be employed to achieve a strong masculine identity (Cloward & Ohlin, 1960; Krienert, 2003). Young lower class boys grow up in an environment where the mother figure plays a central role while the father is usually away from home. Consequently, while boys may find it difficult to establish a strong masculine self-identity in a feminine environment, societal expectations impose that they behave in a manly way. Aggressive and antisocial behavior provides them the opportunity to "protest against femininity" and to stand for their masculinity and independence (Chesney-Lind, & Shelden; 2013; Cloward, & Ohlin, 1960).

The discussion on the link between masculinity and crime was reiterated later also in the work of Ann Oakley (1972) who argued that not only criminals but males in general are valued by their peers for their demonstration of strength, aggressiveness and being successful regardless of the use of legal or illegal ways to achieve their goals. Haskell & Yablonsky (1974) similarly claimed that role expectations for males and females widely differ. Since men are expected to be aggressive, they are also more likely to engage in criminal behavior compared to women who, instead, are socialized to be passive (Haskell & Yablonsky, 1974). However, such straightforward contraposition between "male role identity" and

"female role identity," and the almost inevitable overlap between masculinity and crime have been partly criticized for focusing on differences between men and women, but failing to take into account how men may construct different masculine identities. Increasingly since the 1970s the concept of "sex role" has been heavily criticized (Carrigan, Connell, & Lee, 1985; Connell, 1995; Messerschmidt, 1993), and many scholars argued that the social context in which masculinities can be constructed (e.g. family, school, and workplace) as well the role of class, age, and race should be included in the study of masculinity and crime (Messerschmidt, 1993).

More recent studies have stressed the role that differential gender socialization patterns play in making characteristics such as self-assertiveness, independence, competitiveness, social dominance, and, eventually, physical violence and aggressiveness traits associated with male gender role, while female traits are usually described in terms of empathy towards others, altruism and expressiveness (Maccoby, 1999; Maccoby, & Martin, 1983; Martin & Ruble, 1997). Bem's gender schema theory (1981; 1985; 1993) well describes the societal and cultural influences in shaping the ideas of how male and female are expected to behave. Developing children's self-concept is assimilated into categories of female and male gender schemas which are defined by their culture, as society teaches them "the substantive network of sex-related associations that can come to serve as a cognitive schema" and that "the dichotomy between male and female has extensive and intensive relevance to virtually every aspect of life" (Bem, 1981). The learning process can occur in different social contexts and different agents may play a relevant role in instilling gender roles. While a central position in the socialization process is played by parents, school, peers and mass media also have a strong influence in the process of reinforcing the categorization of what has to be considered masculine or feminine (Henslin, 1999).

Box (2002) pointed out that the research on the link between gender differences and crime/delinquency has been limited and characterized by theoretical and methodological flaws. Most of

empirical research on the masculinity-crime link has focused on male violent behavior (DeKeseredy, & Schwartz, 2005; Messerschmidt, 1999; Polk, 1994; 1999), but some recent studies have also attempted to explore its link with other types of criminal behaviors (e.g. shoplifting, vehicle theft) (Caputo & King, 2015; O'Connor & Kelly, 2006), as well as with fear of crime (Goodey, 1997) and criminal victimization (Daigle, & Mummert, 2014; Durfee, 2011). One of the first criminological studies on sex-role identification and delinquency that attempted to overcome such limitations was conducted by Shover (1979). The study used a sample of 1,002 students in grades eight through twelve, and focused on the link between sex roles and two typologies of illegal behavior (aggressive offenses and property offenses). Using a scale specifically developed by the authors to measure gender role expectations among juveniles, masculine role expectations and feminine role expectations were conceptualized as "behavioral expectations which people hold for themselves, expectations about such matters as appropriate conduct or plans for the future" and measured separately for both the male and female students in the sample[1] (Norland, James, & Shover, 1978; Shover, Norland, James, & Thornton, 1979). The study analyzed both the direct effect of gender role expectations on delinquency and the role of the mediating variables opportunity, attachment and belief on the relationship between gender role expectations and delinquency. Eventually, the study provided little support for the masculinity hypothesis, and feminine role expectations resulted to be a better predictor of aggressive offenses and property offenses than traditional masculine role. Furthermore, path analysis showed the effects on the outcome variable was mainly indirect and mediated by opportunity and social control variables (Shover et al. 1979). Similarly, also subsequent studies failed to support the link between masculine roles and delinquency (Norland, Wessel, & Shover,

[1] The Traditional Masculinity Scale was constructed by utilizing five Likert five Likert-type scale items: 1. I expect to pay for activities when on a date; 2. I expect to help fix things like the car; 3, If I marry, I would expect to provide most of the income for my family; 4. I expect to ask someone for a date rather than be asked; 5 If I marry, I would expect to take responsibility for major family decisions, such as buying a home or a car. Similarly, five Likert-type scale items were used to construct the Traditional Femininity Scale: 1. If I marry, I would expect to be mainly responsible for housework, whether working outside the home or not; 2. Before going out at night, I expect to tell my parents where I am going; 3. I expect to help take care of younger children in the family or neighborhood; 4. I expect to get married and raise a family rather than get a job in the business world; 5. If I marry, I would expect to move to another city if my spouse changed jobs.

1981; Thornton & James, 1979). More recent studies also provide mixed support of the applicability of the masculinity-femininity link to the explanation of crime and antisocial behaviors. A study by Horwitz and White (1987) on a group of American adolescents (N = 1,308) found that males at age 21 who strongly conformed to masculine gender roles were more likely to participate in delinquency. However, an inversely significant relationship was found between masculinity and alcohol and drug problems. On the other hand, while no significant association between femininity and drug problems was detected for the male adolescents, femininity was significantly inversely associated with alcohol and drug problems for females (Horwitz and White, 1987). A study on intimate partner violence among men in the LGBTQ community found a strong significant relationship between holding strong masculine roles and perpetration of physical violence against the partner (Oringher, & Samuelson, 2011). The findings of Oringher and Samuelson's study replicate those of studies on intimate violence in heterosexual couples where heterosexual men with greater conformity to traditional masculine norms were found to be more likely to use violence against their partners (Anderson, & Umberson, 2001; Levitt, Swanger, & Butler, 2008). Similarly, an investigation on a mixed group of both male and female perpetrators of intimate partner violence suggested that while masculinity was significantly associated with higher levels of physiological domestic violence, subjects who reported greater conformity to feminine values were less likely to perpetrate intimate violence (Próspero, 2008). Some evidence of a link between masculinity-femininity expectations and crime came also from a recent study conducted on a sample of 113 Italian pupils on the link between masculinity and bullying, which found that regardless of the sex of the child, higher levels of masculinity were a significant predictor of bullying (Gini & Pizzoli, 2006). Meanwhile, a study on a group of 263 American male and female college students while not revealing a significant relationship between masculine gender identity and deviant behavior, found that femininity and female-role socialization was associated with lower levels of deviance (Nofziger, 2010).

Social Bond Theory

Some criminologists suggest that gender roles affect deviance indirectly, and that the effects of masculine and feminine roles are mediated by other variables (Shover et al., 1978). For the purpose of this study, the mediating role of social control variables will be analyzed. In fact, previous research has pointed out that masculine and feminine gender roles are not equally exposed to same levels or forms of social control at home, at school or among their peers (Bardwick & Douvan, 1971; Block, 1984; Fagot & Patterson 1969; Hagan, Hewitt & Alwin, 1979; Hagan, Simpson, & Gillis, 1987; Heidensohn, 1985; Hoffman-Bustamante, 1973; Shover et al., 1979; Thorne, 1993). For example, Hagan (1979; 1987) stated that within the family, especially in those households that show stronger patriarchal attitudes, there are differences in the forms that social control is experienced by boys and girls. Firstly, boys are more likely to be subject to lower levels of parental control. Second, while boys might experience higher levels of formal social control, informal mechanisms of social control (especially from the family, but also from the school and communities) are more likely to be employed with girls and women.

Hirschi's (1969) social bond theory has been one of the most influential criminological theories, and is also among one of the most empirically tested and supported theories of crime (Franzese, 2009). Hirschi utilized the concept of *social control* to try to give an answer to the question "why do people not commit crime and deviance" rather than why they do it. His explanation stressed the relevance of the presence of strong connections between the individual and society to explain why people would refrain from engaging in antisocial or criminal behavior, whereas lack (or weakened) social bonds would free them from possible restrains to engage in crime and deviance (Hirschi, 1969). The social bond includes four components: attachment to close others, commitment to conventional activities and goals, involvement in conventional activities and belief in widely accepted values and societal norms.

Furthermore, Hirschi stressed the importance of bonds in three social institutions: the family, school and peers. For example, youths with a strong attachment to others, especially with the family, would exhibit lower levels of participation in criminal behavior or high-risk activities since they might not want to disappoint their parents with their behavior. Individuals may also refrain from any involvement in criminal or deviant activities which could end up threatening their attainment of a goal they are committed to (e.g. education and marriage). Likewise, being involved in conventional activities can affect the likelihood of an individual to engage in criminal or deviant activities since the opportunity to engage in delinquency will not present itself as long as the person's time is occupied in pro-social activities. Finally, according to social bond theory, a person that has a strong belief in the laws and norms of the society is less likely to deviate from them.

Although women and gender have been initially ignored from Hirschi's development of social bond theory, an increasing number of scholars have tried to expand the analysis also to female delinquency, and thus test the generalizability of social control theory to both male delinquency and female delinquency (Anderson, Holmes, & Ostresh, 1999; Booth, Farrell, & Varano, 2008; Cernkovich, & Giordano, 1992; Erickson, Crosnoe, & Dornbusch, 2000; Laundra, Kiger, & Bahr, 2002; Özbay, & Özcan, 2006; Rosenbaum, 1987). A large body of research has been mostly supportive of an explanation of both male and female participation in different forms of criminal and deviant behaviors through the lenses of social control theory. However, other studies have noticed that the influence of social bonds may differently affect male and female delinquency (Begg, Langley, Moffitt & Marshall, 1996; Booth et al., 2008; Laundra et al., 2002; Mason & Windle, 2002; Özbay & Özcan, 2006). For example, Booth (2008) tested social control theory on a sample of 1,366 male and female high school students, and some of the results were surprisingly inconsistent with most of the previous research on social control and gender. Contrary to expectations, attachment to parents was found predictive of delinquency only for male students but not

for female students. Moreover, the social bond involvement was found to be significant only for the boys, but in the opposite direction to what the literature on social control suggests (Booth et al., 2008). This finding is also partly in line with the results of a previous study conducted in New Zealand by Begg, Langley, Moffitt and Marshall (1996) that found that being involved in sport activity was not a significant protective factor against youth delinquency.

Gender socialization and differences in female and male delinquency should be addressed within the social and cultural context in which they occur. Most empirical studies on social bond theory have been carried out in the context of Western societies (Özbay & Özcan, 2006; Peterson, Lee, Henninger, & Cubellis, 2014).

Among others, there has been limited research attempts in the context of South Korea, a society that despite the strong influence of the Western culture has remained strongly affected by its Confucian cultural legacy. Social and cultural transformations occurred in South Korea since the beginning of the 20th century had repercussions also on gender attitudes and gender socialization of children, and findings of recent studies on parental attitudes on children gender socialization in Korea well reflect the contrasting nature of gender socialization patterns typical of traditional Korean and those that characterize modern Korean society (Lee, 2004). The role of caregiver for boys and girls in early childhood has been redistributed among several actors in modern Korean society. While traditionally the mother was in charge of the socialization of girls while the oldest male family member (usually the grandfather) was expected to be the primary caregiver for boys, in modern society mothers and, increasingly, also fathers are the primary source of socialization for their children, regardless of the child's sex. Furthermore, as parents devolve responsibilities for the education and socialization of their children to other agents, school and day care centers also currently play a relevant role in the socialization process of boys and girls (Lee, 2004). Meanwhile, also the gender norms and values that are valued as acceptable and expected to be

instilled in boys and girls have undergone some profound changes. In traditional Korean culture, from childhood boys and girls were introduced to a social system that put men in a position of dominance over female members of the society. Traits such as 'dominance,' 'strength' and 'intelligence' were typically considered male traits necessary for a man to successfully represent his extended family in the social context and support their families. On the other hand, 'obedience,' 'weakness,' 'passivity' and 'supportiveness' where considered essential qualities of a woman since their existence had to devoted to being good wives and wise mothers (Cho, 1998, Lee, 2004; Park, 2005). According to findings from in-depth interviews with Korean parents (Lee, 2004), in the contemporary Korean context the coexistence of traditional Confucian gender ideologies has shaped the understanding of the concepts of masculinity and femininity and parental gender socialization in modern Korean society. Traditional gender attributes and roles have not been replaced by a new concept of gender based on Western egalitarian ideologies, but provide the basis for a broadening and reinterpretation of the concept of masculinity and femininity in contemporary Korean society:

> […] [T]hese new views of gender do not state that men and women have completely new roles or that they share the exact same roles, but rather that men and women have modified roles and traits that are defined by the situations. […] Korean men are still expected to play a traditional role as head of their family, but the image of the head of family was "symbolic" rather than "actual." Contemporary women are expected to exhibit traditional feminine traits as well as some masculine characteristics depending on the situation. For both men and women, this results in dual roles that include both traditional gender roles and Western egalitarian roles. Thus, the diverse expectations of contemporary masculinity and femininity reflect the extended men's and women's roles in contemporary Korean society.
>
> (Lee, 2004, p. 148)

Furthermore, while the sex of the child can still be one of the factors affecting parental socialization to gender roles, it seems that contemporary Korean families are familiar with a broader and more multifaceted concept of gender than the fixed gender roles ascribed to men and women by traditional Confucian values of masculinity and femininity. Therefore, contemporary parental gender socialization strategies seem to be taking into account the diverse views on masculinity and femininity in modern

Korean society as well as the different definition of gender roles in diverse present and future social contexts (family, school, work, etc.) (Lee, 2004).

METHODOLOGY

Present Study

The primary goal of this dissertation is to examine the effects of gender roles (Masculinity and Femininity), and the potential mediating effects of social bonds in male and female digital piracy, while controlling potentially relevant variables. For example, Moon (2002) pointed out that opportunity plays an important role in the explanation of computer crime and included variables such as number of hours spent at the computer, and whether adolescents mainly use a computer at home and if they are members of a cyber club, to account for it. Furthermore, in the current study I will perform separate analyses of the theoretical model on forms of crime conducted in the real world, serious delinquency and status delinquency. Although some research on gender and computer crime has been conducted, there have been no attempts to date to employ the masculinity hypothesis to explain crime conducted in cyberspace, an environment that presents profound differences with the real world, also with regard to gender power relations and creation of different gender identity. Furthermore, there is the need to fill the gap in the criminological literature as very limited research has examined the role that variables from other prominent criminological theories can have in mediating the effect of gender values on delinquency.

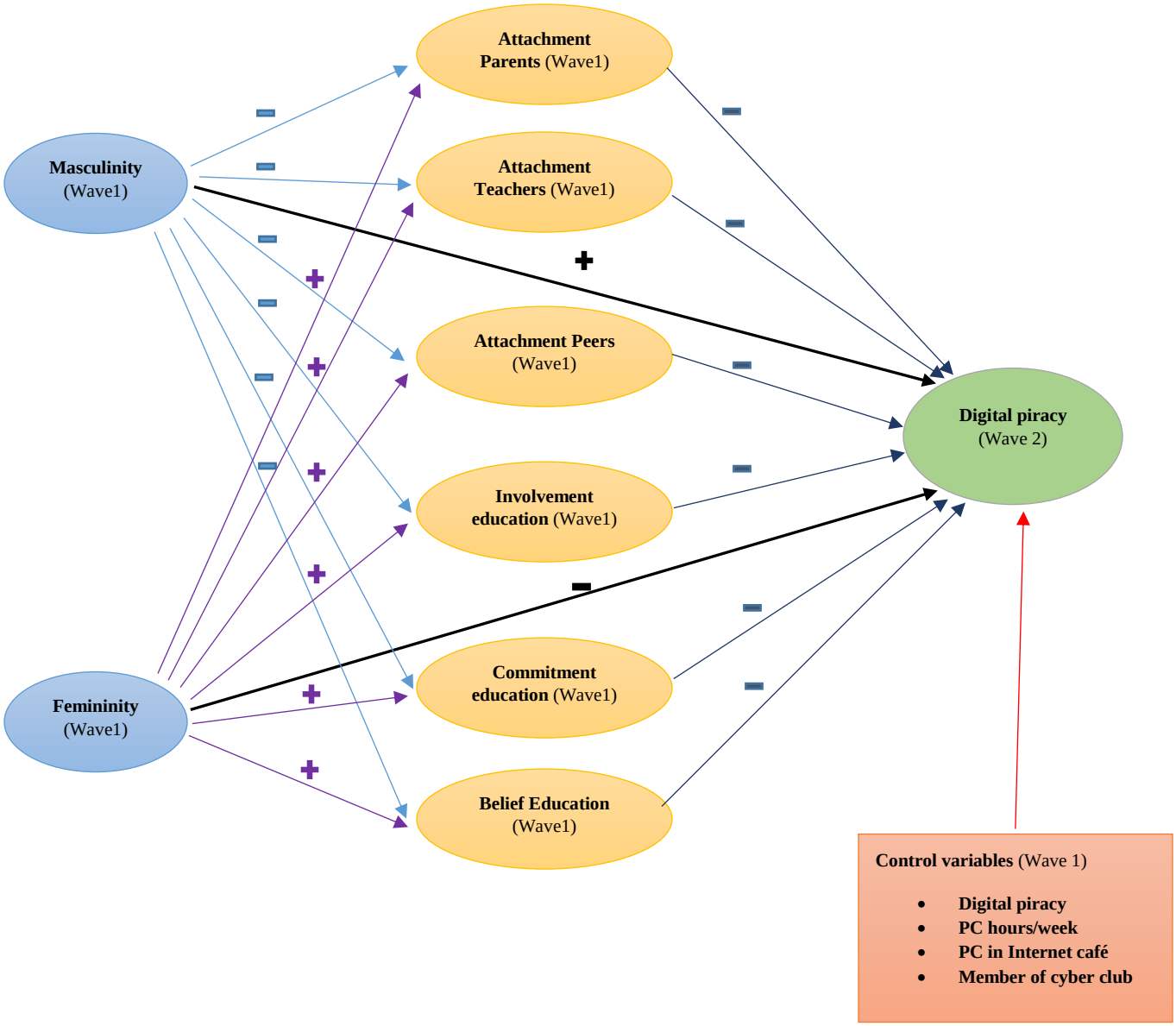
Based on the prior literature, three models (Figure 4, 5 and 6) have been elaborated to assess the impact of gender roles on different forms of delinquency and the mediating role of elements of the social bond in different social domains in explaining different forms of delinquency. The following research questions were formulated:

MODEL 1

Hypothesis 1a: Do masculine values and feminine values significantly affect male and female involvement in digital piracy?

Hypothesis 1b: Do social bonds mediate the link between gender roles and digital piracy?

Figure 4 Model 1

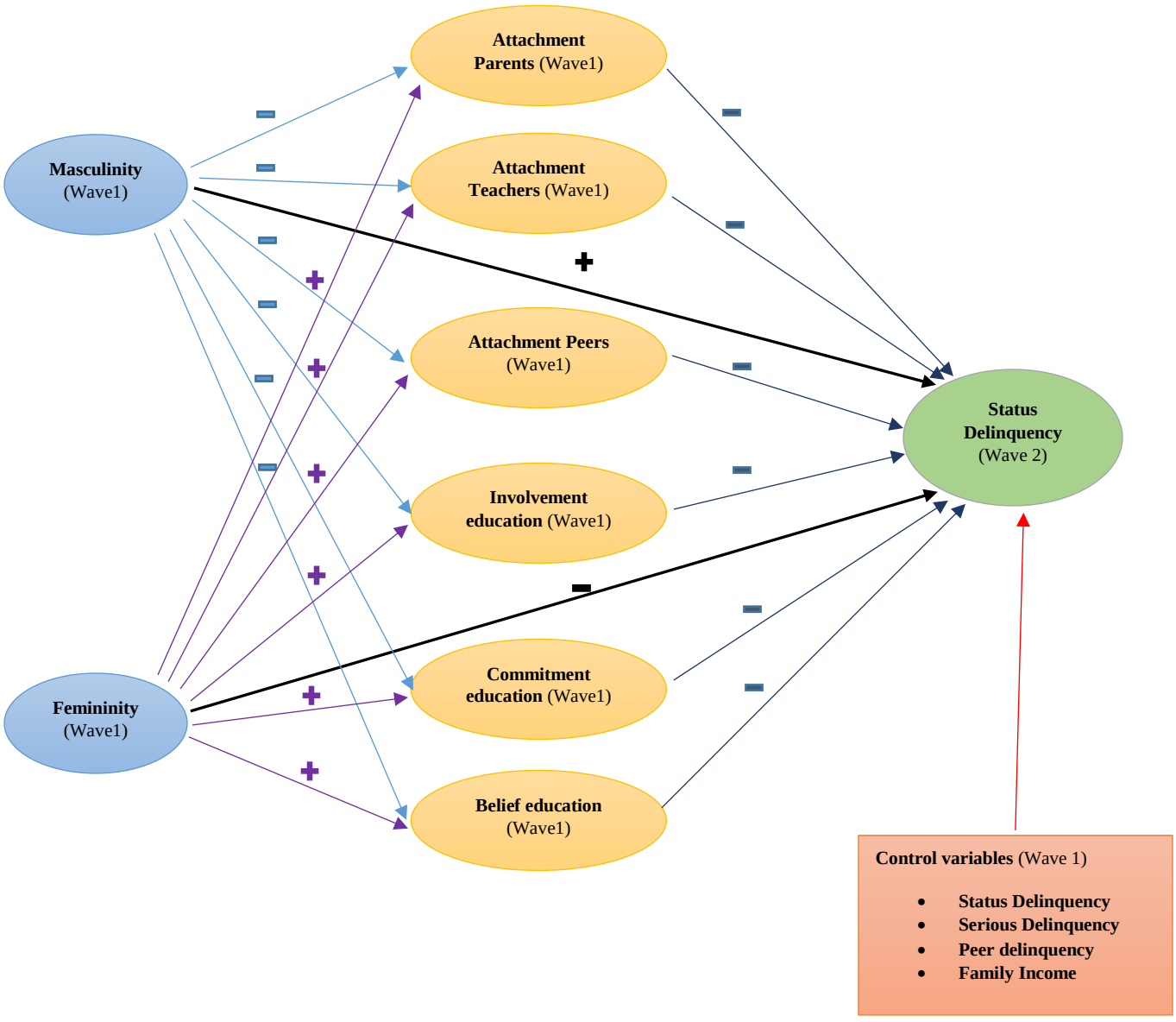


MODEL 2

Hypothesis 2a: Do masculine values and feminine values significantly affect male and female involvement in status delinquency?

Hypothesis 2b: Do social bonds mediate the link between gender roles and status delinquency?

Figure 5 Model 2

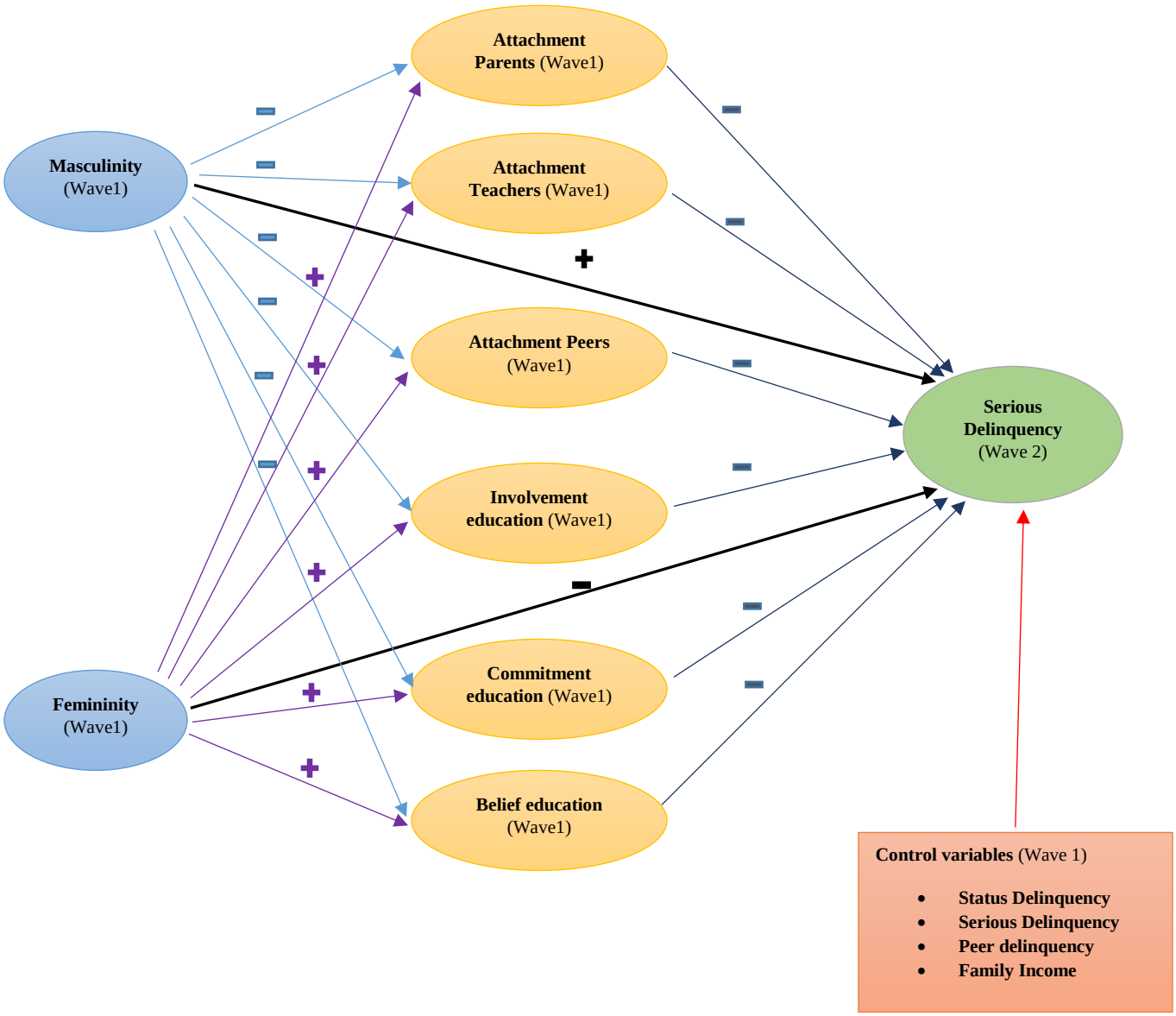


MODEL 3

Hypothesis 3a: Do masculine values and feminine values significantly affect male and female involvement in serious delinquency?

Hypothesis 3b: Do social bonds mediate the link between gender roles and serious delinquency?

Figure 6 Model 3



Moreover, the current study will also seek to identify group-based differences in female and male participation in software piracy (and traditional delinquency) among Korean adolescents using the trajectory modeling technique by Nagin (1999; 2005). Specifically, this approach will provide a useful descriptive tool to explore distinct offending patterns of cyber delinquency and traditional delinquency across male and female Korean youth, and address the following questions:

- Are there distinct trajectories of offending among male students?
- Are there distinct trajectories of offending among female students?
- How do (female and male) cybercrime trajectories compare to traditional crime trajectories?
- Does a dynamic interrelationship between engaging in delinquent behavior in cyberspace and traditional delinquent behaviors perpetrated in the real world seems to emerge?

Data and Sample

The current study examines secondary data from the Korean Youth Panel Survey (KYPS) collected between 2003 and 2008. The National Youth Policy Institution was in charge of collection of the data which allowed for the creation of a consistent "longitudinal youth database as a central resource of research related to adolescent development, education, and behavior in South Korea" (Kim, Kwak, & Yun, 2010). For this KYPS study, two cohorts of Korean students, one made up of students attending the fifth grade in elementary school when the study started and the other group composed of students at the second grade in junior high school (comparable to an 8th grade in the United States), were followed. After the two nationally representative samples of the two cohorts were selected using a stratified multistage cluster sampling method, each year data were collected utilizing a paper and pencil questionnaire for the students, also in addition to face-to-face interviews. Phone interviews with their parents were also conducted in order to collect additional information about the students as well as his or her family.

Only the data for the first cohort (8th grades) will be used for the purpose of the current study, thus allowing for the analysis of six waves of data. Only five waves of data were collected for the second cohort (4th graders) that was surveyed between 2004 through 2008. Overall 3,449 students participated in the project, with a high response rate throughout the entire study, with the lowest response rate at the sixth wave (86%) and 2,967 participants. The initial sample was initially evenly composed of male students (1725) and female students (1724), with a mean age at the beginning of the study of 13 years old.

Attrition and missing vales

A recurrent issue when using survey (panel) data is attrition in the sample between waves and the presence of missing values, and the dataset used in this study is not extraneous from such problem. With regard to the former problem, out of the initial sample (3,449 respondents at Wave 1), about 7.5% of the subjects (261 individuals) discontinued the survey in Wave 2, thus leaving us with a total sample of 3,188 subject equally split between male students (1,594 respondents) and female students (1,594 respondents). Moreover, the issue of missing values is likely to affect statistical research. By reducing the size of the examined sample, missing data can lead to biased findings, result in inflated Type I and Type II error rates and reduce the statistical power of the analysis (Graham, Hofer, & Piccinin 1994; Graham et al. 1997). Among the survey items utilized for this study, 31 items contained at least 1 missing values (See Appendix A).

Different strategies have been developed to handle the problem of missing values, and all of them carry their own strengths and weaknesses. One common method used to handle missing data is the Expectation-Maximization (EM) algorithm (Dempster, Laird, & Rubin, 1977), a procedure that allows a replacement of the missing data with data imputed through a maximum likelihood estimation method. EM involves a two-step iterative process that is repeated until the estimates converge, thus resulting in the

imputation of the missing data and a complete dataset (Dong, & Peng, 2013; Kang, 2013; Kargupta, 2005). The two-step process was summarized by Riggelsen (2006), with the *e-step* described as the step used to "[p]redict missing values given the current best estimate of [the parameter based on information we have gathered up until now]," followed by the *m-step* that "[c]alculate the parameter estimate using the statistics from the E-step, and consider it the new best estimate of [the parameter based on information we have gathered up until now]". Many current statistical software packages allow researcher to perform an EM procedure in order to handle missing data. For the purpose of this study, SPSS (Version 22.0) was used to impute the missing values and create a new dataset.

Measurements

Independent variables

Two variables, *masculinity* and *femininity,* were constructed in an attempt to measure the masculine and feminine orientation of Korean adolescents. Typically, in Western societies, masculinity has been associated with attributes such as independence, being willing to take risks, ambition, courage, and assertiveness. Instead, personality traits that traditionally have been associated with are nurturance, compassion, passion, creativity, and sensitivity (Gill, Stockard, Johnson, & Williams, 1987). Several different instruments have been used in previous studies to measure gender identity (Palan, Areni, & Kiecker, 1999; Norland et al., 1979). In line with previous research (Norland et al., 1978; 1981), the variables *masculinity* and *femininity* have been formulated as a scale of gender-specific behaviors that are traditionally considered typical of men and women. The masculinity and femininity measures are constituted of three items each. The masculinity factor has been constructed by using the following items:

1. To a man, social success is more important than anything else
2. A man ought to stand on his own opinion instead of following that of others
3. Dominating other people to a certain degree is a desirable masculine virtue

Similarly, also female gender role was constructed using three Likert scale items:

1. To a woman, marrying a nice man is more important than her own social success
2. To a woman, following others' opinion is more desirable than insisting on her own
3. Being quiet and obedient is a desirable feminine virtue

Both masculinity and femininity have been measured separately for male and female students.

Mediating variables

A set of mediating variables were constructed to represent the four elements of the social bond (attachment, commitment, involvement and belief) that can be found in the three main domains of adolescents' social life (family, school, and peers), as presented in Hischi's (1969) social control theory. Six variables were constructed separately for the male and female sample. The following variables have been included the study, and each of them has been constructed and measured separately in the male and female sample: attachment to parents, attachment to teachers, attachment to peers, commitment to education, involvement in education, and belief in education. The items used to construct the social bond scales replicate those utilized in previous research on social bond theory (e.g. Peterson et al., 2014)

Dependent variables - Digital piracy

The KYPS survey contains a series of questions about deviant and illegal behaviors that can be committed online through the use of a computer. Among those, respondents were asked how many times in the past year they had used software that had been illegally downloaded from the Internet, intentionally circulated false information on internet bulletin boards, used unauthorized internet ID or resident registration number of other people, disguised sex or age at internet chatting, hacked computers or websites, or insulted other people on chat rooms or bulletin boards. For the purpose of the current study,

the variable “digital piracy” was constructed measuring the number of times that respondents had made use of illegally downloaded software in the previous year.

Dependent variables - Traditional delinquency

In order to construct the two dependent variables that measure traditional delinquency as an illegal act perpetrated in the real world, a series of responses to questions about female and male respondents participation in delinquent behaviors in the past year were added to create the outcome variables “status delinquency” and “serious delinquency.” The items utilized to construct status delinquency includes questions about behaviors such as being absent from school without a justification and running away from home. Furthermore, also the number of times students smoked or drank were included since those behaviors would have been considered illegal at the time of the assessments. Meanwhile, the outcome variable “serious delinquency” was constructed by adding the number of times students had engaged in these criminal acts: Assault, gang fighting, robbery, theft, harassment, threatening other people, bullying, and sexual assault.

Control variables - Digital crime opportunity

Due to the different nature of the types of crime examined in this study, the control variables used in the model with digital piracy as outcome variable differ from those utilized in the other two models having status delinquency and serious delinquency as outcome variable.

Three measures of crime opportunity that have been included in previous criminological studies on cyber delinquency (Moon et al., 2010; Moon et al. 2012) are included in the study as control variables. Even in the context of South Korea where almost all youths have access to computers and the Internet, the opportunity to access the Internet, the time spent online and individuals IT knowledge can greatly

differ from person to person (Moon et al., 2012). Based on previous criminological literature on computer crime, the role of a series of factors that can contribute to shaping the crime structure of computer crime has been examined. The three control variables are 1) time spent using the computer by the respondent, 2) whether the main location where the computer is used is an Internet café, and 3) if the respondent is a member of a cyber-club. The first factor was measured as the average number of hours spent using a computer every day. The second measure, was constructed as a dichotomous variable measuring if the main location where the respondent used the computer was an Internet café (the binary variable was coded as 1 = typically using computer in an Internet café and 0 = typically using computer at home). While previous studies (Moon et al., 2010; Moon et al. 2012) have focused on the home as a typical location of computer use for adolescent, another typical location where adolescents can use a computer an Internet café. Internet cafes, which in Korea are also referred as PC 방(PC bang), might provide the opportunity to utilize computer in an unsupervised location, and to potentially engage in cybercrime. Moreover, Internet cafes do not only provide easy computer access, but also a physical place of social interaction (Stewart, & Choi, 2003) where unskilled PC users could interact with individuals that have high computer and IT skills (the binary variable was coded as 1 = PC mainly used in an Internet café and 0 = PC mainly used in a location different from Internet café). Finally, a measure of membership to a cyber club was included as a dichotomous variable in the study (the binary variable was coded as 1 = not a club member and 0 = club member). All variables were measured at Wave I.

Control variables - Prior delinquency

Previous studies have found prior delinquency to be a strong predictor of future deviance (Brownfield, & Thompson, 2005; Heimer, & Matsueda, 1994). Measures of prior delinquency at Time I where included in the current study as predictors of future delinquent behavior (as measured in Wave II).

Specifically Model 1 incorporates a measure of prior digital piracy, while measures of prior status delinquency and serious delinquency were included as control variables in Model 2 and 3. The same items used to construct the independent variables (digital piracy, status delinquency and serious delinquency) at Time II were used to calculate prior delinquency at Time I.

Control variables - Peer delinquency

Additionally, a measure of association with peer delinquents was added as control variable in model 2 and 3. Similarly to a previous study employing the KYPS dataset (Peterson et al., 2014), the variable was constructed by adding the number of respondent's friends who had engage in different forms of deviance such as having an unexcused absence from school, severely beating others, drinking, smoking, robbing, or stealing.

Control variables - Family income

One of the questions included in the KYPS survey concerned the respondent's average family monthly income at Time I. The item was used to construct the control variable 'family income.' Since the variable was not normally distributed, the variable was recoded as the natural logarithm of the initial survey item.

Analytic Plan

Mediation Analysis

Structural equation modeling (SEM) was used to build the measurement models and then to test the structural models. Data analysis was conducted on mediation models for each outcome variable (digital

piracy, status delinquency, and serious delinquency), and separately for male students and female students, using IBM SPSS Amos 20 (Arbuckle, 2011).

The first statistical step was to perform exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). EFA's main objective is to "describe the behavior of the variables in the data matrix, and to search for patterns and relationships that are not attributable to chance" (Jobson, 2012). Therefore, EFA was utilized in the early stages of the analysis of the dataset and development of measurement scales.

CFA differs from EFA as its main objective is instead to examine whether the hypothesized model is supported by the data, and allows researcher to cross-validate the model initially specified with EFA (Hurley, Scandura, Schriesheim, Brannick, Seers, Vandenberg, & Williams, 1997; Jobson, 2012).

In the current study, after exploratory factor analysis was performed, confirmatory factor analysis was used to cross-validate the specified model. In order to evaluate if data fit well the specified CFA model, the use of different model fit indices is advised. While RMSEA (root mean square error of approximation) is one of the most widely used model fit indices, other commonly used goodness of fit indices are the relative chi-square (also called normal chi-square), CFI (comparative fit index), TLI (Tucker-Lewis index) and SRMR (standardized root mean square residual). Based on the results of several simulation studies, researchers have identified model fit indices cutoff values in order to determine acceptable levels of fit of the hypothesized model (Prudon, 2014). In particular, in the work by Hu and Bentler (1999), cutoff criteria for the most commonly employed model fit indices are presented. The suggested RMSEA cutoff value is $\leq .06$ (Hu & Bentler, 1999), even though some authors have suggested that even a RMSEA value of $\leq .09$ can be representative of an acceptable model (Hopwood, & Donnellan, 2010). A CFI and TLI value of .90 or greater would also suggest a good model fit (Hu and Bentler, 1999). Literature also recommends a cut-off point of .80 for SMRS for an acceptable fit (Hu and Bentler, 1999; Perry, Nicholls, Clough, & Crust, 2015). Finally, the relative chi-square value can also be examined to determine if a model fits well the

data. The relative chi-square is the chi-square divided by the degree of freedom, and this measure was developed as an attempt to make it less dependent on the sample size (Luminet, & Curci, 2008). Researchers disagree on what the value of the relative chi-square best reflects a good model fit. Some authors argue that a value of 2 or more (Ullman, 2001) or more than 3 should be considered a sign that data do not fit well the model, but other researchers even adopted a more relaxed value of 5 or less to indicate that a model is acceptable (Schumacker & Lomax, 2004).

After building the measurement models, structural equation modeling (SEM) using AMOS 20 (Arbuckle, 2011) was used to analyze if the social bond latent constructs mediate the relationship between the gender role independent variables and the outcome variables. A separate mediation model for each outcome variable (digital piracy, status delinquency and serious delinquency) was tested, and the female and male samples were analyzed separately for each of the outcome variables. To evaluate the model fit of each model, the results of four fit indices were examined: The relative chi-square, RMSEA, CFI and TLI. In case that the hypothesized full model fits the data poorly, one possible way to improve the model fit is to correlate the error terms after analyzing the fit indices. The choice of when a path between error terms should be added, should be based on the results of the AMOS modification index output. Modification indices estimate what the drop in the chi square value would be after correlating those two error terms. According to Byrne (2001), a path should not be added between error terms whose modification index does not exceed 100, and researchers should decide whether to add a path if correlating the error terms makes sense theoretically (Ho, 2013). Once the model has been redefined, the following step is to test the significance of the hypothesized mediations

According to Baron and Kenny (Baron and Kenny, 1986) the following conditions must be met for a full or partial mediation to exist. First, a significant relationship must exist between the independent variable and the outcome variable. Therefore, the gender roles variables must be significantly related to

the outcome variable included in each of the hypothesized model. Second, also the relationship between the independent variable and the mediator must be significant. In order for this condition to be met, masculinity and femininity should be significantly related to the latent variables measuring the strength of social bonds. Third, a significant relationship must exist between the mediating variables and the outcome variable. After following these initial steps, we can establish the presence of mediation if the there is a drop in the effect of the independent variable(s) on the dependent variable after including the mediating variable(s) in the model (partial mediation). Moreover, a drop to zero in the relationship between the independent variable and the outcome variable after including the mediating variable, should be interpreted as evidence of full mediation. Successively, in order to assess the significance of any reduction of the direct effect of the independent variables masculinity and femininity on digital piracy or traditional delinquency, Sobel test was employed (Baron and Kenny, 1986; Sobel, 1982; 1990). In the recent years other methods to test mediation have become more popular because of the advantage that they would provide compared to Sobel test. Moreover, Sobel test may be not appropriate to test mediation when samples are small in size (Preacher and Leonardelli, 2003). Specifically, small samples sizes might not meet one of the basic assumptions of this approach which assumes a normal distribution of the indirect effects (Hayes, 2009; Preacher and Hayes, 2004). Therefore, some researchers have argued that a sample of at least 500 is required to use Sobel test (Miller and Johnson, 2013). However, considering the large sample size used in the current study, the normality of the sampling distribution should not be affected. Furthermore, some researchers have also highlighted how other strategies to test mediation, such as bootstrapping methods have a greater statistical power and lower rates of Type I error compared to Sobel test (MacKinnon, Lockwood, & Williams, 2004; Pituch et al., 2005; Preacher & Hayes, 2008). However, despite the increasing popularity of alternative mediation testing methods, some authors have challenged the consensus surrounding their superiority to test mediation hypotheses (Lance & Vandenberg, 2011). In

particular, based on the results of their analyses Lance and Vandenberg (2011) argued that if "sample sizes exceed 140 cases with moderate effects, [Sobel test] appears to satisfy the necessary assumptions, avoids exceeding acceptable Type I error rates, and provides a sufficient level of statistical power for testing mediation hypothesis."

Group-based trajectory modeling

In order to explore potential differences in the developmental trajectories of traditional delinquency and digital crime, the current study will also apply the Group-Based Trajectory Modeling (GBTM) approach as proposed by Nagin and Tremblay (1999). The GBTM approach allows researchers to identify the trajectories that groups within the studied population followed over time or age (Nagin, 2005), and one of the characteristics that has made it so influential also in criminological studies over the last 20 years is that GBTM approach "provides the capacity for testing whether the hypothesized trajectories emerge from the data itself […] rather than assuming the existence of developmental trajectories of a specific form before statistical data analysis begins" (Nagin, 2005). Moreover, the GBTM approach is also capable of a. estimating the proportion of the population following each identified trajectory group, b. relating the probability of following a certain group based on individual characteristics and circumstances, c. using the probability of group membership in order to create profiles of group members, d. including time-varying covariates to the analysis and e. estimating joint trajectories of distinct but related behaviors (Nagin, 2002).

This section of the analysis will include two stages. The first step involves the identification of different trajectory groups within Korean male students and Korean female students for the three outcome variables (digital piracy, status delinquency and serious delinquency). Second, joint trajectory modeling

will be conducted (separately for males and females) to explore the interrelationship between involvement in computer crime and participation in delinquent activities in the physical world.

In order to identify the delinquency trajectories, we used a group-based semiparametric mixture modeling approach using Proc Traj in Stata 10 (http://www.andrew.cmu.edu/user/bjones). The procedure provides three different model options: the zero-inflated Poisson (ZIP) model, the censored normal (CNORMAL) model, and the logit model (logit) (Jones et al., 2001). The ZIP model is usually used when researchers conduct a longitudinal analysis of count data with a large number of zeros. The CNORMAL model is typically selected when the outcome variable is a scale with a minimum and a maximum. However, the same model can also be employed with count data when data are normally distributed. Finally, the logit model should be used when the outcome variable is dichotomous (Jones et al., 2001). The outcome variables in the current research (e.g. digital piracy, status delinquency and serious delinquency) are all count data with extra-zeros present in the outcome measure. Therefore the ZIP model seems the most appropriate for the current analysis.

The next step is the identification of the number of trajectories for each model and the shape of each trajectory group. A series of statistical considerations should guide the researcher in the process of model selection. Specifically, as recommended by Nagin (1999), to determine the model that best fit the data, the following criteria should be considered: 1. Bayesian Information Criterion (BIC) statistic, 2. the posterior probability of group membership, and 3. the size of the trajectory group. The Bayesian Information Criterion is calculated as BIC = log(L) — 0.5 k *log(N), where L is the value of the model's maximized likelihood, N is the sample size and k is the number of parameters in the model (Nagin, 1999; 2005; 2009). As more parameters are included in the equation, we are able to increase the fit of the model and the likelihood of the data. However, the BIC also introduces a penalization for adding additional

parameters (Nagin, 2005; 2009). The BIC score is always a negative number and the model with the highest BIC score (or the absolute lowest BIC score) should be preferred.

In the process of model selection, we start with a two-group solution and successively compare its fit with the three-trajectory group option. We should repeat this process until the model does not increase data fit or loses statistical significance. A similar iterative procedure will be used to determine the shape of each trajectory (e.g. linear, quadratic, cubic, etc.). When estimating trajectory groups, quadratic polynomials tend to provide a better fit than linear models. However, cubic models seem to increase the fit of models with a limited number of groups (Bushway, Thornberry, & Krohn, 2003; Merola, 2012). Therefore, the shapes of the trajectory groups of each one of the models included in our analysis where initially estimated as a function of a quadratic polynomial. Successively, alternative models with different shapes (e.g. linear, cubic, etc.) will be estimated and compared with the initial model and eventually allow us to determine which model has the best fit. Two final criterions that should be considered in the process of determining the number of groups and the shape of the trajectories is the average posterior probability of group membership and the size of the trajectory groups. The posterior probability of group membership measures the probability that individuals will belong to the group they are more likely to be assigned to. According to Nagin (2005; 2009), the posterior probability of group membership value should be greater than .7 for all groups. Furthermore, with regard to the size of the trajectory groups, we do not want the size to fall under 5% of the total sample.

One of the extensions of group-based trajectory modeling is joint trajectory modeling. According to Nagin et al. (2010), dual trajectory modeling is a technique that provides "statistical summary of the developmental linkages between the two outcomes of interest [and can] be used to analyze the connections between the developmental trajectories of two outcomes that are evolving contemporaneously […] or that evolve over different time periods that may or may not." Moreover, the procedure can also be extended to

the analyses of the linkage of more than two outcomes that are developing at the same time. Criminological studies have paid little attention to the overlaps between digital crime and traditional juvenile delinquency. Therefore, joint trajectory modeling will provide a useful tool to investigate possible interlinkages between a form of crime perpetrated in cyberspace and deviant and illegal behaviors perpetrated in the real world.

RESULTS

Building the measurement model

Exploratory Factor Analysis

The initial dataset was divided in two separate samples in order the conduct separate analyses for male students and female students. Before extracting the factors from each dataset, a few requirements should be satisfied. First, the dataset should consist of a large number of cases. Although researchers disagree on the exact number of cases necessary to perform factor analysis, the number ranges between 100 or greater and 300 or more (Hair, Anderson, Tatham, & Black, 1995; Tabachnick, & Fidell, 2007). Even after splitting the original dataset into two groups according to the sex of the respondents, the two samples have more than 1,000 cases, thus satisfying the first requirement. Second, the adequacy of the data for factor analysis should also be guided by an analysis of the relationships between the sample individual items in the correlation matrix. According to Tabachnick and Fidell (2007), the suitability of the data for factor analysis can be deemed as appropriate if the correlation matrix includes "several sizeable correlations." Specifically, if none of the correlations displayed in the correlation matrix is above .30, factor analysis might not be the most appropriate tool (See Appendix A). Finally, the Kaiser-Meyer-Olkin (KMO) index and the Bartlett's Test of Sphericity should be performed to assess the suitability of the dataset for factor analysis. The KMO index measure ranges from 0 to 1, with an index measure of .50 or more indicating that the data are suitable for factor analysis (Field, 2009; Kaiser, 1974; Williams, Brown, & Onsman, 2012). Similarly, a statistically significant Bartlett's Test of Sphericity indicates that factor analysis can be performed properly. Based on the results of KMO and the Bartlett's Test of Sphericity, factor analysis seems to be appropriate for both the boys sample and the girls sample. For the male students sample, KMO was above .5 (KMO = .811) and the Bartlett's Test of Sphericity was

statistically significant (χ^2 (378) = 14084.299, p = .000), and also for the female sample KMO was greater than .5 (KMO = .802) and the Bartlett's Test of Sphericity was statistically significant (χ^2 (406) = 15197.358, p = .000) (See Appendix A).

Subsequently, an exploratory factor analysis (EFA) using Maximum Likelihood as extraction method and Promax rotation was performed on both samples. Eigenvalues greater than 1 and an examination of a screeplot (See Appendix A) were utilized as criteria to determine the number of factors to retain. Furthermore, only items which loaded more than .3 on at least one factor were included in the interpretation of the EFA. A total of seven factors were retained for both the male sample and female sample: Masculinity (3 items), Femininity (3 items), Attachment to parents (5 items), Attachment to teachers (3 items), Attachment to peers (4 items), Commitment to education (5 items), Belief in Education (2 items). The total variance explained by the seven factors in the male sample is 47.7%, while in the female sample the seven factors account for 48.4% of the total variance (See Appendix A).

Finally, the internal consistency of the construct was measured with Cronbach's alpha. Cronbach's alpha reliability coefficient can range between 0 and 1, with higher values indicating a higher level of internal consistency. Although a Cronbach's alpha value of .7 or greater is commonly considered a good indicator of internal consistency (Nunnally, 1978), it has been suggested that also a Cronbach's alpha score of .6 or greater can be seen as acceptable for scales constructed with less than 10 items (Loewenthal, 1996). Evidence of internal reliability is supported, with Cronbach alpha values ranging between .648 and .832 for the male sample and .614 and .856 for the female sample (See Appendix A).

Confirmatory Factor Analysis

As a second step, confirmatory factor analysis was used to confirm the results of EFA. Specifically, Amos 20 was used to determine if the seven-factors solutions emerged from EFA for both samples well

fit the data. The fit indices relative chi-square, RMSEA, CFI, TLI and SMRS were used to evaluate the model fit. Moreover, if the data fits poorly our models, dropping items with low loadings (.30 or less) and adding a correlations between error terms can increase the model fit. The fit for both the model using the male students sample and the model using the female students dataset was acceptable as all fit indexes included in this analysis support the hypothesis of good model fit. Table 1 and Table 2 show the summary of the goodness-of-fit indexes for the male model and female model.

Table 1 Goodness of fit summary (Male)

X2	df	p	CMIN/DF	CFI	TLI	RMSEA
1382.093	329	.000	4.305	.921	.929	.046

Table 2 Goodness of fit summary (Female)

X2	df	p	CMIN/DF	CFI	TLI	RMSEA
1382.093	329	.000	4.227	.936	.927	.045

Descriptive Statistics

Descriptive statistics for each variable and the items utilized to construct the factors, including range, standard deviation and mean for both male students and female students are reported in Table 3. Moreover, a series of independent t-tests performed on the observed variables suggest significant variation by gender for some of the measures included in the study (See Appendix A). With the exception of the status delinquency measures at Time 1, all measures of delinquency suggested a significant difference between males and females. Male frequencies for digital piracy measures at time 1 ($t (2572.37) = 13.29$, $p < .01$) and time 2 ($t (2617.15) = 9.69$, $p < .01$) as well those for participation in serious delinquency are significantly higher than the females (Time 1: $t (3124.62) = 4.48$, $p < .01$; Time 2: $t (3066.90) = 3.38$, $p < .01$). On the other hand, females reported significantly higher frequencies of status delinquency at Time

2 than males (t (3185.93) = -1.45, p < .01). Finally, significant mean differences were found also for the control variables. Male students were found to be more likely than female students to use the computer in an internet café (t (2543.369) = 0.7, p < .01), and to be members of a cyber club (t (3172.45) = .04, p < .01).

Table 3 Descriptive statistics

	Male				Female			
	Min.	**Max.**	**Mean**	**SD**	**Min.**	**Max.**	**Mean**	**SD**
Masculinity (T1)	1.18	4.78	3.22	.59	.87	4.06	2.53	.61
Femininity (T1)	.40	2.87	1.39	.43	.24	2.99	.99	.43
Parental attach. (T1)	.98	4.35	2.85	.60	1.05	5.14	3.52	.78
Teacher att. (T1)	.68	3.09	1.70	.43	.94	4.63	2.44	.74
Peer att. (T1)	87	4.22	3.52	.52	.78	3.86	3.30	.46
Commitment education(T1)	.80	3.68	2.39	.49	.68	3.23	2.09	.44
Involvement education(T1)	0	72	12.56	9.70	0	64	11.60	9.47
Belief education (T1)	.97	4.77	3.10	.81	.84	4.12	2.70	.77
Status delinquency (T2)	0	10	1.31	2.74	0	10	1.46	2.73
Serious delinquency (T2)	0	10	.73	2.20	0	10	.49	1.80
Digital Piracy (T2)	0	10	1.25	2.81	0	10	.45	1.69
Status delinquency (T1)	0	10	1.16	2.48	0	10	1.81	3.03
Serious delinquency (T1)	0	10	1.49	2.79	0	10	1.07	2.42
Digital delinquency (T1)	0	10	2.13	3.44	0	10	.79	2.02
Peer delinquency (T1)	0	8	1.10	1.88	0	8	1.16	1.79
Family house income (T1)	1.3	4	2.49	.44	.70	4	2.48	.45
Member Cyber club (T1)	0	1	.79	.409	0	1	.74	.43
PC hrs/day	0	99	2.57	2.99	0	99	2.38	2.85
PC mainly used Internet Cafe	0	1	.10	.30	0	1	.03	.17

Mediation Analysis

MODEL 1(a) – Male digital piracy

A two-step process was used to analyze the direct and indirect effect of gender roles on digital piracy for both the male sample and the female sample. First, the direct effect of masculinity and femininity on male digital piracy was estimated without including the mediating variables in the model. The partial model fits the data acceptably with RMSEA at .5 and CFI at .94 respectively. However, the relative chi-square was 5.66 and TLI was .89. The direct effect of both independent variables on digital piracy was significant (Masculinity $\beta = .08$, $p < .01$; Femininity $\beta = -.094$, $p < .01$).

Figure 7 Model 1(a): Direct effects of gender roles on male digital piracy

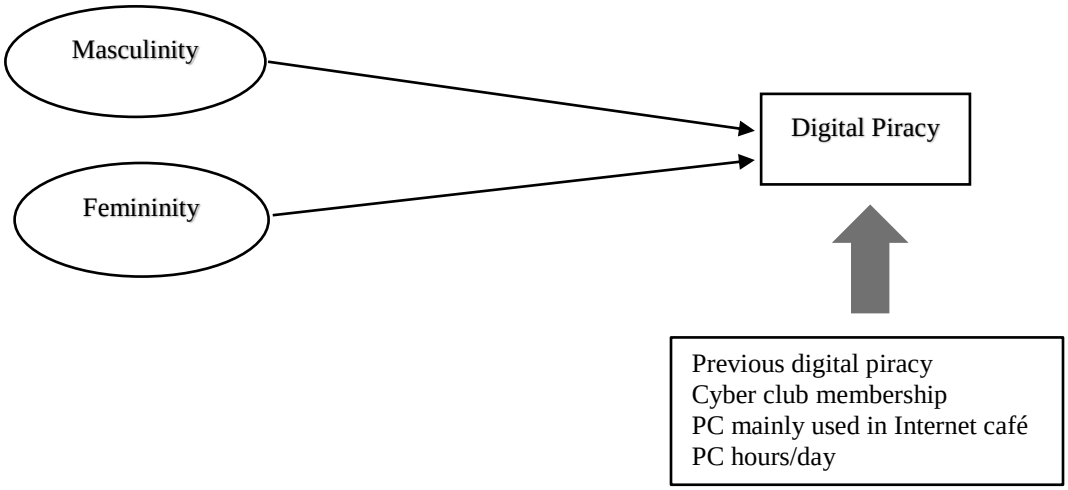


Table 4 Model 1(a): Summary of the regression weights

	Beta	S.E.	P-value (sig.)
Path			
Masculinity → Digital Piracy (T2)	.084	.129	.007
Femininity → Digital Piracy (T2)	-.094	.170	.003
Digital Piracy (T1) → Digital Piracy (T2)	.396	.019	.000
Member cyber club → Digital Piracy (T2)	-.079	.158	.000
PC in Internet cafe → Digital Piracy (T2)	-.062	.209	.006
PC hrs/day → Digital Piracy (T2)	.013	.021	.554

Successively, a full model which included all social bond mediating variables was also tested through SEM (Figure 8). Although the model chi-square was significant (chi-square = 1681.72, $p < .01$), all other indices indicate that the data fit well the model (relative chi-square = 3.42; RMSEA = .03; CFI = .91; TLI = .90). The analysis revealed that 21% of the variance of digital piracy was explained by the relationship of the variables included in the model. Both independent variables showed significant direct effects on all mediators included in the model. Furthermore, after including the mediators, masculinity ($\beta = .1$, $p < .01$) and femininity ($\beta = -.11$, $p < .01$) showed a significant effect on digital piracy (Table 5). Finally, it is worth noting that none of the mediators had a significant effect on the outcome variable, and for this reason, based on the Baron and Kenny (1986) approach, a mediational effect would be excluded.

Figure 8 Model 1(a): Full mediational model for male digital piracy

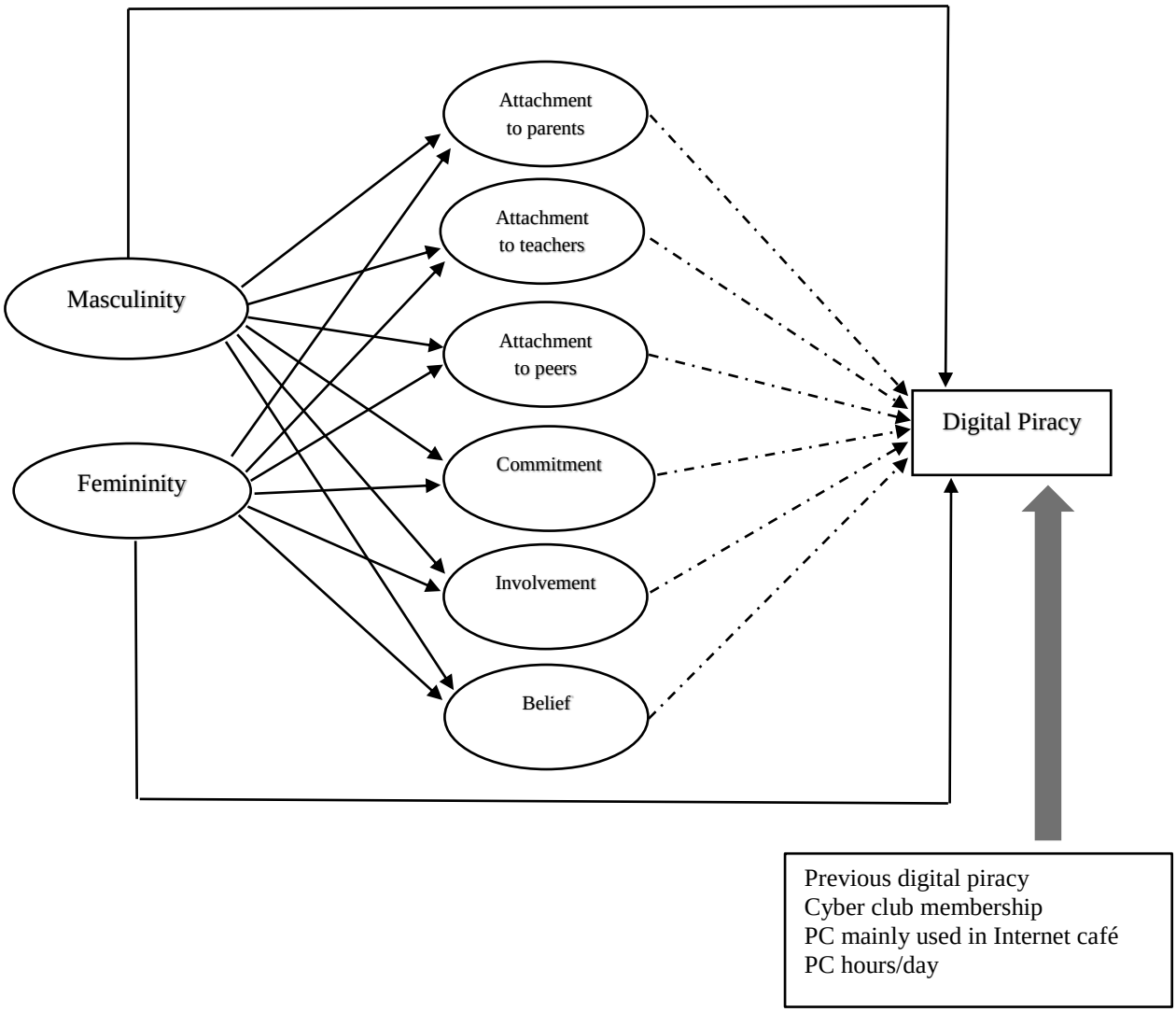


Table 5 Model 1(a): Summary of the regression weights for the full mediational model

	Beta	S.E.	P-value (sig.)
Path			
Masculinity → Parental attachment	.226	.045	.000
Masculinity → Peer attachment	.300	.034	.000
Masculinity → Teacher attachment	.200	.046	.000
Masculinity → Commitment education	.462	.037	.000
Masculinity → Involvement education	.177	.499	.000
Masculinity → Belief education	.499	.054	.000
Femininity → Parental attachment	-.175	.061	.000
Femininity → Peer attachment	-.146	.044	.000
Femininity → Teacher attachment	-.198	.063	.000
Femininity → Commitment education	-.412	.052	.000
Femininity → Involvement education	-.107	.672	.002
Femininity → Belief education	-.198	.067	.000
Masculinity → Digital Piracy (T2)	.100	.207	.046
Femininity → Digital Piracy (T2)	-.113	.241	.010
Digital Piracy (T1) → Digital Piracy (T2)	.393	.019	.000
Member cyber club → Digital Piracy (T2)	-.079	.158	.000
PC in Internet cafe → Digital Piracy (T2)	-.058	.211	.011
PC hrs/day → Digital Piracy (T2)	.022	.022	.346
Parental attachment → Digital Piracy (T2)	.000	.100	.997
Peer attachment → Digital Piracy (T2)	-.042	.126	.106
Teacher attachment → Digital Piracy (T2)	-.021	.117	.492
Commitment education → Digital Piracy (T2)	.010	.157	.751
Involvement education → Digital Piracy (T2)	-.024	.007	.289
Belief education → Digital Piracy (T2)	.030	.093	.308

MODEL 1(b) – Female digital piracy

A partial model testing the direct effect of the independent variables masculinity and femininity on digital piracy for the female students sample was also run. Unlike the results for the model examining the effects of gender roles on male involvement in digital piracy, both masculinity ($\beta = .002$, $p > .05$) and femininity ($\beta = -.034$, $p > .05$) were not found to be significant predictors of female digital piracy (Figure 9 & Table 6).

Figure 9 Model 1(b): Direct effects of gender roles on female digital piracy

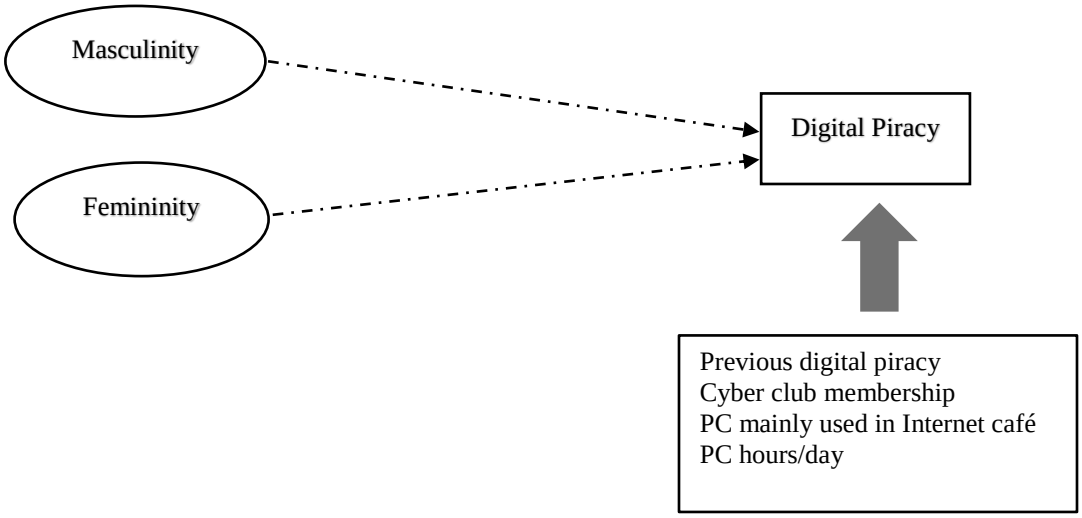


Table 6 Model 1(b): Summary of the regression weights

	Beta	S.E.	P-value (sig.)
Path			
Masculinity → Digital Piracy (T2)	.002	.073	.940
Femininity → Digital Piracy (T2)	-.034	.103	.285
Digital Piracy (T1) → Digital Piracy (T2)	.252	.021	.000
Member cyber club → Digital Piracy (T2)	-.072	.095	.003
PC in Internet cafe → Digital Piracy (T2)	-.019	.237	.430
PC hrs/day → Digital Piracy (T2)	-.001	.015	.970

Even though the analysis did not reveal any direct effects, a full mediational model was tested since indirect effects can be detected even when direct or total effects are not present (Rucker, Preacher, Tormala, & Petty, 2011)

The full model (Figure 10) showed an acceptable fit (CMIN/DF = 3.774; RMSEA = .04; CFI = .90), although the chi-square was significant and the Tucker-Lewis coefficient was below .9 (TLI = .89). The model also does not seemed to show strong predictive power since only 8% of the variance of female digital piracy was explained by the relationship between the exogenous and mediating variables with the outcome variable. The independent variables remained not significant in the full mediational model, but have a significant relationship with all social bond variables except attachment to teachers. Meanwhile, attachment to teachers is the only mediator that significantly directly affected digital piracy ($\beta = -.062$, $p < .05$). The results of the analysis seems to also confirm that previous participation in digital piracy ($\beta = .247$, $p < .01$) and being a member of a cyber club ($\beta = -.071$, $p < .01$) increase the likelihood of use of illegally downloaded software. The results also reveal that mediational effects are absent from the full model with the female sample (Table 7).

Figure 10 Model 1(b): Full mediational model for female digital piracy

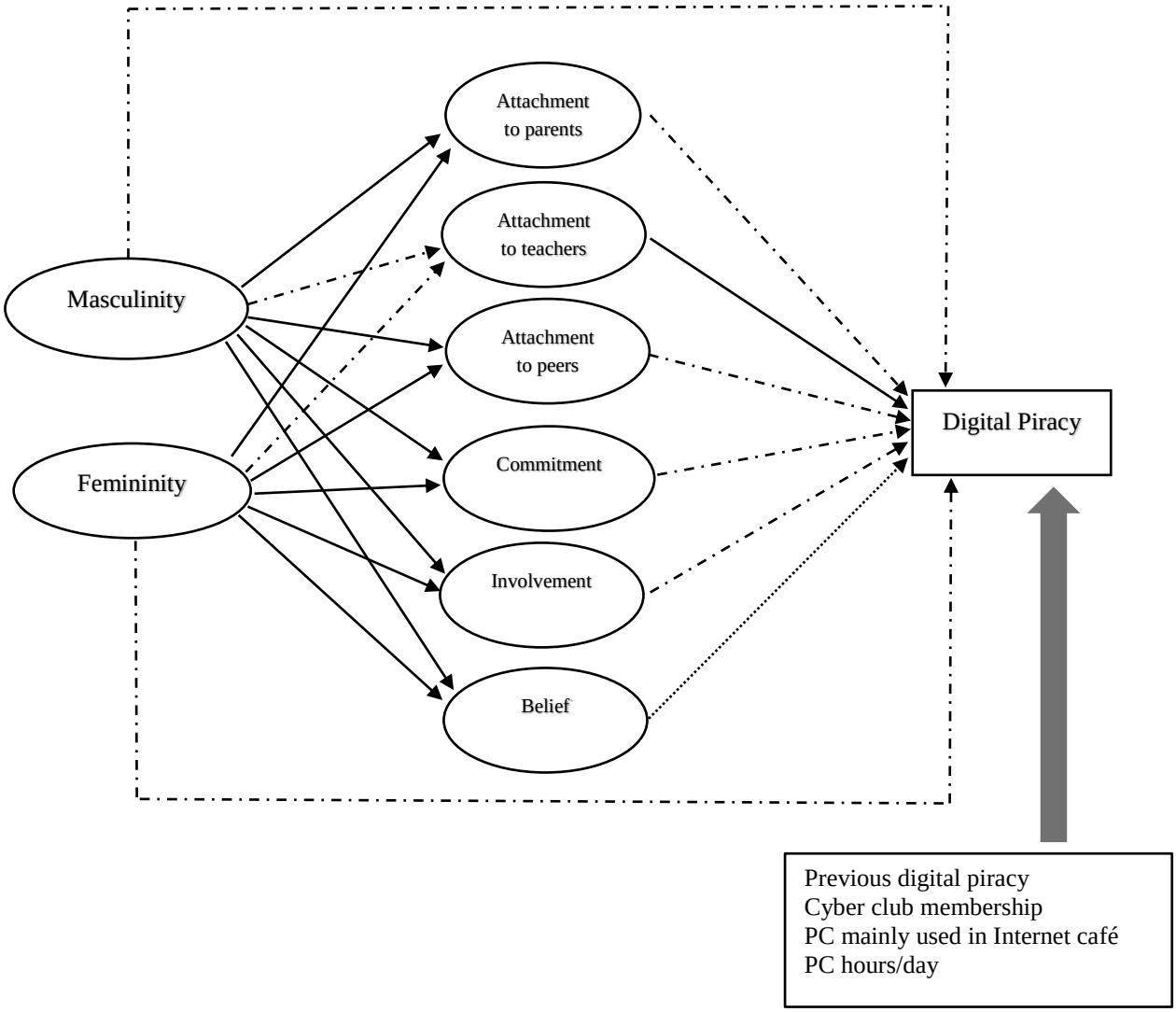


Table 7 Model 1(b): Summary of the regression weights for the full mediational model

Path	Beta	S.E.	P-value (sig.)
Masculinity → Parental attachment	.074	.039	.026
Masculinity → Peer attachment	.164	.024	.000
Masculinity → Teacher attachment	.018	.041	.597
Masculinity → Commitment education	.127	.025	.000
Masculinity → Involvement education	.152	.416	.000
Masculinity → Belief education	.243	.039	.000
Femininity → Parental attachment	-.123	.056	.000
Femininity → Peer attachment	-.211	.036	.000
Femininity → Teacher attachment	-.027	.058	.465
Femininity → Commitment education	-.268	.039	.000
Femininity → Involvement education	-.090	.579	.006
Femininity → Belief education	-.169	.054	.000
Masculinity → Digital Piracy (T2)	-.011	.079	.734
Femininity → Digital Piracy (T2)	-.017	.115	.638
Digital Piracy (T1) → Digital Piracy (T2)	.247	.021	.000
Member cyber club → Digital Piracy (T2)	-.071	.095	.004
PC in Internet cafe → Digital Piracy (T2)	-.020	.237	.422
PC hrs/day → Digital Piracy (T2)	.001	.015	.959
Parental attachment → Digital Piracy (T2)	.005	.056	.862
Peer attachment → Digital Piracy (T2)	.023	.092	.400
Teacher attachment → Digital Piracy (T2)	-.062	.058	.032
Commitment education → Digital Piracy (T2)	.039	.115	.241
Involvement education → Digital Piracy (T2)	-.035	.004	.155
Belief education → Digital Piracy (T2)	.049	.056	.066

MODEL 2(a) – Male status delinquency

After assessing the indirect effects of gender roles and social bond variables on a digital form of crime, a similar procedure was employed to analyze the effects on forms of crime perpetrated in the real world (Figure 11). The analysis was carried out separately for status delinquency and serious delinquency. The results of the partial model suggests that the data fit well the model having male status delinquency as outcome variable (RMSEA = .06; CFI = .94), although the relative chi-square was greater than 5 (CMIN/DF = 6.744) and the Tucker-Lewis coefficient slightly smaller than .9 (TLI = .89). Status delinquency was significantly predicted by 'masculinity' ($\beta = -.08$, $p < .05$). Femininity ($\beta = -.08$) was also a significant predictor of status delinquency, but at the .1 level (Table 8).

Figure 11 Model 2(a): Direct effects of gender roles on male status delinquency

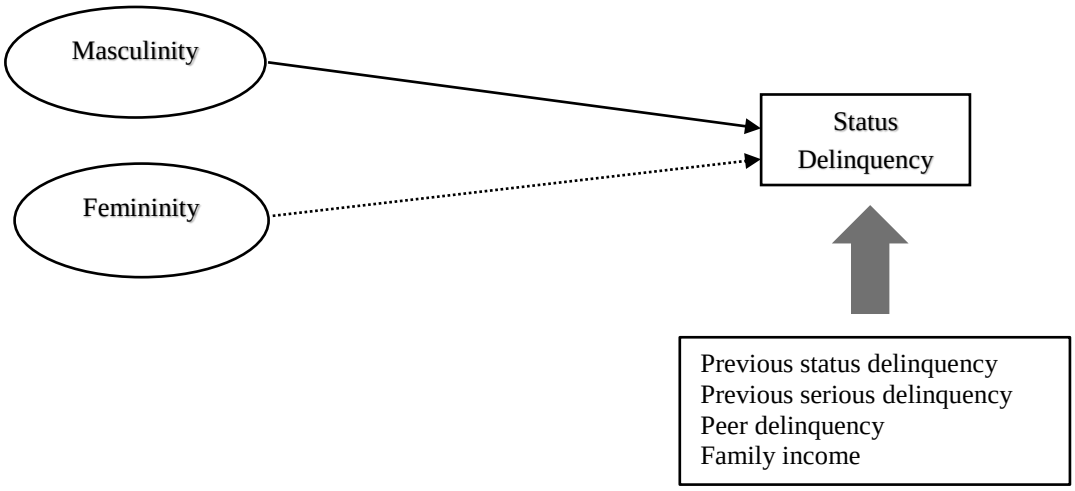


Table 8 Model 2(a): Summary of the regression weights

	Beta	S.E.	P-value (sig.)
Path			
Masculinity → Status delinquency (T2)	.060	.120	.041
Femininity → Status delinquency (T2)	-.052	.157	.078
Status delinquency (T1) → Status delinquency (T2)	.417	.027	.000
Serious delinquency (T1) → Status delinquency (T2)	.077	.024	.001
Peer delinquency → Status delinquency (T2)	.091	.037	.000
Family income → Status delinquency (T2)	.013	.135	.551

After including the social bond variables as mediators, the full model (See Figure 12) still fits the data well (cmin/df = 3.792; CFI = .9; RMSEA = .042), and 25% of male status delinquency variance is explained by its relationship with gender roles and social bond variables. All relationships in the model, with the exception of the relationship between the social bond measure attachment to peers and the outcome variable appeared to be significant at the .05 level of significance (Table 9). Finally the Sobel test (Table 10) revealed that all indirect effects between gender roles and the outcome variable through social bonds were statistically significant. The only exception was the indirect relationships through attachment to teachers which only approached statistical significance at .1 level of significance.

Figure 12 Model 2(a): Full mediational model for male status delinquency

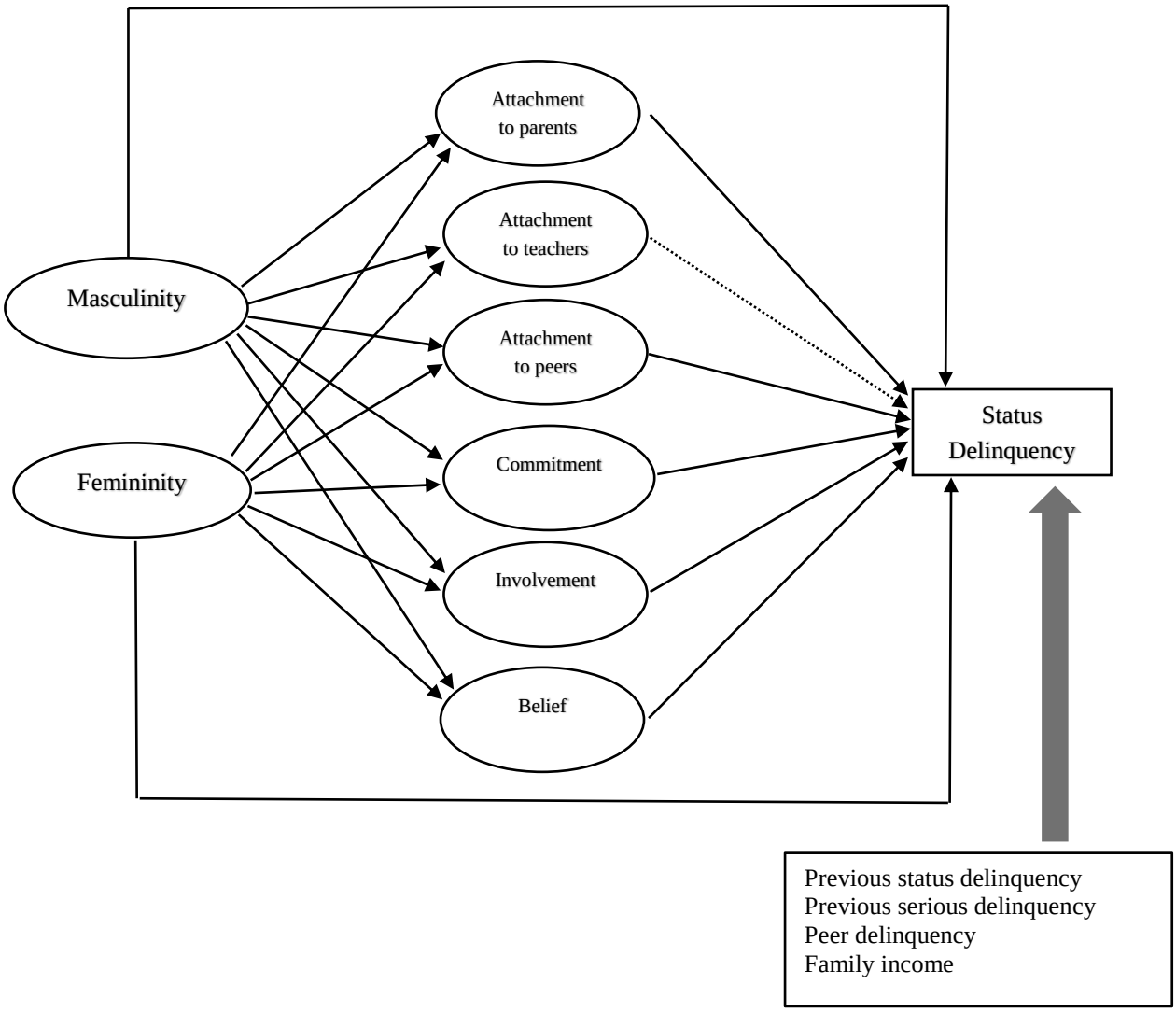


Table 9 Model 2(a): Summary of the regression weights for the full mediational model

Path	Beta	S.E.	P-value (sig.)
Masculinity → Parental attachment	.287	.047	.000
Masculinity → Peer attachment	.316	.036	.000
Masculinity → Teacher attachment	.273	.049	.000
Masculinity → Commitment education	.503	.039	.000
Masculinity → Involvement education	.169	.515	.000
Masculinity → Belief education	.512	.057	.000
Femininity → Parental attachment	-.244	.064	.000
Femininity → Peer attachment	-.162	.045	.000
Femininity → Teacher attachment	-.276	.066	.000
Femininity → Commitment education	-.458	.054	.000
Femininity → Involvement education	-.096	.679	.008
Femininity → Belief education	-.214	.068	.000
Masculinity → Digital Piracy (T2)	.147	.218	.007
Femininity → Digital Piracy (T2)	-.115	.251	.017
Status delinquency (T1) → Status delinquency (T2)	.402	.027	.000
Serious delinquency (T1) → Status delinquency (T2)	.069	.023	.004
Peer delinquency → Status delinquency (T2)	.091	.036	.000
Family income → Status delinquency (T2)	.019	.134	.384
Parental attachment → Status delinquency (T2)	-.086	.088	.000
Peer attachment → Status delinquency (T2)	.074	.120	.004
Teacher attachment → Status delinquency (T2)	-.048	.103	.088
Commitment education → Status delinquency (T2)	-.090	.156	.005
Involvement education → Status delinquency (T2)	-.069	.006	.002
Belief education → Status delinquency (T2)	-.068	.089	.018

Table 10 Model 2(a): Sobel Test

Indirect Effect	z
Masculinity → Attachment to parents → Status delinquency	-3.023**
Masculinity → Attachment to teacher → Status delinquency	-1.638 †
Masculinity → Attachment to peers → Status delinquency	2.711**
Masculinity → Commitment → Status delinquency	-2.686**
Masculinity → Involvement → Status delinquency	-2.631**
Masculinity → Belief → Status delinquency	-2.303*
Femininity → Attachment to parents → Status delinquency	2.891**
Femininity → Attachment to teacher → Status delinquency	1.635 †
Femininity → Attachment to peers → Status delinquency	-2.352**
Femininity → Commitment → Status delinquency	2.666**
Femininity → Involvement → Status delinquency	2.033*
Femininity → Belief → Status delinquency	2.150*

Note.
†p <.1
*p < .05,
**p < .01,
***p<.001.

MODEL 2(b) – Female status delinquency

A partial model was used to assess the direct effect of gender roles on involvement of female adolescents on minor delinquent acts (Figure 13). While the Comparative Fit Index (CFI = .927) indicate a good fit, the other indices indicate that that the data do not fit well the partial model (cmin/df = 10.186; RMSEA = .076; TLI = .856). Furthermore, the relationships between the independent variables masculinity and femininity and the outcome variable status delinquency were not found to be statistically significant (Table 11)

Figure 13 Model 2 (b): Direct effects of gender roles on female status delinquency

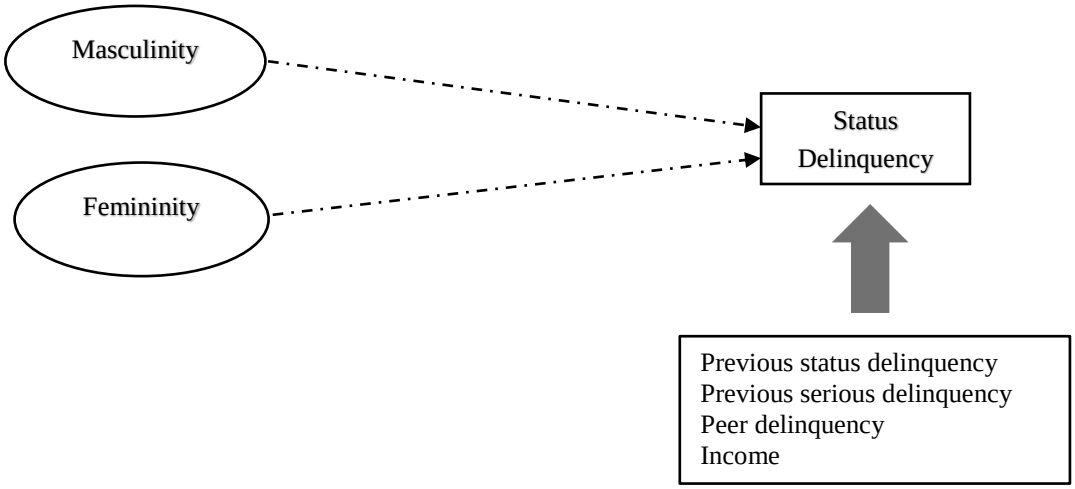


Table 11 Model 2(b): Summary of the regression weights

	Beta	S.E.	P-value (sig.)
Path			
Masculinity → Status delinquency (T2)	.041	.104	.117
Femininity → Status delinquency (T2)	.027	.141	.316
Status delinquency (T1) → Status delinquency (T2)	.446	.023	.000
Serious delinquency (T1) → Status delinquency (T2)	.047	.027	.054
Peer delinquency → Status delinquency (T2)	.130	.038	.000
Family income → Status delinquency (T2)	-.002	.128	.940

Despite the lack of direct effects, a full model was tested to investigate the presence of mediational effects (Rucker et al., 2011). The full model fit indices indicate that the data fit well the model (CMIN/DF = 4.1; RMSEA = .044; CFI = .90). With 30% of the variance of status delinquency explained, the model shows a moderate predictive power. Nevertheless according to the results of full mediational model, like those of the partial model testing only the direct effect of gender roles on involvement of female adolescents in minor acts of delinquency, the independent variable 'femininity' remains not significant ($\beta = .006, p > .05$), while 'masculinity' $\beta = .051, p < .1$) is statistically significant at the .1 level of significance. Significant direct effects exist instead between the exogenous variables and all measures of social bond with the exception of attachment to teachers. Meanwhile, commitment to education ($\beta = -.130, p < .05$) is the only mediating variable with a significant relationship with 'status delinquency.' The result of Sobel Test ($z = -2.41, p > .05$), however, excluded any significant mediation between masculinity and the outcome variable through commitment to education. Finally, those female students that had engaged in acts of minor delinquency the year before ($\beta = .43, p < .05$) or that were more likely to associate with delinquent friends ($\beta = .129, p < .05$), were also more likely to show delinquent behavior.

Figure 14 Model 2(b): Full mediational model for female status delinquency

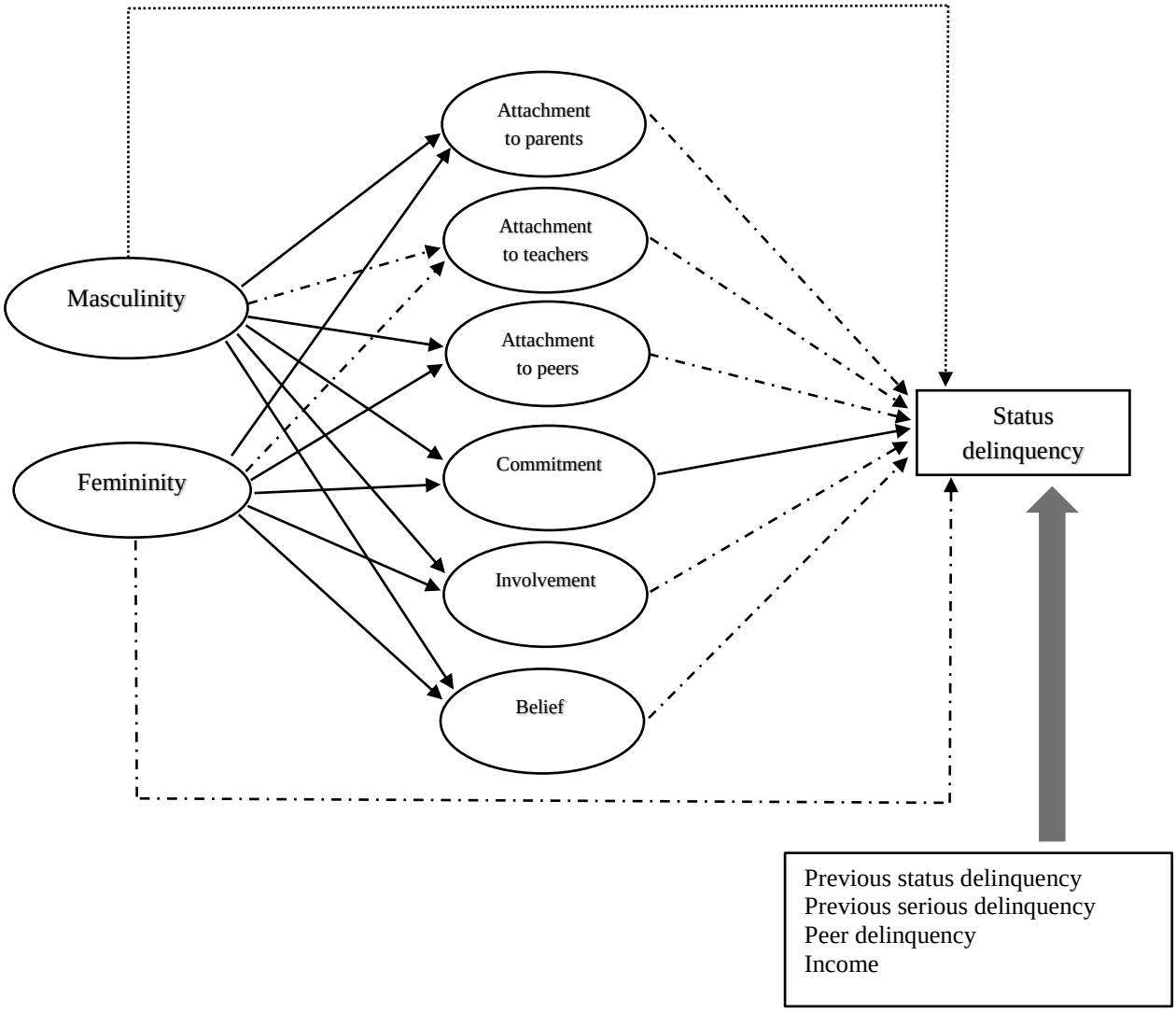


Table 12 Model 2(b): Summary of the regression weights for the full mediational model

Path	Beta	S.E.	P-value (sig.)
Masculinity → Parental attachment	.067	.039	.044
Masculinity → Peer attachment	.163	.024	.000
Masculinity → Teacher attachment	.010	.042	.783
Masculinity → Commitment education	.110	.025	.002
Masculinity → Involvement education	.145	.417	.000
Masculinity → Belief education	.238	.039	.000
Femininity → Parental attachment	-.120	.055	.000
Femininity → Peer attachment	-.209	.035	.000
Femininity → Teacher attachment	-.029	.057	.421
Femininity → Commitment education	-.262	.038	.000
Femininity → Involvement education	-.079	.571	.014
Femininity → Belief education	-.162	.053	.000
Masculinity → Digital Piracy (T2)	.051	.110	.081
Femininity → Digital Piracy (T2)	.008	.155	.808
Status delinquency (T1) → Status delinquency (T2)	.431	.022	.000
Serious delinquency (T1) → Status delinquency (T2)	.040	.027	.100
Peer delinquency → Status delinquency (T2)	.129	.038	.000
Family income → Status delinquency (T2)	.006	.128	.771
Parental attachment → Status delinquency (T2)	.011	.079	.646
Peer attachment → Status delinquency (T2)	.037	.128	.118
Teacher attachment → Status delinquency (T2)	.024	.081	.352
Commitment education → Status delinquency (T2)	-.130	.162	.000
Involvement education → Status delinquency (T2)	-.025	.006	.251
Belief education → Status delinquency (T2)	.001	.077	.958

MODEL 3(a) – Male serious delinquency

Finally, we assessed the direct and indirect relationship of gender roles with male and female involvement in serious forms of delinquency. First, when testing for the direct effects of masculinity and femininity on male serious delinquency, the model showed an acceptable fit (CFI = .946; RMSEA = .06) (Figure 15). However, the relative chi-square was greater than 5 (cmin/df = 6.756) and the Tucker-Lewis coefficient was less than .9 (TLI = .884). Furthermore, the regression results showed no significant effect of either masculinity (β = -.012, $p > .05$) or femininity (β = -.037, $p > .05$) on the outcome variable (Table 13).

Figure 15 Model 3(a): Direct effects of gender roles on male serious delinquency

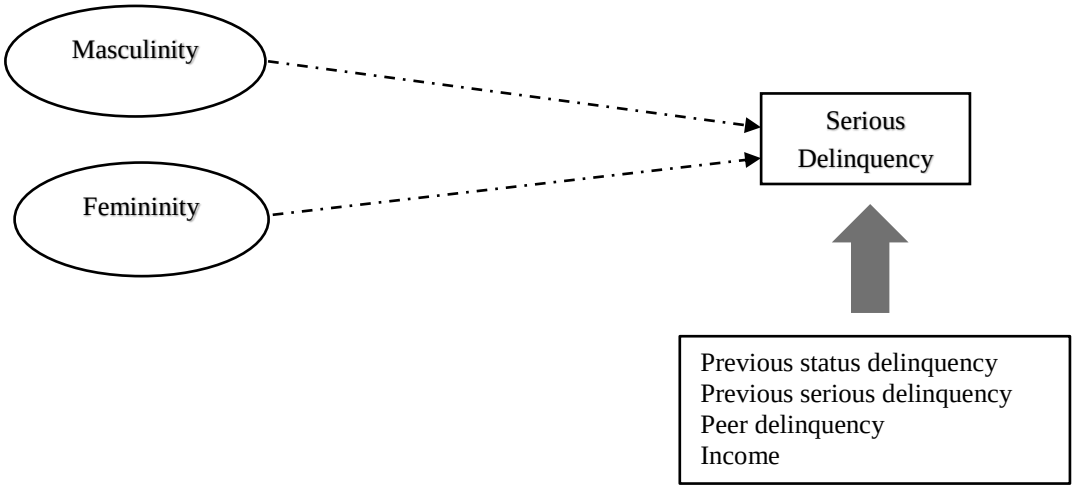


Table 13 Model 3(a): Summary of the regression weights

	Beta	S.E.	P-value (sig.)
Path			
Masculinity → Status delinquency (T2)	-.012	.103	.705
Femininity → Status delinquency (T2)	-.037	.135	.242
Status delinquency (T1) → Status delinquency (T2)	.090	.023	.000
Serious delinquency (T1) → Status delinquency (T2)	.247	.020	.000
Peer delinquency → Status delinquency (T2)	.121	.032	.000
Family income → Status delinquency (T2)	-.020	.116	.398

Structural equation modeling was also used to analyze the full mediational model for male serious delinquency. While the fit indices indicate that the model is plausible (CMIN/DF = 3.796; CFI = .908; RMSEA = .042), according to the results the hypothesized model exhibits a weak predictive power since just 13% of the total variance of the outcome variable was explained by its relationship with the exogenous variables and mediating variables. While the direct effects of the independent variables on serious delinquency remained not significant also in the full model, the direct effect of gender roles on the social bond variables are all significant at the .05 level. However, only the mediating variable commitment (β = -.067, $p < .05$) is a significant predictor of serious delinquency. A follow up Sobel Test was then used to find if commitment significantly mediates the paths between gender roles variables and serious delinquency, but Sobel test z score only approached significance (Masculinity → commitment → serious delinquency: $z = -1.924$, $p = .054$; Femininity → commitment → serious delinquency: $z = -1.912$, $p = .055$). Finally, similarly to the analysis of the full mediational model for status delinquency, also in this model the control variables seem to play an important role as predictors of serious delinquency: previous serious delinquency ($\beta = .245$, $p < .05$) as well as previous status delinquency ($\beta = .084$, $p < .05$) and association with delinquent peers ($\beta = .12$, $p < .05$) had a positive significant association with the outcome variable (Figure 16 & Table 14).

Figure 16 Model 3(a): Full mediational model for male serious delinquency

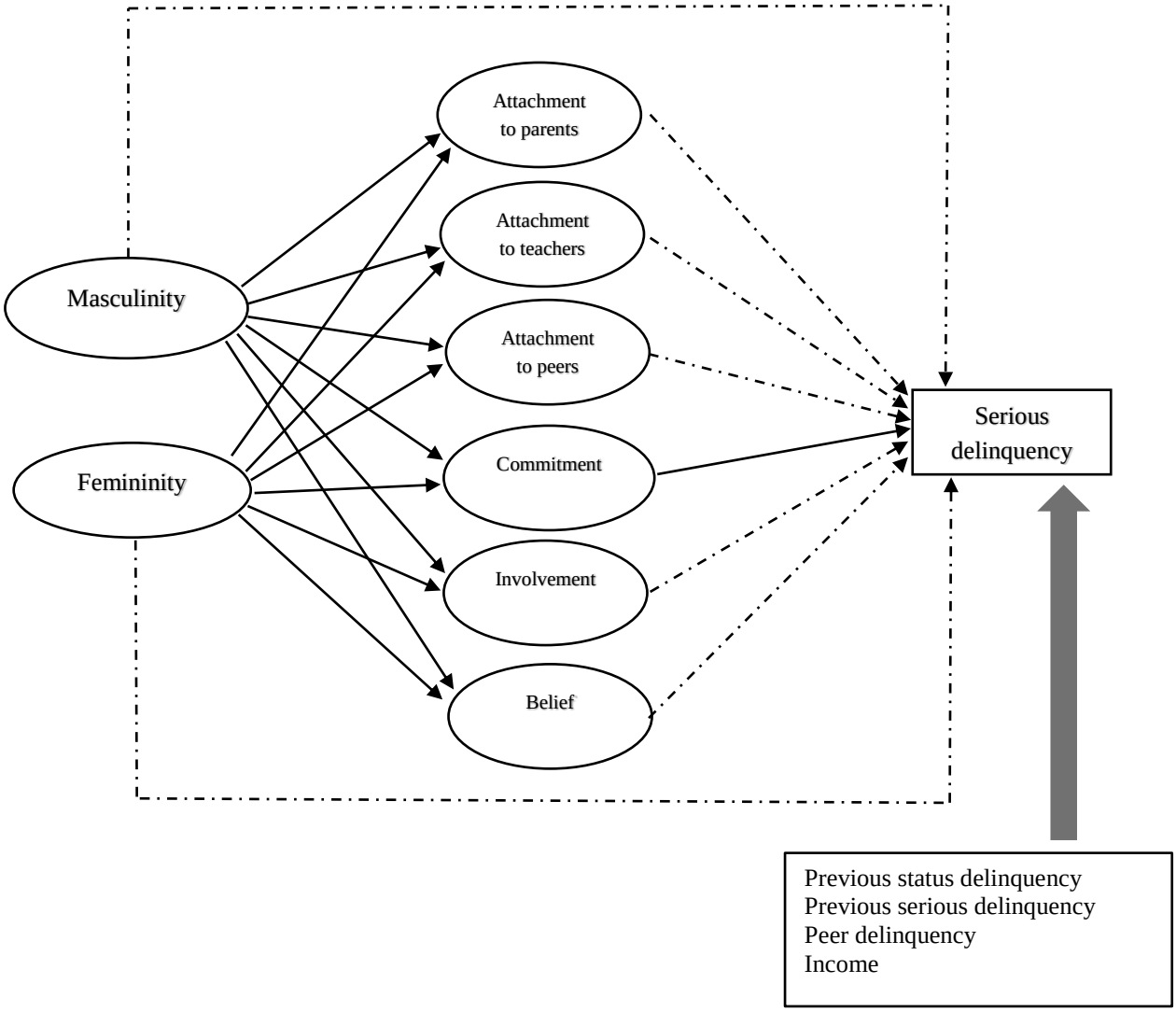


Table 14 Model 3(a): Summary of the regression weights for the full mediational model

	Beta	S.E.	P-value (sig.)
Path			
Masculinity → Parental attachment	.287	.047	.000
Masculinity → Peer attachment	.316	.036	.000
Masculinity → Teacher attachment	.274	.049	.000
Masculinity → Commitment education	.504	.039	.000
Masculinity → Involvement education	.169	.514	.000
Masculinity → Belief education	.512	.056	.000
Femininity → Parental attachment	-.244	.064	.000
Femininity → Peer attachment	-.163	.045	.000
Femininity → Teacher attachment	-.278	.066	.000
Femininity → Commitment education	-.460	.054	.000
Femininity → Involvement education	-.096	.679	.008
Femininity → Belief education	-.214	.069	.000
Masculinity → Digital Piracy (T2)	.012	.188	.841
Femininity → Digital Piracy (T2)	-.061	.216	.235
Status delinquency (T1) → Serious delinquency (T2)	.084	.023	.001
Serious delinquency (T1) → Serious delinquency (T2)	.245	.020	.000
Peer delinquency → Serious delinquency (T2)	.120	.032	.000
Family income → Serious delinquency (T2)	-.019	.117	.421
Parental attachment → Serious delinquency (T2)	-.010	.076	.726
Peer attachment → Serious delinquency (T2)	.017	.104	.522
Teacher attachment → Serious delinquency (T2)	.008	.089	.785
Commitment education → Serious delinquency (T2)	-.067	.136	.050
Involvement education → Serious delinquency (T2)	.008	.005	.737
Belief education → Serious delinquency (T2)	-.001	.077	.977

MODEL 3(b) – Female serious delinquency

The partial model testing for direct effects of gender roles on the likelihood of female students to engage in serious delinquent acts shows some resemblance with the results of Model 2. The suitability of the model was supported by the comparative fit index (CFI = .92), although the other fit indices were poor (CMIN/DF = 10; RMSEA = .075; TLI = .843). Moreover, no significant relationship was found between 'masculinity' (β = .027, $p > .05$) and 'femininity' (β = -.037, $p > .05$) with the outcome variable (Figure 17 and Table 15).

Figure 17 Model 3(b): Direct effects of gender roles on female serious delinquency

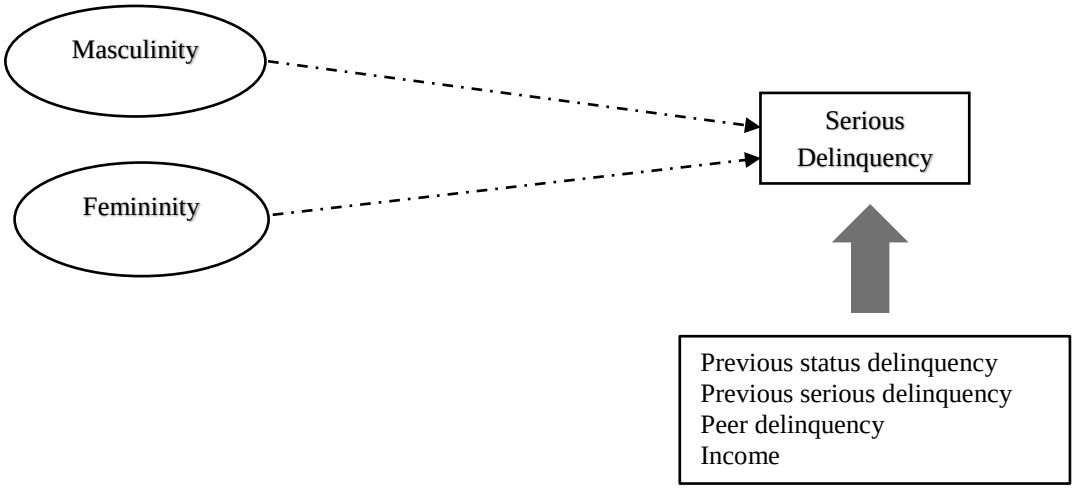


Table 15 Model 3(b): Summary of the regression weights

	Beta	S.E.	P-value (sig.)
Path			
Masculinity → Status delinquency (T2)	.027	.076	.357
Femininity → Status delinquency (T2)	-.037	.104	.215
Status delinquency (T1) → Status delinquency (T2)	.092	.017	.001
Serious delinquency (T1) → Status delinquency (T2)	.210	.020	.000
Peer delinquency → Status delinquency (T2)	.145	.028	.000
Family income → Status delinquency (T2)	.022	.095	.357

Similarly to the above discussed analyses, SEM was used to test for mediational effects of the social bonds variables between gender roles and female serious delinquency. Based on the measures of the fit indices, the model seems to fit adequately the data (CMIN/DF = 4.11; CFI = .905; RMSEA = .044), although the chi-square was significant at the .05 significance level and the Tucker-Lewis coefficient only approached the cutoff value of .9 (TLI = .891). For the outcome variable, the explained variance was only 13%, thus indicating a weak explanatory power of the final model. While the direct relationship between masculinity and the outcome variable remains not significant ($\beta = .03$, $p > .05$) also in the full model, there was an improvement in the significance of the relationship between femininity and serious delinquency, which is significant at the .1 significance level ($\beta = -.057$, $p = .097$). Furthermore, the gender roles variables show a significant relationship with all mediating variables except the measure of attachment to teachers. On the other hand, only commitment was found to be a significant predictor of lower levels of serious delinquency ($\beta = -.102$, $p < .05$). Finally, also in this model no mediational effects could be detected.

Figure 18 Model 3(b) – Full mediational model for serious delinquency

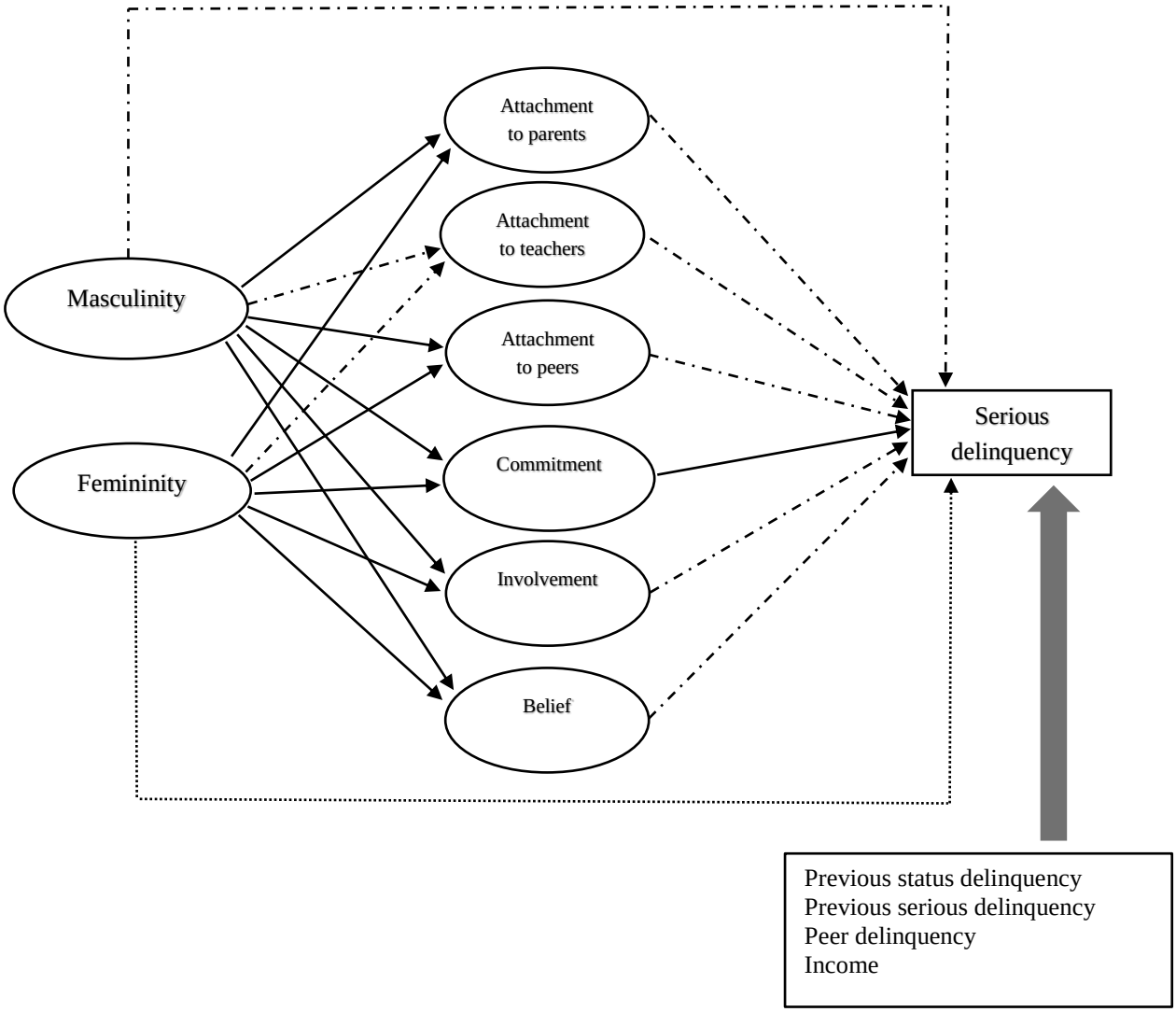


Table 16 Model 3(b): Summary of the regression weights for the full mediational model

	Beta	S.E.	P-value (sig.)
Path			
Masculinity → Parental attachment	.067	.039	.044
Masculinity → Peer attachment	.163	.024	.000
Masculinity → Teacher attachment	.010	.042	.779
Masculinity → Commitment education	.110	.025	.002
Masculinity → Involvement education	.145	.417	.000
Masculinity → Belief education	.238	.039	.000
Femininity → Parental attachment	-.120	.055	.000
Femininity → Peer attachment	-.209	.035	.000
Femininity → Teacher attachment	-.029	.057	.422
Femininity → Commitment education	-.262	.038	.000
Femininity → Involvement education	-.079	.571	.014
Femininity → Belief education	-.162	.053	.000
Masculinity → Digital Piracy (T2)	.030	.081	.347
Femininity → Digital Piracy (T2)	-.057	.115	.097
Status delinquency (T1) → Serious delinquency (T2)	.073	.017	.009
Serious delinquency (T1) → Serious delinquency (T2)	.204	.020	.000
Peer delinquency → Serious delinquency (T2)	.139	.028	.000
Family income → Serious delinquency (T2)	.024	.094	.311
Parental attachment → Serious delinquency (T2)	-.040	.058	.138
Peer attachment → Serious delinquency (T2)	.017	.094	.522
Teacher attachment → Serious delinquency (T2)	.006	.059	.835
Commitment education → Serious delinquency (T2)	-.102	.119	.002
Involvement education → Serious delinquency (T2)	.021	.004	.366
Belief education → Serious delinquency (T2)	.029	.057	.259

Summary of the findings

According to the results of the analysis of the hypothesized models, only two models (Model 1(a) and Model 2(a)) show some evidence of a significant association between gender roles and the outcome variables, male digital piracy and male status delinquency respectively. However, only in Model 2(a) the effects of gender roles on the outcome variable were significantly mediated by social bonds variables. In both models, the relationships between masculinity and femininity and the outcome variables were significant in the expected direction, even though the effect size was low. While masculinity was a good predictor of digital piracy ($\beta = .100$, $p < .05$) as well as of status delinquency ($\beta = .147$, $p < .05$), femininity resulted to be a good predictor lower levels of digital piracy ($\beta = –.113$, $p < .05$) and status delinquency ($\beta = –.115$, $p < .05$). Although a statistically significant association existed between gender roles and social bond measures in both models, a significant relationship between the mediating variables and the outcome variable was detected only in Model 2(a). Moreover, Sobel's Test confirmed the presence of mediational effects between gender roles and status delinquency through social bond variables. Similarly to the findings of a previous study by Shover et al. (1979), the relationship between gender roles and social bonds variables was in the opposite direction as the one initially hypothesized by the researcher. A significant positive relationship existed between masculinity and all social bonds variables. In particular, the effect on attachment to peers, belief in education and commitment to education were found to be medium-large in size as they ranged between $\beta = .300$ and $\beta = .512$. On the other hand, femininity significantly predicted lower levels for all measures of social bonds. Especially, femininity was a strong predictor of lower commitment to education ($\beta = -.458$, $p < .05$). In Model 2(a) also the relationships between the social bonds variables and the dependent variable status delinquency were significant (however the relationship between attachment to peers and status delinquency was significant only at the .1 level), and, as expected based on Hirschi's social control theory, higher levels of attachment,

involvement commitment and belief were associated with lower levels of involvement in status delinquency. The only exception was detected for the association between attachment to peers and status delinquency that exhibited a positive relationship ($\beta = .74$, $p < .05$). While in contrast with the tenets of social control theory, this result was in line with findings from previous criminological research (e.g. Elliott, Huizinga, & Ageton, 1985; Hindelang, 1973; Peterson et al., 2014). Finally, some of the control variables included in the models were significantly associated with digital piracy and traditional delinquency, even though they did not always operate in the expected direction and were not always significant for both male and female students. Among the opportunity factors for digital piracy (Model 1(a) and Model 1(b)), the findings indicated that both male students and female students that were members of a cyber club were more likely to use software that was illegally downloaded ($\beta = –.079$, $p < .05$; ($\beta = –.071$, $p < .05$). However using a computer in an Internet café was a protective factor from involvement in digital piracy ($\beta = –.058$, $p < .05$), but only for male students. Consistent with previous criminological studies (Moon et al., 2010) prior involvement in digital piracy was a strong predictor of digital piracy at Time 2 ($\beta = .393$, $p < .05$; ($\beta = .247$, $p < .05$). However, the numbers of hours spent at the computer was not significantly associated with digital piracy. In Models 2(a) and 2(b) as well as in Models 3(a) and 3(b), all control variables, with the exception of family income, were found to be significantly associated with status delinquency and serious delinquency. In particular, status delinquency at Time 1 was a strong predictor of boys' status delinquency at Time 2 ($\beta = .402$, $p < .05$) and girls' status delinquency at Time 2 ($\beta = .431$, $p < .05$), while prior involvement in serious delinquency showed a stronger association with male serious delinquency at Time 2 ($\beta = .245$, $p < .05$) and female serious delinquency at Time 2 ($\beta = .204$, $p < .05$). The findings also indicated that boys and girls who associated with delinquent peers were more likely to engage in both forms of traditional delinquency.

Group Based Trajectory Analysis

In the second part of the study we applied the group-based trajectory modeling (GBTM) approach (Jones, & Nagin, 2007; Nagin, 1999; 2005) to explore if unique trajectories of male and female participation in digital piracy as well as trajectories of involvement in traditional delinquency could be identified. The time variable utilized was Waves, specifically the first five waves of the KYPS study were included in the analysis (See Appendix A).

The first step in the GBTM analysis was the selection of the number of trajectories that best fit each model. Each model was initially fitted with a one-trajectory solution up to a seven-group solution until the best fitting model could be identified. Furthermore, as part of the preliminary analysis we assumed all trajectory curves to follow a quadratic shape. While the value Bayesian Information Criterion (BIC) served as a primary tool to select the model with the best fit, also the size of the identified groups (at least 5%) was a determining factor in the selection of the best model. However, in the process of selecting the model that "summarize[s] the distinctive features of the data in the most parsimonious—and useful— fashion possible" we relied not only on objective statistical tools, but also on the researcher's personal judgment (Nagin, 2010) (Table 17). After the number of trajectories is identified, the proper shape of the trajectories must be investigated (intercept, linear, quadratic, and cubic). The following section describes the selected models.

Table 17 Bayesian Information Criterion: The selected model is shown in bold

Model	Digital piracy		Status delinquency		Serious delinquency	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**
One group	-10885.17	-7773.95	-13425.39	-14898.06	-4326.73	-4283.97
Two groups	-10238.21	-7282.07	-12415.31	-13548.81	-4024.77	-4469.77
Three groups	-9896.29	**-6946.00**	-12071.79	-13047.90	**-3921.88**	**-3767.94**
Four groups	-9786.11	-6923.50	-11966.18	-12944.13	-3889.21	----------
Five groups	**-9702.06**	-6928.43	**-11896.37**	**-12828.03**	-3882.89	-3782.04
Six groups	-9697.24	-6947.44	-11852.67	-12778.52	-3892.24	-3784.71
Seven groups	-9664.93	----------	-11813.84	-12756.37	-3879.23	-3790.61

GBTM – Male digital piracy

Table 18 shows the developmental trajectories of male students' involvement in digital piracy. The best fitting model final model had a BIC = -9702.06 (N = 1370), and contained 5 groups, with two curve shapes identified as 'intercept only,' two shapes as 'linear' and one shape as 'quadratic.' The first group (N = 509), the 'Never' group, is the largest one and is composed of individuals who did not engage in acts of digital piracy in all five waves of the survey. The second largest group (fifth trajectory) is composed by subjects who have engaged in high levels of cyber delinquency throughout their adolescence (on average 4.46/year). 320 subjects (23.71%) were included in that group which was labeled 'High rate' group. A third trajectory was composed by subjects whose levels of involvement in digital piracy stayed low over the five years of the survey. 228 male students (16.74%) were in the 'Low rate' third trajectory group. Finally, the last two groups shows opposite trajectory patterns. The former, 'High-Decrease' group, is composed of individuals whose offending levels were high in Wave 1 (Avg. = 5.42), but then steadily decreased over the following waves. This is the smallest group and less than 10% of the male students were included (N = 87). The latter group like the previous one shows a linear relationship with time. However, the rate of offending of subjects tended to increase constantly over time, from an average of 1.35 software illegally downloaded in Wave 1 to average of 4.67 in Wave 5. The group was labeled 'Low-Increase' and included 226 male students (17.83%). Finally, the values of the average posterior probability for each group membership exceeded .70 (Table 19). We can therefore assume that individuals assigned to a certain group do not simultaneously belong also to a different group.

Figure 19 Male digital piracy trajectories

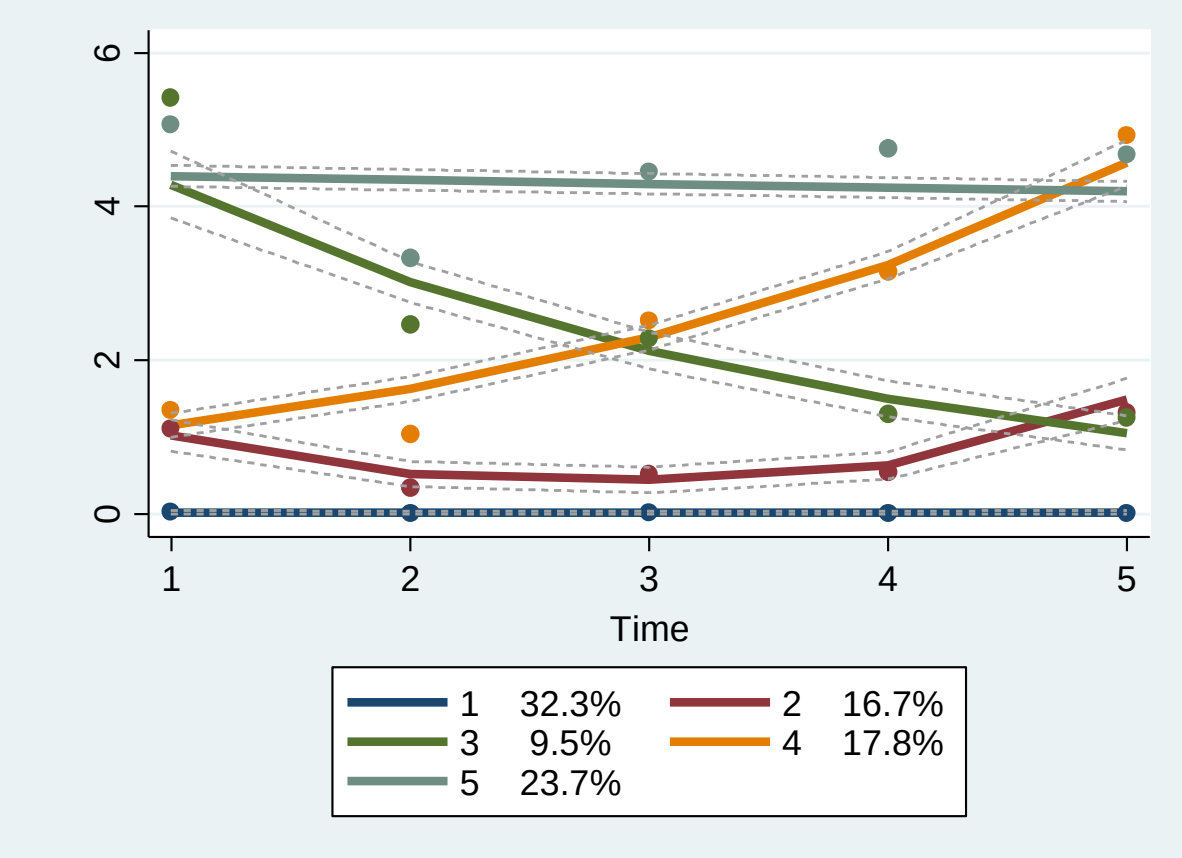


Table 18 Male digital piracy: Summary of the parameter estimates

Maximum Likelihood Estimates
Zero Inflated Poisson

Group	Parameter	Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
1	Intercept	-3.49872	0.29663	-11.795	0.0000
2	Intercept	1.81478	0.26653	6.809	0.0000
	Linear	1.43025	0.28963	-4.938	0.0000
	Quadratic	0.25618	0.04942	5.184	0.0000
3	Intercept	2.41386	0.07254	33.277	0.0000
	Linear	-0.33835	0.03093	-10.940	0.0000
4	Intercept	0.40739	0.08818	4.620	0.0000
	Linear	0.35589	0.02033	17.507	0.0000
5	Intercept	2.10176	0.01562	134.536	0.0000
	Alpha0	-0.17612	0.08169	-2.156	0.0311
	Alpha1	0.02498	0.02302	1.085	0.2779
Membership					
	1	32.25370%	1.55963	20.680	0.0000
	2	16.74292%	1.45307	11.522	0.0000
	3	9.45537%	1.17965	8.015	0.0000
	4	17.83176%	1.49211	11.951	0.0000
	5	23.71625%	1.60317	14.793	0.0000

BIC= -9672.22 (N=6792) BIC= -9660.21 (N=1370) AIC= -9621.05 L= -9606.05

Table 19 Male digital piracy: Average posterior probability

Group	N	Mean Probability	Std. Dev.
1	509	.86	.134
2	228	.74	.161
3	87	.82	.171
4	226	.75	.204
5	320	.82	.178

GBTM – Female digital piracy

When analyzing the group memberships for female students' participation in digital piracy, the best fitting model (BIC = -6928.98) was a three-solution model (N = 1724). Table 20 and Figure 20 show the results of the model. The first trajectory included more than half of the sample (N = 1066, 54.03% of the sample), and comprised those female students who did not engage in digital piracy across the five waves of the study. This group was labeled as 'Never' group. The second largest group is composed of those subjects whose involvement in digital piracy was low throughout their adolescence. 365 female students (26.15%) were included in this group which was named 'Low rate' group. The final group show a linear relationship with time and was labeled as 'High-Increase.' This is the smallest group (N= 293, 19.81% of the sample) and is composed of those individuals whose level of offending was moderate when measured at Wave 1 (Avg. = 2.20), and constantly increased over time (Avg. = 4.06 at Wave 5). Finally, since the values of the average posterior probability for the three curves exceeded .80 (Table 21), we can assume that the subjects assigned to a certain group only belong to that specific group.

Figure 20 Female digital piracy trajectories

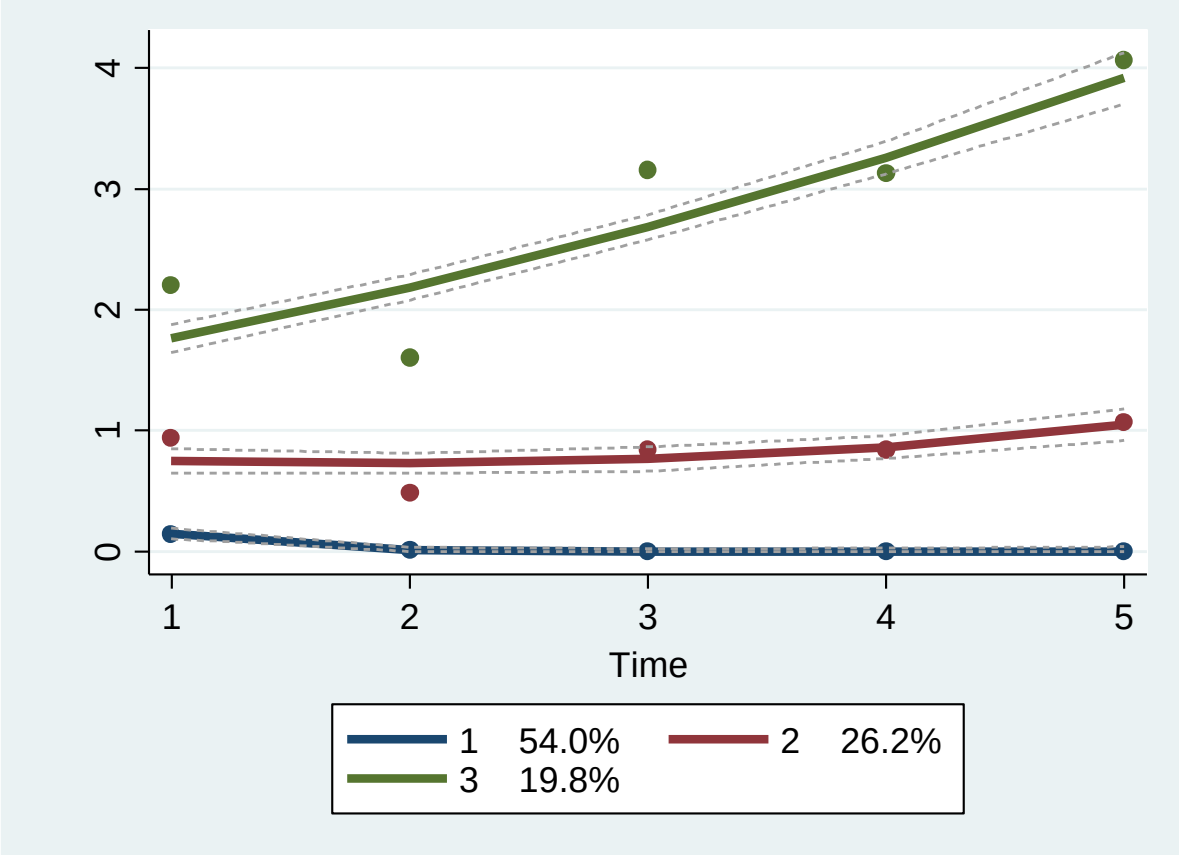


Table 20 Female digital piracy: Summary of the parameter estimates

Maximum Likelihood Estimates
Zero Inflated Poisson

Group	Parameter	Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
1	Intercept	2.21861	0.62783	3.534	0.0004
	Linear	-2.93122	0.56133	-5.222	0.0000
2	Intercept	1.15666	0.15297	7.561	0.0000
	Linear	-0.29555	0.12514	-2.362	0.0182
	Quadratic	0.04234	0.02057	2.059	0.0396
3	Intercept	1.68406	0.04246	39.665	0.0000
	Linear	0.07399	0.01145	6.459	0.0000
	Alpha0	-0.17612	0.08169	-2.156	0.0000
	Alpha1	0.02498	0.02302	1.085	0.0000
Membership					
	1	54.03713%	1.55271	34.802	0.0000
	2	26.15141%	1.42084	18.406	0.0000
	3	19.81146%	1.20150	16.489	0.0000

BIC= -6928.98 (N=7862) BIC= -6920.63 (N=1724) AIC= -6890.65 L= -6879.65

Table 21 Female digital piracy: Average posterior probability

Group	N	Mean Probability	Std. Dev.
1	1066	.86	.093
2	365	.91	.132
3	293	.93	.131

GBTM – Male status delinquency

The developmental trajectories of male students' involvement in status delinquency are presented in Table 22 and Figure 21. The model with the best fit had a BIC = -11905.17 and contained 5 trajectories. 23.60% of the male sample (N = 366) belonged to the 'Never' group, thus including those subjects who had abstained from any forms of minor delinquency over the five years. The second trajectory included a smaller number of *late starters* (N = 155, 10.77%) whose delinquent actions did not escalate until their late adolescence after desisting from crime in their early adolescence. This second group, which was labeled 'Late-Increase,' overlapped with the 'Never' group from Time 1 to Time 4, but levels of offending highly increased in Wave 5 (Avg. = 4.78). The third group included 271 students (20.38%) whose levels of offending were relatively low and stable over the five years. The group was labeled as 'Low rate' group. The two remaining trajectory groups are both best represented through a linear relationship over time, both composed of individuals whose levels of involvement in status delinquency increased in the course of their adolescence. However, while in the fourth group students (N = 214, 18.36%) had low offending levels in early adolescence which then constantly increased in the following years, the students included in the fifth group already showed higher levels of offending in early adolescence which tended to slightly increase in the following years. Finally, the values of the average posterior probability for each group membership in this model were greater than .70 (Table 23), thus indicating that each individual only belongs to the group is was assigned to.

Figure 21 Male status delinquency trajectories

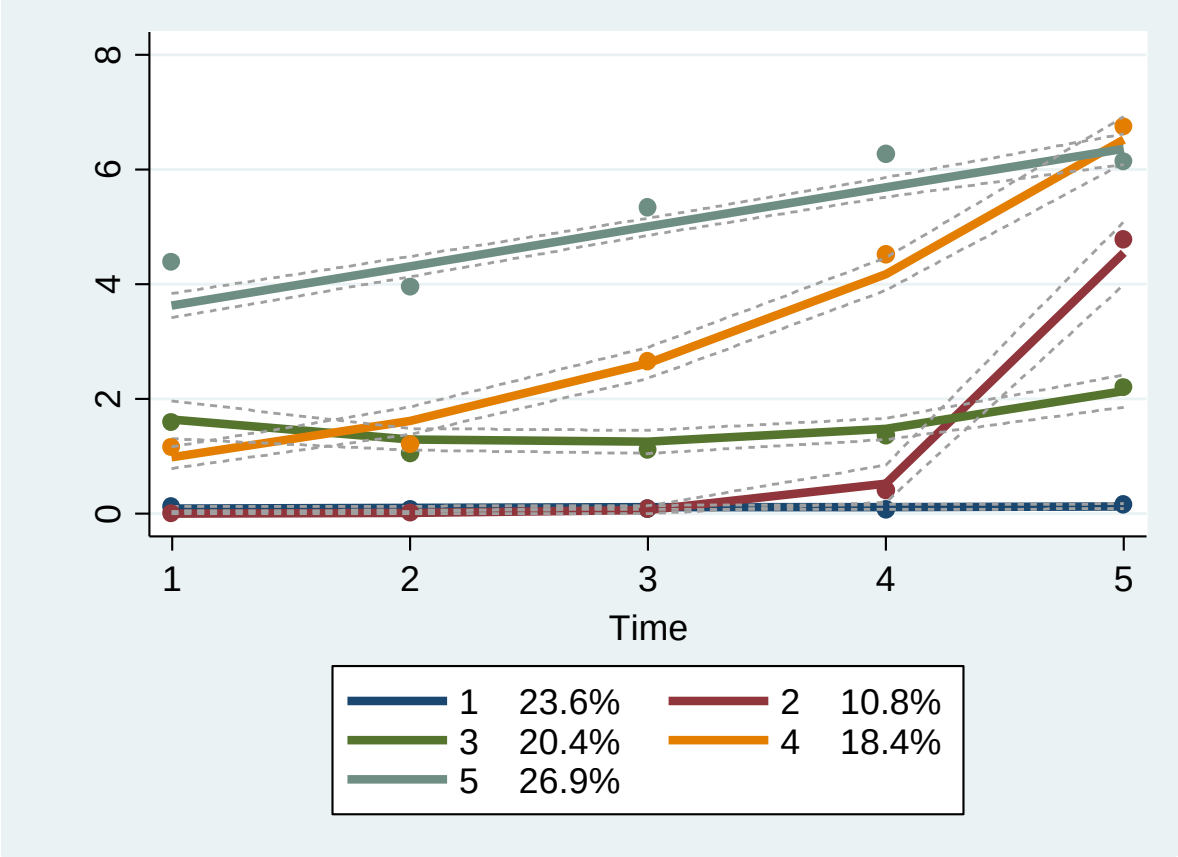


Table 22 Male status delinquency: Summary of the parameter estimates

Maximum Likelihood Estimates
Zero Inflated Poisson

Group	Parameter	Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
1	Intercept	-1.80697	0.14794	-12.214	0.0000
2	Intercept	-8.65934	1.59122	-5.442	0.0000
	Linear	2.08701	0.31919	6.538	0.0000
3	Intercept	1.77716	0.22119	8.035	0.0000
	Linear	-0.70466	0.16701	-4.219	0.0000
	Quadratic	0.11067	0.02660	4.161	0.0000
4	Intercept	0.30007	0.12484	2.404	0.0163
	Linear	0.36726	0.02605	14.099	0.0000
5	Intercept	1.94751	0.03876	50.247	0.0000
	Linear	0.03269	0.01034	3.163	0.0016
	Alpha0	0.29998	0.08290	3.619	0.0311
	Alpha1	-0.30084	0.02531	-11.885	0.2779
	Membership				
	1	23.60166%	1.48090	15.937	0.0000
	2	10.77733%	1.28686	8.375	0.0000
	3	20.38155%	1.55855	13.077	0.0000
	4	18.36490%	1.63555	11.229	0.0000
	5	26.87456%	1.74999	15.357	0.0000

BIC=-11905.17 (N=6824) BIC=-11892.33 (N=1370) AIC=-11850.54 L=-11834.54

Table 23 Male status delinquency: Average posterior probability

Group	N	Mean Probability	Std. Dev.
1	366	.84	.110
2	155	.71	.160
3	271	.81	.166
4	214	.80	.169
5	364	.88	.148

GBTM – Female status delinquency

A five-class solution was found to provide the best fit also for female involvement in status delinquency (BIC = -12859.79). More than 50% of the female students were included in the first two groups. The first group ('Never' group) was estimated to comprise 588 subjects (30.65%) that never engaged in any form of status delinquency while approximately 26% of the female students belonged to a 'Low rate' trajectory group. The third and fourth curves showed two opposite trajectory patterns, one characterized by adolescents whose levels of offending were low in early adolescence but steadily increased over the following five years ('Low-Increase' group, N = 194, 11.92%), and a slightly bigger group ('High-Increase' group, N = 237, 15.20%) comprising female students that despite having high levels of offending in early adolescence showed a desisting path over the following years. Finally, the 'High rate' group (N = 244, 15.88%) comprised those female students whose levels of offending was high and steady over the five years of the study. The average posterior probability of all five group memberships was found to be greater than .70 also in this model.

Figure 22 Female status delinquency trajectories

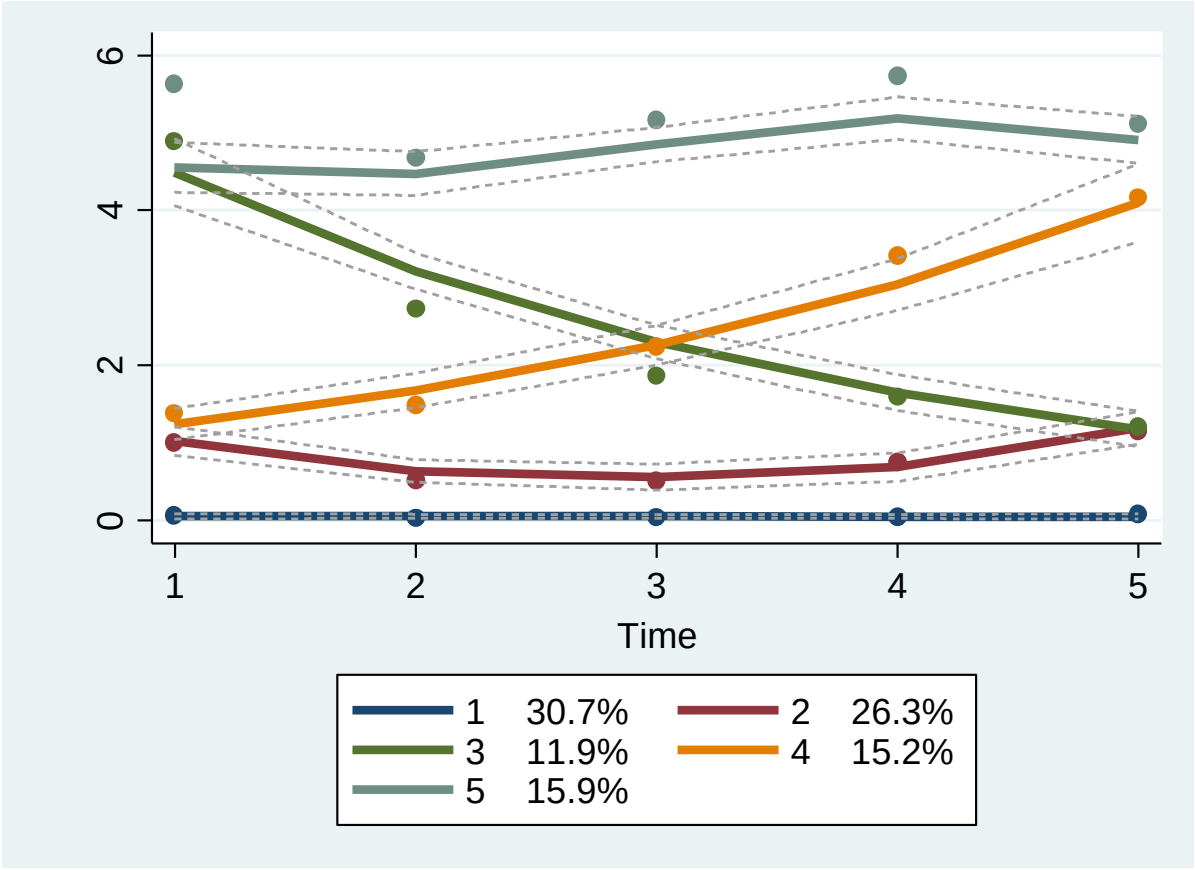


Table 24 Female status delinquency: Summary of the parameter estimates

Maximum Likelihood Estimates
Zero Inflated Poisson

Group	Parameter	Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
1	Intercept	-2.49584	0.18764	-13.301	0.0000
2	Intercept	1.27055	0.23859	5.325	0.0000
	Linear	-0.97367	0.22278	-4.371	0.0000
	Quadratic	0.17125	0.03444	4.972	0.0000
3	Intercept	2.26519	0.07387	30.665	0.0000
	Linear	-0.31873	0.03153	-10.109	0.0000
4	Intercept	0.34774	0.10085	3.448	0.0006
	Linear	0.31408	0.02255	13.931	0.0000
5	Intercept	2.17303	0.15264	14.236	0.0000
	Linear	-0.35446	0.19879	-1.783	0.0746
	Quadratic	0.16039	0.07329	2.188	0.0287
	Cubic	-0.01849	0.00803	-2.303	0.0213
	Alpha0	-0.62322	0.08469	-7.359	0.0000
	Alpha1	0.04202	0.02440	1.722	0.0851
Membership					
	1	30.65687%	1.73870	17.632	0.0000
	2	26.32909%	1.65493	15.910	0.0000
	3	11.92517%	1.23340	9.669	0.0000
	4	15.20213%	1.50712	10.087	0.0000
	5	15.88673%	1.20890	13.141	0.0000

BIC=-12859.79 (N=8571) BIC=-12845.35 (N=1724) AIC=-12796.28 L=-12778.28

Table 25 Female status delinquency: Average posterior probability

Group	N	Mean Probability	Std. Dev.
1	588	.86	.109
2	461	.77	.156
3	194	.72	.194
4	237	.77	.186
5	244	.89	.155

GBTM – Male serious delinquency

Table 26 shows the trajectories for male involvement in serious delinquency. With a BIC of -3916.12 (N = 6844), a three class solution was identified as the one best fitting the data. Of the three group memberships, the first trajectory group was the most numerous group (N = 984, 59.71%). This group was labeled as 'Never' group. The remaining trajectories, both described group members who tended to desist from delinquency over time, and were labeled as 'Low-Decrease' and 'High-Decrease.' The former group exhibited a group of subjects (N = 265, 28.42%) whose level of offending was low at the first measurement and steadily dropped over time, while the latter trajectory (N = 121, 11.86%) started out with high levels of serious delinquency which steadily dropped over time. The average posterior probability for each group membership was above the threshold value of .70 (Table 27).

Figure 23 Male serious delinquency trajectories

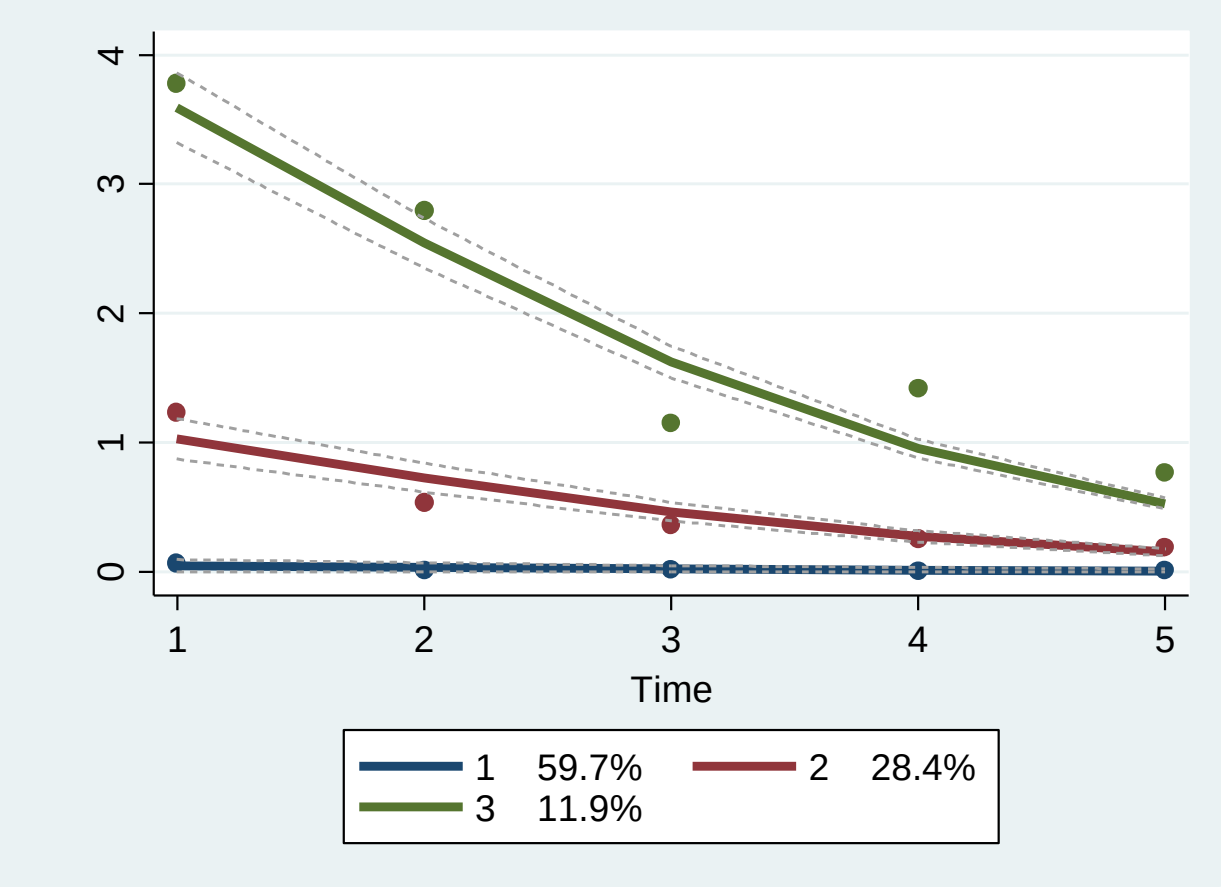


Table 26 Male serious delinquency: Summary of the parameter estimates

Maximum Likelihood Estimates
Zero Inflated Poisson

Group	Parameter	Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
1	Intercept	-2.51553	0.20968	-11.997	0.0000
2	Intercept	0.60273	0.07495	8.042	0.0000
3	Intercept	1.85242	0.03801	48.729	0.0000
	Alpha0	-0.91894	0.13006	-7.065	0.0000
	Alpha1	0.66455	0.03791	17.530	0.2779
	Membership				
	1	59.71223%	2.58776	23.075	0.0000
	2	28.42150%	2.32159	12.242	0.0000
	3	11.86627%	1.30571	9.088	0.0000

BIC= -3916.12 (N=6844) BIC= -3910.49 (N=1370) AIC= -3892.21 L= -3885.21

Table 27 Male serious delinquency: Average posterior probability

Group	N	Mean Probability	Std. Dev.
1	984	.82	.106
2	265	.88	.105
3	121	.93	.105

GBTM – Female serious delinquency

A three group model (BIC = -3752.26) was found to best fit the data also for the female sample (Table 28). Moreover, the shape of the three curves resembled that of the model for male students. Thus, the three identified groups were similarly labeled as 'Never' group, 'Low-Decrease' group and 'High-Decrease' group. However, clear differences exist in male and female frequency of involvement in serious delinquent behavior over the course of their adolescence. First, the 'Never' group is also in the case the largest, thus confirming that the majority of female students like male students showed a zero rate offending over the course of their adolescence. However, while about 60% of the male sample followed the 'Never' trajectory group, a group as large as three quarters of the total female sample (74.85%) was included in the female 'Never' trajectory group. Then, with regard to the 'Low-Decrease' group, only 14.6% of the female subjects were found to be included in this trajectory. Finally, as for the 'High-Decrease' group, 10.54% of the female students showed a decreasing trend from high levels delinquency in early adolescence to desistance as they aged out.

Figure 24 Female serious delinquency trajectories

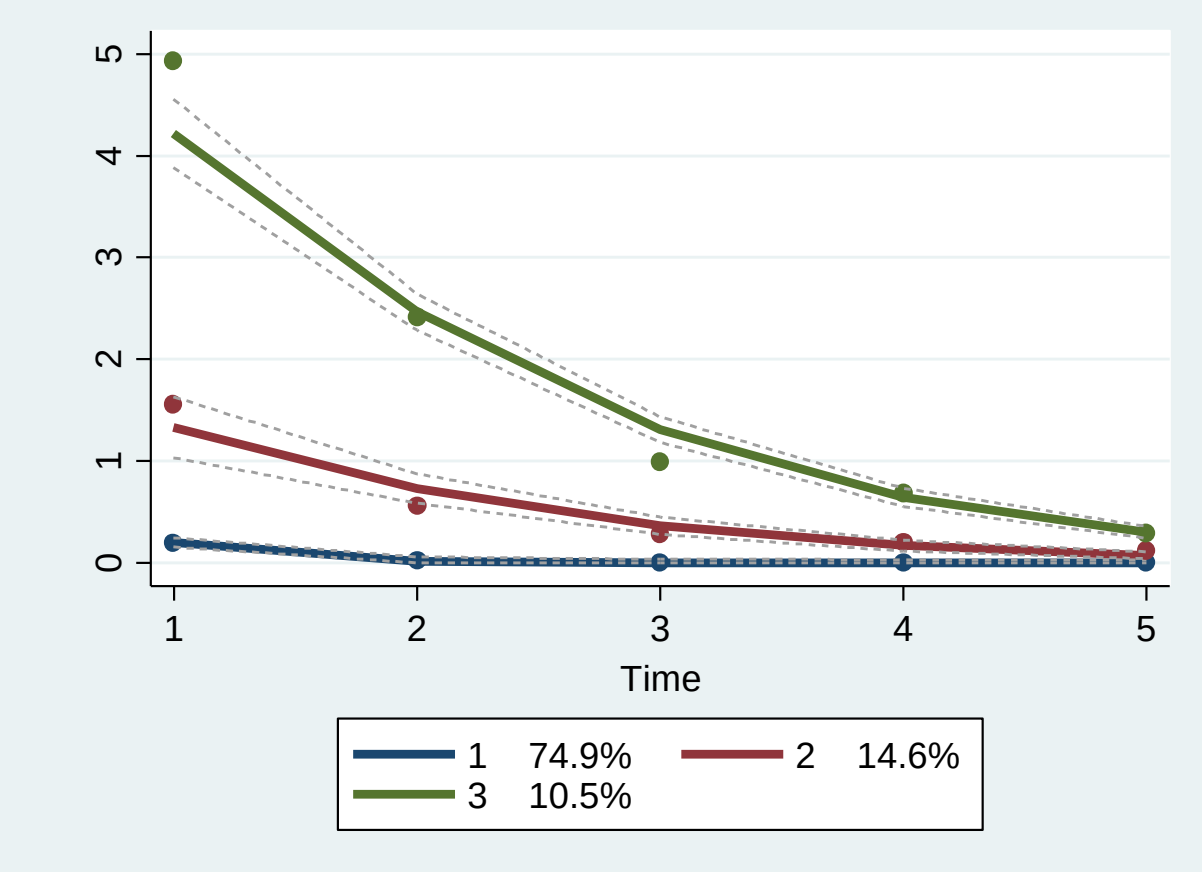


Table 28 Female serious delinquency: Summary of the parameter estimates

Maximum Likelihood Estimates
Zero Inflated Poisson

Group	Parameter	Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
1	Intercept	1.11115	0.33148	3.352	0.0008
	Linear	-2.13508	0.29354	-7.274	0.0000
2	Intercept	1.14139	0.15871	7.192	0.0000
	Linear	-0.26979	0.05837	-4.622	0.0000
3	Intercept	2.23193	0.05667	39.382	0.0000
	Linear	-0.20696	0.02480	-8.346	0.0000
	Alpha0	-0.86247	0.17862	-4.829	0.0000
	Alpha1	0.63420	0.06045	10.491	0.0000
		Membership			
	1	74.85296%	1.92865	38.811	0.0000
	2	14.60676%	1.65616	8.820	0.0000
	3	10.54028%	1.09826	9.597	0.0000

BIC= -3752.26 (N=8599) BIC= -3744.23 (N=1724) AIC= -3716.97 L= -3706.97

Table 29 Female serious delinquency: Average posterior probability

Group	N	Mean Probability	Std. Dev.
1	1422	.90	.080
2	164	.81	.155
3	138	.93	.104

Dual Trajectories

Dual trajectory modeling was utilized to analyze the dynamic connections between the developmental trajectories of the outcome variables. Specifically, we estimated the conditional probabilities of membership in each of the status delinquency (or serious delinquency) trajectories given the membership in each of the digital piracy trajectories, and the conditional probabilities of membership in one digital piracy, given membership in another status delinquency (or serious delinquency) trajectory. Thus, the following section of the study explored the likelihood that male or female students are involved in one type of delinquency (e.g. digital piracy) when engaging in another form of delinquency (e.g. status delinquency).

Dual trajectories of male digital piracy and status delinquency

Male students in the Never status delinquency trajectory were slightly more likely to belong to the High rate digital piracy trajectory (26%), than the Never (22.8%) or Low rate (24.2%) trajectories of digital piracy. Among those individuals belonging to the Low rate status delinquency trajectory, around one third of the students were likely to belong to the Never digital piracy trajectory (36.6%). Adolescents in the Low-Increase and High rate status delinquency trajectories exhibited an almost equal likelihood to belong to the digital piracy Never trajectory (30.4% and 30.3%) and high rate trajectory (29.9% and 29.2%) (Table 30 and Figure 25). On the other side, male students in the Never digital piracy trajectory were more likely to belong respectively to the status delinquency Late-Increase (28.47%) and Low rate (29.33%) trajectories. Membership in the digital piracy Low-Increase trajectory was mainly associated with status delinquency Low rate (32.53%) and Late-Increase (25.13%) trajectories, while those students in the High rate digital piracy trajectory were almost equally likely to be classified in the stats delinquency Never (20.54%), Low rate (23.71%) and Low-Increase (24.25%) trajectories (Table 31 and Figure 26).

Table 30 Conditional probabilities of digital piracy groups given status delinquency groups

BOYS		STATUS DELINQUENCY				
		Never	Late-Increase	Low rate	Low-Increase	High rate
DIGITAL PIRACY	Never	22.8	37.9	36.6	30.4	30.3
	Low rate	24.2	17.3	15.4	12.1	15.6
	High-Decrease	9.3	9.8	4.3	9.1	19.9
	Low-Increase	17.7	18.3	22.1	18.5	5
	High rate	26	16.7	21.7	29.9	29.2

Figure 25 Conditional probabilities of digital piracy groups given status delinquency groups

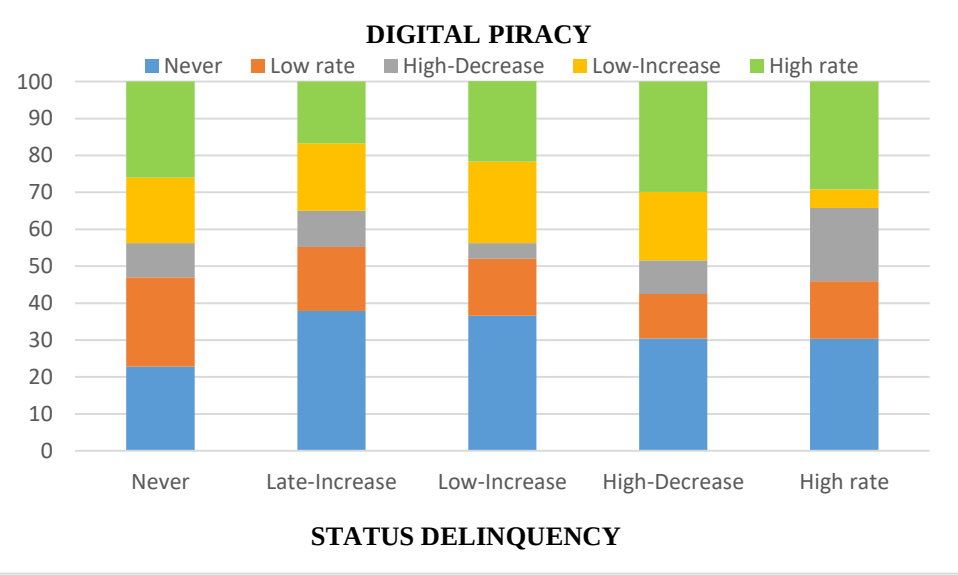
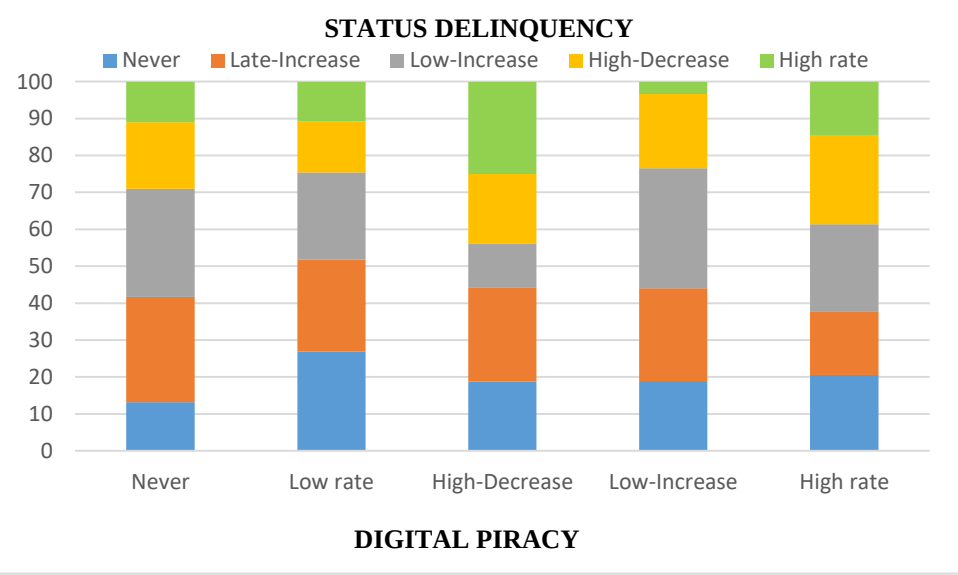


Table 31 Conditional probabilities of status delinquency groups given digital piracy groups

BOYS		STATUS DELINQUENCY				
		Never	Late-Increase	Low rate	Low-Increase	High rate
DIGITAL PIRACY	Never	13.21	28.47	29.33	18.04	10.93
	Low rate	26.85	24.88	23.66	13.81	10.78
	High-Decrease	18.76	25.53	11.88	18.79	25.01
	Low-Increase	18.88	25.13	32.53	20.15	3.29
	High rate	20.54	17.1	23.71	24.25	14.36

Figure 26 Conditional probabilities of status delinquency groups given digital piracy groups



Dual trajectories of female digital piracy and status delinquency

For girls, when analyzing the likelihood of membership in any of the digital piracy groups conditional on membership in a specific status delinquency trajectory, it appears that 50% or more of the female students were likely to belong to the Never digital piracy trajectory regardless of the status delinquency trajectory they belonged to. Moreover, the likelihood of belonging to a trajectory representing higher levels of involvement in digital piracy tended to increase as the examination of the association between the two outcome variables moved from the status delinquency Never trajectory (15.9%) to the status delinquency High rate trajectory (24.9%). The only exception for female students in the status delinquency Low rate trajectory who were more likely to belong to the status delinquency Never (61.1%) and High rate (25%) trajectories compared to the adolescents following any of the other status delinquency trajectory groups (Table 32 and Figure 27). Conversely, female students in the Never digital piracy trajectory, as well as in the Low rate and Moderate-Increase digital piracy trajectories are more likely to be classified in the status delinquency Never trajectory (respectively 44.75%, 52.86% and 35.89%) and in the decreasing trajectory (respectively 20.73%, 19.6% and 22.18%) (Table 33 and Figure 28).

Table 32 Conditional probabilities of digital piracy groups given status delinquency groups

GIRLS		STATUS DELINQUENCY				
		Never	Low rate	High-Decrease	Low-Increase	High rate
DIGITAL PIRACY	Never	53.4	61.1	53.9	52.8	53.5
	Low rate	30.7	13.9	24.8	23.3	21.6
	Moderate-Increase	15.9	25	21.4	23.9	24.9

Figure 27 Conditional probabilities of digital piracy groups given status delinquency groups

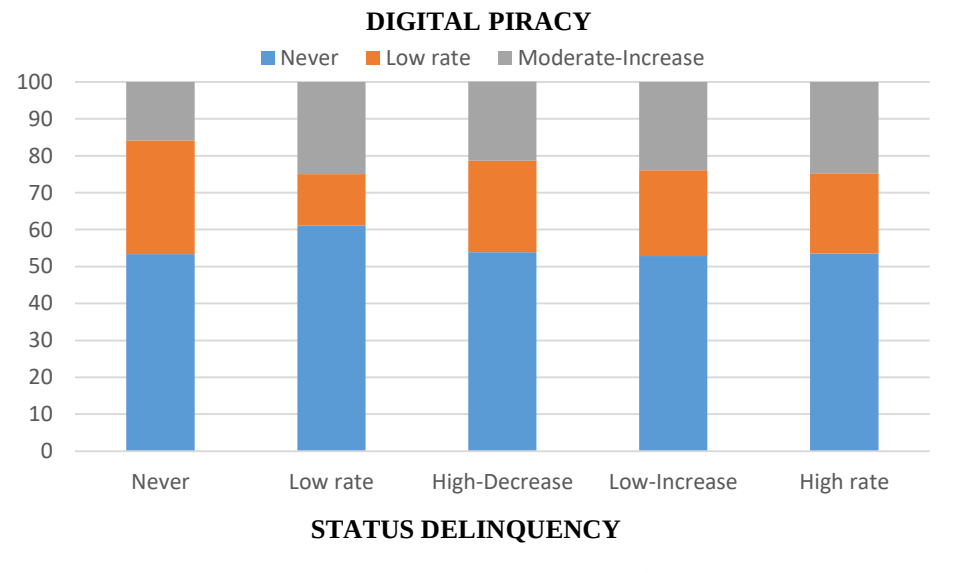
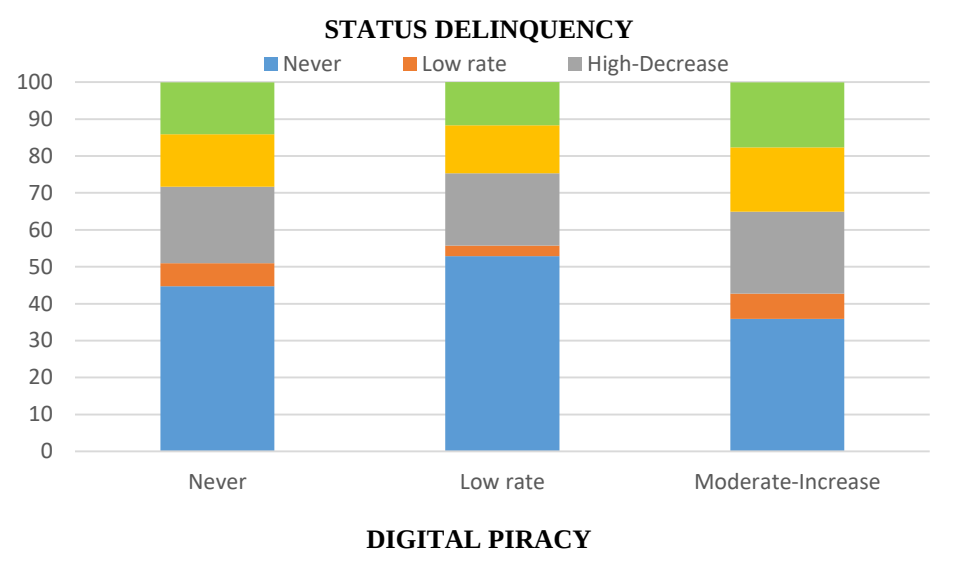


Table 33 Conditional probabilities of status delinquency groups given digital piracy groups

GIRLS		STATUS DELINQUENCY				
		Never	Low rate	High-Decrease	Low-Increase	High rate
DIGITAL PIRACY	Never	44.75	6.19	20.73	14.26	14.04
	Low rate	52.86	2.9	19.6	12.97	11.66
	Moderate-Increase	35.89	6.83	22.18	17.43	17.64

Figure 28 Conditional probabilities of status delinquency groups given digital piracy groups



Dual trajectories of male digital piracy and serious delinquency

A pattern of association is noticeable when examining the likelihood of membership in any serious delinquency trajectory given the membership in a digital piracy trajectory, and vice versa. While boys in a no delinquency group for one outcome variable were also more likely to follow a no delinquency trajectory for the other outcome variable, those that belonged to a high delinquency trajectory were more to be associated to a higher delinquency trajectory for the other form of delinquency. For instance, boys in the Never serious delinquency trajectory were more likely to follow a digital piracy never trajectory (33.4%), while the likelihood of belonging to the digital piracy Low-Increase and High rate trajectories dropped to about 20%. For adolescents in the serious delinquency High-Decrease membership the likelihood of following the digital piracy Never trajectory and High rate trajectory were respectively 31.5% and 43% (Table 34 and Figure 29). Similarly, boys in the digital piracy High rate trajectory exhibited a lower probability of belonging to the serious delinquency Never trajectory (54.62%) than those belonging to any other digital piracy group, while showing a higher likelihood of following the serious delinquency High-Decrease trajectory (15.3%) (Table 35 and Figure 30).

Table 34 Conditional probabilities of digital piracy groups given serious delinquency groups

BOYS		SERIOUS DELINQUENCY		
		Never	Low-Decrease	High-Decrease
DIGITAL PIRACY	Never	33.4	28.6	31.5
	Low rate	18.7	12.5	12.5
	High-Decrease	8.3	15.6	0.9
	Low-Increase	20.4	11.3	12.1
	High rate	19.2	32	43

Figure 29 Conditional probabilities of digital piracy groups given serious delinquency groups

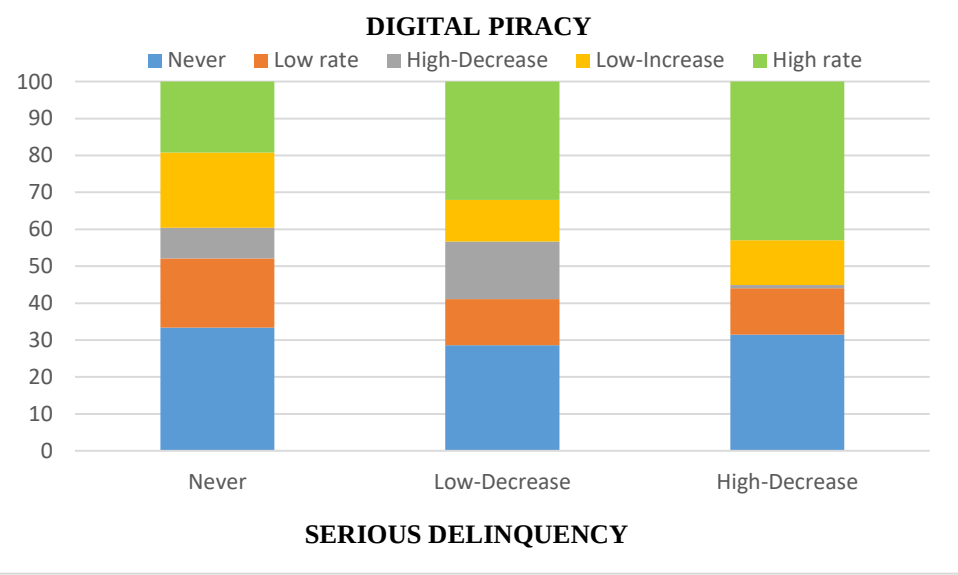
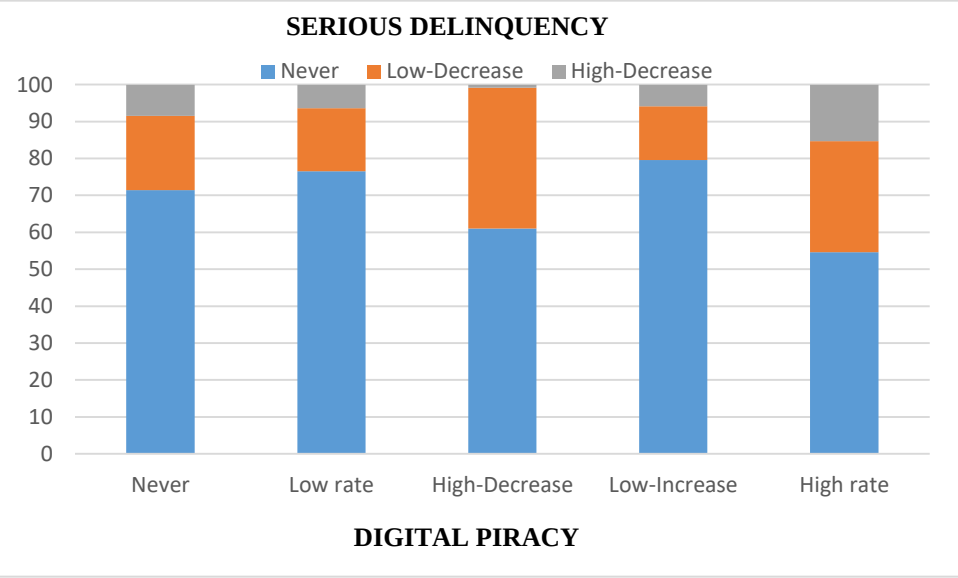


Table 35 Conditional probabilities of serious delinquency groups given digital piracy groups

BOYS		SERIOUS DELINQUENCY		
		Never	Low-Decrease	High-Decrease
DIGITAL PIRACY	Never	71.39	20.18	8.41
	Low rate	76.57	17.02	6.4
	High-Decrease	61.03	38.13	0.83
	Low-Increase	79.56	14.55	5.88
	High rate	54.62	30.07	15.3

Figure 30 Conditional probabilities of serious delinquency groups given digital piracy groups



Dual trajectories of female digital piracy and serious delinquency

Although patterns of association between serious delinquency and digital piracy similar to the ones previously described for male delinquency seems to exist also for the dual trajectory of female digital piracy and serious delinquency, such patterns are less evident. While the likelihood of belonging to the digital piracy Never delinquency trajectory is around 55% regardless of the serious delinquency trajectory followed by female students, the probability of being classified in the digital piracy High rate trajectory increases as we move from the serious delinquency Never trajectory (19.3%) to the High-Decrease trajectory (27.7%) (Table 36 and Figure 31). On the other hand, female adolescents belonging to any of the digital piracy trajectories are about equally more likely to follow the serious delinquency Never trajectory (about 80%), and also have a similar likelihood to also follow the serious delinquency Low-Decrease and High-Decrease trajectories. Also, the probability of following the serious delinquency High-Decrease trajectory was only slightly higher for female students in the digital piracy Moderate-Increase trajectory (10.74%) than for those in the digital piracy Never (7.84%) and Low rate (5.12%) trajectories (Table 37 and Figure 32).

Table 36 Conditional probabilities of digital piracy groups given serious delinquency groups

GIRLS		SERIOUS DELINQUENCY		
		Never	Low-Decrease	High-Decrease
DIGITAL PIRACY	Never	53.5	58.4	55
	Low rate	27.2	23	17.3
	Moderate-Increase	19.3	18.6	27.7

Figure 31 Conditional probabilities of digital piracy groups given serious delinquency groups

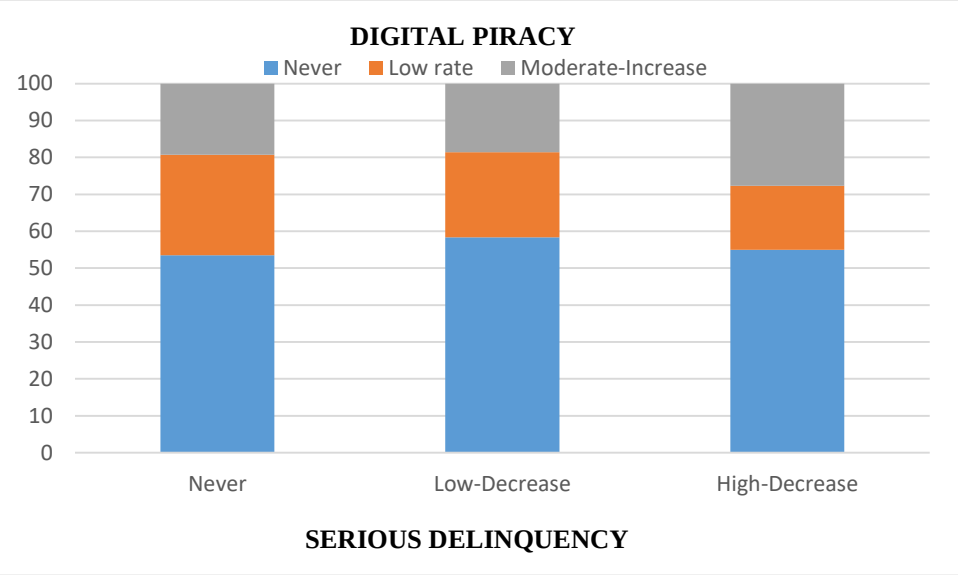
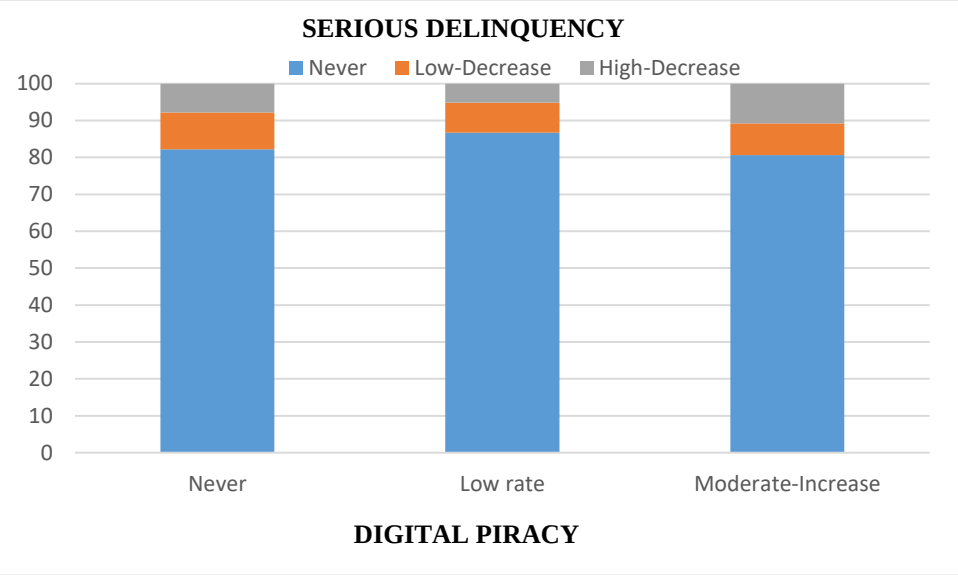


Table 37 Conditional probabilities of serious delinquency groups given digital piracy groups

GIRLS		SERIOUS DELINQUENCY		
		Never	Low-Decrease	High-Decrease
DIGITAL PIRACY	Never	82.21	9.94	7.84
	Low rate	86.74	8.12	5.12
	Moderate-Increase	80.66	8.59	10.74

Figure 32 Conditional probabilities of serious delinquency groups given digital piracy groups



Summary of the findings

The results from the trajectory analyses for involvement in digital piracy, status delinquency and serious delinquency highlight several similarities and differences in male and female offending trajectories over the course of their adolescence.

First, when examining male and female digital piracy trajectories (Figure 19 and Figure 20) five groups were identified for male students while a three trajectories model was found to the best solution for female students. Besides the different number of groups identified for boys and girls, the analysis of the trajectories of the two models showed that a larger portion of the male sample was included in an offending path compared to female subjects. While more than half of the female students were included in the 'Never' group (54%), 67.7% of boys belonged to an offending trajectory. Moreover, among those in a male offending trajectory, almost 25% of male students were included in a 'High rate' trajectory of chronic offenders who steadily used software illegally downloaded from the Internet over their entire adolescence.

Although the same number of groups was identified for both boys' and girls' status delinquency trajectories (five), major differences exist between the two models (Figure 21 and Figure 22). A comparison of the two models suggests that the trajectory that represents students who desisted from any form of status delinquency throughout their adolescence is slightly larger for the female sample (30.7%) than for the male sample (23.6%). The model focusing on female status delinquency trajectories unlike the male model identified a small group of students (11.9%) who followed a desisting trajectory over time, while a peculiarity of the trajectory model for male adolescents was the identification of a similarly sized group of students (10.8%) who while desisting in their delinquent behavior in their early adolescence, exhibited a sudden increase in participation in delinquency in late adolescence. Finally, both models included a similarly sized group of students (around 15%) that increasingly engaged in minor acts of

delinquency in the course of their adolescence and another trajectory of chronic offenders, 26.9% of the male sample and 15.9% of the female sample, representing students who engaged in antisocial activity at high rate over their entire adolescence.

The last two models comparing male and female trajectories of serious delinquency identified models with the same number of groups and similar trajectory shapes and size (Figure 23 and Figure 24). Specifically, about 60% of the male students and 75% of the female students were included in a non-offending trajectory thus highlighting that regardless of sex differences, the large majority of Korean adolescents tend to refrain from engaging in acts of serious delinquency over the course of their adolescence. The other two identified trajectories represented desisting trajectories. The first desisting trajectory included students whose involvement in serious delinquency was low in the early adolescent years, and eventually constantly decrease over the following years of observation period. The size of Low-Decrease trajectory for male students (28.4%) was two times larger than the female trajectory (14.6%). The other desisting trajectory, instead, represents a smaller group of adolescents who while engaging in serious delinquency at high rate at the age of 12 years old, gradually desisted from offending in the following four years. Unlike the previous two groups, the size of both the boys' and the girls' trajectory is almost equal in size (around 10%).

Finally, joint trajectory analysis was used to estimate the probabilities of digital piracy trajectory group conditional on status delinquency (or serious delinquency) trajectory group, and, conversely, the likelihood of membership in any status delinquency (or serious delinquency) trajectory conditional on digital piracy trajectory group. Models describing the interrelationship of digital piracy and status delinquency (Table 30 and Table 31) present unclear patterns and it can be difficult to classify male and female patterns of relationship. For example, not all the boys in a non-offending of status delinquency abstain also from digital piracy, but they are almost as likely to follow a low rate and high rate trajectory

of digital piracy. Similarly, the majority of the chronic offenders do not necessarily engage in high levels of illegal downloading, but are also as likely to abstain from digital piracy. Patterns are unclear also when observing probabilities of status delinquency group membership conditional on digital piracy trajectory group. So, while a trajectory of non-offending in digital piracy was more likely to be accompanied by a trend of increasing involvement in status delinquency, adolescents that belonged to the trajectory of high participation in illegal downloading had a similar probability of being in any of the status delinquency trajectory groups. Girls following any of the status delinquency trajectory groups were more likely to refrain from engaging in illegal downloading, and, vice versa, probability of following the non-offending trajectory was higher for female adolescents in any of the digital piracy trajectories. From the results of the joint trajectory analysis from the relationship between male and female digital piracy and serious delinquency, it appears boys are likely to show similar probabilities of belonging to a Never trajectory in involvement in digital piracy regardless of the serious delinquency trajectory they belonged to, and vice versa, comparable probabilities of following a Never trajectory of serious delinquency for any of the digital piracy trajectory groups. Moreover, those male students belonging to a high offending trajectory of one form of delinquency were also more likely to engage in the other form of delinquency. In general, for girls the likelihood of belonging to any specific trajectory group given membership in any specific trajectory for the other outcome variable were very similar across groups, with the probability of belonging to the Never trajectory being the greatest one. However, similar to the results of the joint trajectory analysis for boys, girls in a high offending serious delinquency trajectory had a greater likelihood to follow a high offending trajectory of digital piracy compared to the female students belonging to other serious delinquency group membership.

DISCUSSION

The main purpose of this project was to investigate the applicability of gender based theories of crime to the explanation of cyber delinquency in the social and cultural context of South Korea. In particular, the study focused on a specific form of computer crime, i.e. software piracy. Moreover, social bond theory was also used in the study to test the mediation role of social bond variables in the relationship between gender roles and cyber delinquency. Two primary research questions were formulated: 1) Does adherence to masculine and feminine gender role beliefs affect male and female involvement in digital piracy? 2) Do social bonds mediate the link between gender roles and digital piracy? Successively, the analysis was expanded to investigate the influence of gender roles and social bonds on forms of delinquency that unlike digital piracy occur in the physical world and do not necessitate the utilization of the computer and/or the Internet as a medium in order to be committed. Specifically, four additional research questions were: 1) Do masculine attitudes and feminine attitudes significantly affect male and female involvement in status delinquency? 2) Do social bonds mediate the relationship between gender roles and status delinquency? 3) Do masculine attitudes and feminine attitudes significantly affect male and female involvement in serious delinquency? 4) Do social bonds mediate the relationship between gender roles and serious delinquency? In general, our findings lent only partial support to the formulated hypotheses, indicating that holding stronger masculine beliefs and feminine beliefs was significantly associated with involvement in some forms of male delinquency. Furthermore, the results also suggested that all social bonds measures partially mediated the effects of masculinity and femininity of male students' participation in male status delinquency.

A second section of the study explored male and female delinquency trajectories developed by Korean adolescents over the course of their adolescence. While examining similarities and differences

between male and female trajectories of digital piracy, status delinquency and serious delinquency, the analysis also explored patterns of interrelationship between engaging in delinquent behaviors in the real world and cyber delinquency. Relevant similarities as well as differences between male and female trajectories of delinquency will be discussed.

Summary of the findings

The results of the study only partially support the hypothesis that a significant association between gender roles and youth delinquency exists, as support for the theory was observed only in two of the six hypothesized models (Model 1(a) and Model 2(a)). As expected, findings for those two models suggest that adolescents that have a stronger belief in masculine values are more likely to engage in some forms of youth delinquency. Moreover, femininity was found to be a good protective factor as higher levels of femininity were significantly associated with lower levels of delinquency. However, findings suggest that gender roles do not equally predict involvement in all three types of deviant behavior in the current study. Moreover, gender differences were observed. Firstly, adherence to masculine and feminine values did have a significant direct effect only on youth delinquency in the form of digital piracy and status delinquency, while they were not significant predictors of higher or lower levels of serious delinquency. While our results seem to limit the generalizability of the masculinity hypothesis to only certain forms of delinquency (traditional delinquency and digital piracy), it was interesting to observe that the hypothesized mechanisms could explain youth involvement both online and offline forms of delinquency, despite the fact that computer crime presents fundamental differences with traditional delinquency. It is also possible that despite such differences, adolescents show a similar attitude towards minor acts of deviance (e.g. drinking, smoking) and digital piracy, which youths might not view as a "real" criminal behavior. Second, masculinity and femininity were found to be significant only in models focusing on male delinquency,

while no significant effects were detected in any of the models analyzing female delinquency. Thus, compared to previous studies, our study seems to exclude any relation between masculinity-femininity and female delinquency, both directly and indirectly.

The second major purpose of the study was to investigate the role of social bonds as described in Hirschi's social control theory as potential mediating variables between gender roles and youth delinquency. Only Model 1(a) and Model 2(a) presented a significant direct relationship between gender roles and the outcome variables, therefore deserving special attention when examining the full mediational model. Model 1(a) had to be excluded a priori since none of the social bonds variables showed a statistically significant effect on digital piracy. On the other side, in Model 2(a) all six social bond measures were found to be good predictors of lower levels of male status delinquency (peer attachment was significant only at the .1 level of significance). Eventually, the results of the Sobel's test confirmed that the social bonds variables mediated the effects of gender roles on male status delinquency, therefore providing support for the mediation hypothesis for only one of the hypothesized models. Our findings are partly discrepant with those of previous research. Shover et al. (1979) found that gender roles indirectly affected male and female students' involvement in property offenses and aggressive delinquency through weaker social bonds. Another study (Norland et al., 1981) also indicated that masculinity while not directly related to individuals' participation in status, property and aggressive offenses, indirectly contributed to an increase in delinquency through social bonds. On the other hand, in the current study gender roles had a significant effect on boys' participation in status delinquency both directly and indirectly, but we could not detect any significant mediational effects in any of the other mediational models.

Parallel to the analysis of the direct and indirect effects of youths' adherence to masculine and feminine beliefs on delinquency, the interpretation of the results also shed light on the relationship between gender roles and social bonds. Thorthon and James (1979) found that masculinity did not contribute to a

weakening of the social bonds for girls while more masculine boys were more likely to have weaker social bonds. In another study (Norland et al., 1981), social bonds were more likely to be stronger for girls who were more masculine. Finally, while girls with more masculine traits had a weaker attachment to conventional others, femininity seemed to strengthen social bonds for both boys and girls (Shover, et al., 1979). Contrary to our expectations, in our study the relationship between gender roles and social bonds was in the opposite direction than the one found in previous studies. Social bonds seemed to be stronger for male and female students that were more masculine. On the other side, femininity was associated with weaker social bonds. The only exception was the relationship between girls' sex roles expectations and attachment to teachers, which was the only not significant relationship.

Our findings are only partially consistent with Hirschi's social control theory and cast doubts on its generalizability to both male delinquency and female delinquency, as well to its little explanatory power of different types of delinquency. Based on the results, social control theory can well explain boys' involvement in status delinquency while its applicability is rather limited when applied to digital piracy as well as serious delinquency and to female delinquency in general. As expected, in Model 2(a) stronger social bonds were associated with a decline in male status delinquency. The only exception was peer attachment which was found to have a positive relationship with boys' participation in status delinquency. Moreover, also in Model 2(b) as well in Model 3(a) and 3(b) peer attachment while not significant was in the opposite direction than the one predicted by Hirschi's social control theory and initially hypothesized in our study. While these findings seem to contradict social bond theory which asserts that all elements of the social bond are supposed to reduce delinquency, they are in line with Sutherland's differential association theory and Akers' social learning theory which posit that individuals acquire criminal behavior through interaction with intimate others, such as family, friends and peers (Akers, 1985; Sutherland & Cressey, 1955).

Limited support for social bond theory comes also from the analysis of the other models. For girls, the only social bond variable that was significantly associated with a decrease in status delinquency was commitment to education. Moreover, commitment to education was the only strong predictor of lower levels of participation in serious delinquency for both male and female adolescents. Finally, with regard to the generalizability of Hirschi's theory to computer crime, none of the social bond measures was significantly associated with male involvement in digital piracy, while, interestingly, weaker attachment to teacher was related to higher levels of female digital piracy.

Findings indicate that some of the measures that had been added to the models as control variables were among the stronger predictors of youth delinquency. For digital piracy, prior involvement in digital piracy was the stronger predictor of both male and female use of illegally downloaded software. Among the variables included in the study as central opportunity factors to commit computer crime, only being a member of a cyber club significantly predicted an increase in digital piracy. While such finding was in line with results from previous research (Moon et al., 2010), no significant association was found between the numbers of hours spent using a PC and digital piracy. Furthermore, surprisingly, using a computer mainly in an Internet Café was not found to be a risk factor for digital piracy but was associated with a significant decrease in digital piracy. Similarly, also for the status delinquency and serious delinquency models, prior delinquent behavior was a strong predictor of future involvement in youth delinquency for both boys and girls. In particular, subjects who displayed higher levels of involvement in status delinquency or serious delinquency at Time 1 were also more likely to report a higher number of delinquent of status delinquent acts or serious delinquent acts at Time 2. Results also indicate that males and females who associate with delinquent peers are more likely engage in both forms of traditional delinquency. This finding provides further support to differential association and social learning theory.

Next, this study applied group-based trajectory modeling to explore trajectory of participation in online and offline delinquency. Unlike most the previous research on delinquent trajectories, the current study focused on trajectories of crime not only for boys but also for female adolescents. Moreover, while most of previous trajectory research focused on traditional delinquency, the current study contributes to criminological literature by examining and comparing trajectories of involvement in offline and online delinquency. Thus, our results provided some interesting insight into the evolution of youth delinquency over adolescence and of similarities and differences in trajectory patterns across gender as well as between diverse forms of delinquent behaviors. First, levels of offending were slightly higher for boys, who were also more likely to be in an offending trajectory than girls for all types of delinquent behavior. Nevertheless, findings largely suggests that differences in levels of offending for male and female adolescents are not extremely marked, important similarities between male and female students' patterns of offending should be addressed. For digital piracy, around half of the male and female students were likely to belong to a stable offending group trajectory or increasing offending trajectory. On the other hand, the male model also evidenced the presence of a large group of high chronic offenders that instead was lacking in the female model. For status delinquency, the analyses evidenced the presence of a larger group of non-offenders and the presence of a desisting group in the female model, but also highlighted stable or increasing participation in status delinquency over age, with about 75% of the boys and 60% of the girls belonging to one of the stable offending trajectories of increasing trajectory pattern. Finally, for serious delinquency results evidenced that the number of trajectories as well as the patterns of offending were the same across gender, even though girls were slightly more likely than boys to follow a non-offending trajectory than any of the other two desisting trajectories. Second, the comparison of trajectories across different forms of delinquency allowed us to highlight similarities between patterns of traditional delinquency and computer crime. In particular, when comparing the trajectories for status delinquency

and digital piracy, we notice that such models are characterized by patterns of stable or increasing offending over adolescence, with only a smaller portion of the adolescents following a trajectory of non-offending over the five years they were surveyed. It is possible that a large group of students felt less constrained by legal and social norms as they approached the legal age to engage in many of the activities that we used to construct the status delinquency variable. With regard to digital piracy trends among Korean students, the analysis seems to give support to previous literature which described the generally positive attitude towards illegal downloading and file sharing in Asian countries (e.g. Chiou, Huang, & Lee, 2005; Janssens, Vandacle, & Beken, 2009; Moores, & Dhillon, 2000; Yu, 2013). On the contrary, the majority of the students tended to not engage in serious forms of delinquency over the course of their adolescent years, or exhibit desisting trajectories as students offending rates constantly decreased over the five years of the survey. Therefore, serious delinquency appear to be a rather rare event in early adolescence among Korean adolescents, and shows evidence of a gradual decrease over the following years. The presence of two declining serious delinquency trajectories can be interpreted in light of previous longitudinal studies that identified trajectories that start with medium or high levels of aggressive behaviors which shows a decline over time (Lerner, Liben, & Mueller, 2015). On the other hand, in contrast to findings from previous trajectory research, our study could not detect any distinct group of chronic offenders or of youths whose levels of serious delinquency escalate during adolescence nor a group of subjects belonging to trajectory of low stable delinquency over time (e.g. Nagin, & Tremblay, 2005; Odgers, Moffitt, Broadbent, Dickson, Hancox, Harrington, & Caspi, 2008; Tremblay, 1999).

Finally, joint trajectory analysis allowed for a comprehensive analysis of the co-occurrence of computer crime and traditional delinquency. The interpretation of the results does not seem to provide evidence of ‘specialization’ in online delinquency or traditional delinquency. Meanwhile, findings also provide little evidence of the versatility of delinquents. In fact, the chance of being involved in digital

piracy while also following a trajectory of high offending for traditional delinquency tended to be about the same or only slightly higher than the likelihood of belonging to any of the other trajectory groups.

Limitations and future research

While this study has the potential to make a meaningful contribution to the criminological literature on gender and crime, as well to expand our knowledge on computer crime, specific limitations should also be addressed. In particular, some of the primary limitations in the current project stem mainly from limitations of the original dataset. First, the items used to construct our masculinity and femininity measures resemble those of the masculine expectations scale and the femininity expectations scale used by Norland, James and Shover (1978). Each scale consists of five Likert scale items containing statements about traditional masculine and feminine role expectations. However, because of the nature of the KYPS dataset, each gender role measure constructed for the current research includes only three items. Moreover, in recent years more elaborated and reliable scales have been developed. For example, one of the most common tools to measure gender roles has been the Bem Sex Role Inventory (Beere, 1990; Bem, 1974).The BSRI in its original form includes a total of 60 items, and it has been used to classify individuals not only as masculine or feminine, but BEM also conceptualized two additional categories. Subjects with a high score of both masculine and feminine traits would be classified as androgynous while a low score in both masculinity and femininity would be labeled as undifferentiated. Second, while our social bonds measures could cover all four elements of the social bond conceptualized by Hirschi, it was impossible to describe the entire domain spectrum for all four of them. The only domain that could be represented for all four social bond measures was education. Finally, the trajectory analysis study was conducted using five waves of the KYPS dataset. The sample was composed of students attending the second grade of junior high school when the data for the first wave of the yearly survey were collected. Thus, we were

able to focus our trajectory analysis on Korean adolescents rather than on college students who have been the focus of most of previous research on computer crime. However, since the dataset consists of a total of six waves over the course of six years, our analysis could not investigate how developmental trajectories of online and offline delinquency develop from childhood into adulthood, and their co-occurrence over time. Furthermore, we also had to drop the last of the six waves from the original dataset since some of the delinquent behaviors used to construct the status delinquency variable would have ceased to be considered illegal after students turn 18 years old.

Future research could build on this study and expand it in different directions. First, although the current study focused on a peculiar form of computer crime, i.e. digital piracy, the KYPS dataset included a series of other questions about involvement in other forms of delinquency and antisocial behaviors that can be committed through the use of a computer, such us hacking and using unauthorized internet ID or resident registration number of other people. Therefore, future research could examine the applicability of the current theoretical framework to other forms of computer crime as well as look into their development over time. Moreover, future study could also evaluate the interrelationship of different forms of computer crime among each other and with traditional delinquency. Second, we suggest that future research of computer crime and the relationship between gender and cyber delinquency includes other Asian countries. Such comparative research in the Asian context would be especially interesting when considering that in the Asian context Korea is a relatively feminine society. Specifically, with a score of 39 in the masculinity dimension measured in the Hofstede dimension of national culture[2] South Korea is one of the most feminine Asian countries, especially when compared to countries such as China (66) and

[2] The six dimensions of national culture included in Hofstede's study are 1. Power distance, 2. Individualism, 3. Masculinity, 4. Uncertainty Avoidance, 5. Long Term Orientation, and 6. Indulgence. Specifically, masculinity was defined as the "preference in society for achievement, heroism, assertiveness and material rewards for success. Society at large is more competitive. Its opposite, femininity, stands for a preference for cooperation, modesty, caring for the weak and quality of life. Society at large is more consensus-oriented. In the business context Masculinity versus Femininity is sometimes also related to as "tough versus tender" cultures."

Japan (95) (Hofstede, & Hofstede, 2001). Finally, from a methodological perspective, we suggest that more sophisticated statistical techniques should be used to conduct a longitudinal mediation analysis in the relationship between gender roles and delinquency. For instance, longitudinal mediational processes could be examined by using advanced structural equation modeling approaches, such as cross-lagged panel model.

APPENDIX A

Items Used for the Gender Roles Measures

Masculinity: 1. To a man, social success is more important than anything else; 2. A man ought to stand on his own opinion instead of following that of others; 3. Dominating other people to a certain degree is a desirable masculine virtue. The responses to these items range on a five-point scale from 1 (strongly disagree) and 5 (strongly agree).

Femininity: 1. To a woman, marrying a nice man is more important than her own social success; 2. To a woman, following others' opinion is more desirable than insisting on her own; 3. Being quiet and obedient is a desirable feminine virtue. The responses to these items range on a five-point scale from 1 (strongly disagree) and 5 (strongly agree).

Items Used for the Social Bond Measures

Parental Attachment: 1. My parents and I try to spend much time together; 2. My parents always treat me with love and affection; 3. My parents and I understand each other well; 4. My parents and I candidly talk about everything; 5. I frequently talk about my thoughts and what I experience away from home with my parents; 6. My parents and I have frequent conversations. The responses to these items range on a five-point scale from 1 (very untrue) and 5 (very true).

Attachment to Teacher: 1. I can talk about all my troubles and worries to my teachers without reservation; 2. Teachers treat me with love and affection; 3. I hope to become a person just like my teacher. The responses to these items range on a five-point scale from 1 (very untrue) and 5 (very true).

Peer Attachment: 1. I hope to maintain the close relationships for a long time; 2. I am happy whenever I get together with them; 3. I try to have the same thoughts and feelings to them; 4. We can frankly talk about our troubles and worries. The responses to these items range on a five-point scale from 1 (very untrue) and 5 (very true).

Commitment to Education: Class grades in five school subjects were used to measure how hard the subjects study: 1. National language; 2. English; 3. Mathematics; 4. Social studies 5. Sciences. The responses to these items range on a five-point scale from 1 (very poor) and 5 (very good).

Involvement in Education: The total amount of hours spent per week studying specific school subjects was added to create this measure: 1. National language; 2. English; 3. Mathematics; 4. Social studies 5. Sciences; 6. Music; 7. Arts; 8. Physical education.

Belief in Education: 1. It is essential to get higher education for self-development; 2. It is essential to get higher education in order to get a good job; 3. It is essential to get higher education in order to get an ideal spouse; 4. Getting higher education provides better opportunities for making good friends. The responses to these items range on a five-point scale from 1 (strongly disagree) and 5 (strongly agree).

Percent Missing for Variables in the Models

	N	% Missing
INVOLV1	3124	2.0
INVOLV2	3122	2.1
INVOLV3	3120	2.1
INVOLV4	3128	1.9
INVOLV5	3125	2.0
INVOLV6	3167	.7
INVOLV7	3100	2.8
INVOLV8	3173	.5
PCHRS	3188	.0
LGINCOME	3188	.0
BELEDU1	2917	8.5
BELEDU2	3030	5.0
BELEDU3	3008	5.6
BELEDU4	3019	5.3
BELEDU5	3084	3.3
COMMIT1	3188	.0
COMMIT2	3188	.0
COMMIT3	3188	.0
COMMIT4	3188	.0
COMMIT5	3188	.0
PARATT1	3188	.0
PARATT2	3187	.0
PARATT3	3188	.0
PARATT4	3187	.0
PARATT5	3186	.1
PARATT6	3187	.0
EDUATT1	3188	.0
EDUATT2	3187	.0
EDUATT3	3186	.1
PEERATT1	3178	.3
PEERATT2	3178	.3
PEERATT3	3178	.3
PEERATT4	3177	.3
PEER_DEW	3180	.3
PIRACYW1	3127	1.9
PIRACYW2	3186	.1
SERDELW1	3174	.4
SERDELW2	3180	.3
STATUSW1	3136	1.6
STATUSW2	3180	.3
FEM1	3186	.1
FEM2	3185	.1
FEM3	3186	.1
MASC1	3185	.1
MASC2	3185	.1
MASC3	3185	.1
CYBCLUB	3188	.0
PCINTCAF	3188	.0

MALE SAMPLE

Correlations

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]
[1] MASC1	1	.475**	.396**	.211**	.184**	.251**	-.027	.045	-.026	-.044	-.018	.019	-.038	.021
[2] MASC2		1	.459**	.178**	.046	.160**	.094**	.144**	.033	.039	.067**	.108**	.022	.055*
[3] MASC3			1	.232**	.203**	.233**	.090**	.086**	.027	.014	.030	.086**	.027	.018
[4] FEM1				1	.400**	.265**	.023	.035	.012	-.011	-.005	-.035	.024	-.010
[5] FEM2					1	.509**	-.045	-.031	-.019	-.018	.015	-.024	.014	-.029
[6] FEM3						1	-.008	.013	-.010	-.003	.001	.016	-.013	-.043
[7] PARATT1							1	.488**	.520**	.422**	.426**	.558**	.172**	.193**
[8] PARATT2								1	.576**	.378**	.324**	.429**	.135**	.219**
[9] PARATT3									1	.522**	.426**	.506**	.206**	.205**
[10] PARATT4										1	.523**	.502**	.219**	.169**
[11] PARATT5											1	.591**	.219**	.184**
[12] PARATT6												1	.185**	.172**
[13] EDUATT1													1	.395**
[14] EDUATT2														1
[15] EDUATT3														
[16] PEERATT1														
[17] PEERATT2														
[18] PEERATT3														
[19] PEERATT4														
[20] COMMIT1														
[21] COMMIT2														
[22] COMMIT3														
[23] COMMIT4														
[24] COMMIT5														
[25] BELEDU1														
[26] BELEDU2														
[27] BELEDU3														
[28] BELEDU4														

[29] BELEDU5														
[15]	[16]	[17]	[18]	[19]	[20]	[21]	[22]	[23]	[24]	[25]	[26]	[27]	[28]	[29]
.040	.098**	.084**	.099**	.054*	.066**	.077**	.076**	.113**	.094**	.227**	.260**	.300**	.182**	.292**
.063*	.138**	.149**	.160**	.117**	.078**	.123**	.095**	.116**	.124**	.170**	.204**	.192**	.091**	.206**
-.010	.094**	.106**	.136**	.098**	.026	.083**	.041	.052*	.084**	.151**	.167**	.168**	.137**	.178**
-.034	.029	.047	.084**	.077**	-.016	.001	-.040	-.045	-.024	.038	.035	.101**	.055*	.112**
-.048	-.015	-.005	.051*	-.033	-.050*	-.045	-.085**	-.106**	-.062*	-.005	.000	.072**	.048	.055*
-.044	-.043	-.014	.021	-.036	-.071**	-.053*	-.061*	-.131**	-.059*	.005	.016	.110**	.106**	.066**
.140**	.079**	.090**	.142**	.083**	.144**	.204**	.194**	.156**	.205**	.078**	.054*	.063*	.069**	.028
.118**	.152**	.175**	.097**	.095**	.094**	.169**	.183**	.153**	.165**	.085**	.062*	.037	.031	.032
.139**	.109**	.115**	.090**	.077**	.153**	.176**	.179**	.133**	.182**	.039	-.021	.024	.068**	-.014
.160**	.039	.042	.086**	.104**	.034	.118**	.119**	.092**	.137**	.045	.004	.020	.039	-.006
.150**	.067**	.074**	.105**	.137**	.097**	.149**	.124**	.134**	.135**	.040	.029	.035	.056*	.016
.072**	.083**	.095**	.102**	.098**	.104**	.181**	.158**	.151**	.187**	.059*	.025	.028	.049*	.035
.301**	.058*	.017	.054*	.123**	.077**	.104**	.096**	.068**	.094**	.003	-.024	-.043	.066**	-.111**
.453**	.077**	.034	.054*	.089**	.145**	.174**	.125**	.143**	.157**	.061*	.044	.041	.100**	.026
1	.051*	.002	.053*	.027	.120**	.156**	.128**	.148**	.143**	.069**	.049*	.060*	.102**	.015
	1	.707**	.454**	.399**	.067**	.104**	.077**	.081**	.083**	.074**	.066**	.024	-.020	.077**
		1	.534**	.442**	.059*	.109**	.094**	.062*	.107**	.063*	.088**	.051*	.016	.103**
			1	.433**	.091**	.135**	.086**	.083**	.094**	.090**	.089**	.085**	.087**	.052*
				1	.020	.058*	.001	.042	.077**	.059*	.068**	.013	-.023	.068**
					1	.479**	.412**	.367**	.385**	.131**	.117**	.072**	.098**	.035
						1	.519**	.387**	.394**	.212**	.188**	.113**	.139**	.039
							1	.395**	.492**	.161**	.140**	.065**	.044	.022
								1	.515**	.177**	.131**	.071**	.063*	.019
									1	.174**	.146**	.111**	.084**	.041
										1	.703**	.535**	.391**	.298**
											1	.597**	.389**	.409**
												1	.494**	.337**
													1	.216**
														1

**. Correlation is significant at the 0.01 level (2-tailed).

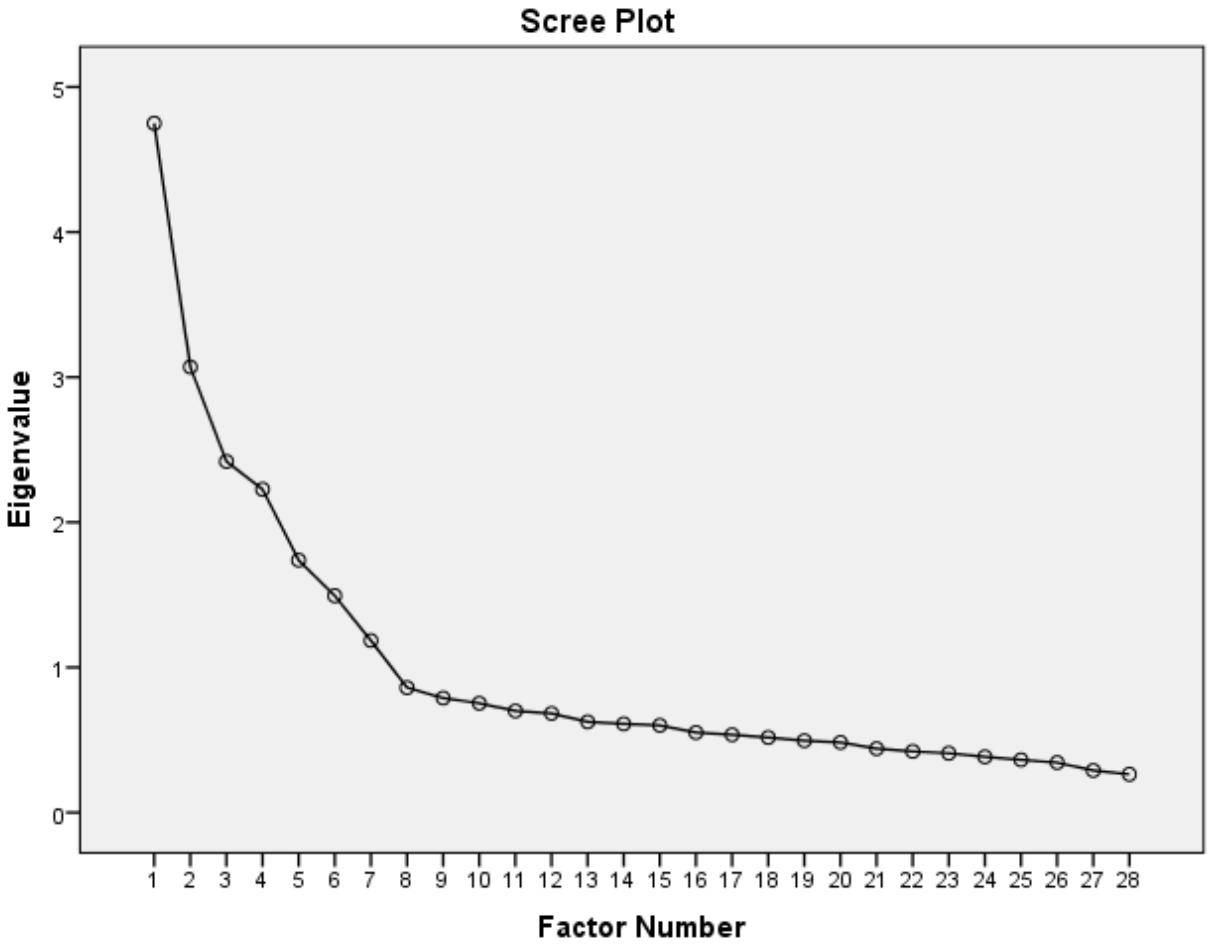
*. Correlation is significant at the 0.05 level (2-tailed).

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.811
Bartlett's Test of Sphericity	Approx. Chi-Square	14084.299
	df	378
	Sig.	0.000

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	4.750	16.964	16.964	4.060	14.501	14.501	3.410
2	3.070	10.964	27.928	2.560	9.141	23.642	2.884
3	2.419	8.639	36.567	2.026	7.236	30.878	2.572
4	2.227	7.953	44.520	1.697	6.060	36.939	2.355
5	1.739	6.209	50.729	1.368	4.885	41.824	1.601
6	1.494	5.336	56.065	.807	2.882	44.706	2.075
7	1.185	4.233	60.298	.909	3.247	47.953	1.812
8	.861	3.074	63.372				
9	.789	2.817	66.189				
10	.753	2.690	68.878				
11	.700	2.500	71.378				
12	.683	2.439	73.818				
13	.625	2.231	76.049				
14	.611	2.180	78.229				
15	.600	2.144	80.373				
16	.551	1.968	82.342				
17	.536	1.915	84.257				
18	.517	1.847	86.104				
19	.495	1.769	87.873				
20	.483	1.726	89.598				
21	.440	1.571	91.170				
22	.421	1.503	92.672				
23	.409	1.459	94.131				
24	.384	1.370	95.501				
25	.363	1.296	96.797				
26	.344	1.228	98.025				
27	.290	1.035	99.060				
28	.263	.940	100.000				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Factor Number

Pattern Matrix

	Factor						
	1	**2**	**3**	**4**	**5**	**6**	**7**
PARATT6	.789						
PARATT3	.714						
PARATT4	.695						
PARATT1	.687						
PARATT5	.670						
PARATT2	.589						
COMMIT3		.726					
COMMIT2		.664					
COMMIT5		.660					
COMMIT1		.639					
COMMIT4		.606					
BELEDU2			.853				
BELEDU1			.800				
BELEDU3			.711				
BELEDU4			.525				
PEERATT2				.898			
PEERATT1				.797			
PEERATT3				.593			
PEERATT4				.517			
FEM2					.894		
FEM3					.564		
FEM1					.432		
MASC2						.803	
MASC1						.582	
MASC3						.569	
EDUATT2							.726
EDUATT3							.617
EDUATT1							.507

Reliability Statistics

Variable	Cronbach's Alpha	N of Items
Masculinity	.703	3
Femininity	.652	3
Parental Attachment	.845	6
Attachment to Education	.648	3
Peer Attachment	.771	4
Commitment to Education	.793	5
Belief in Education	.796	5

FEMALE SAMPLE

Correlations

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]
[1] MASC1	1	.457**	.431**	.283**	.132**	.210**	.030	.036	.016	-.020	-.012	.008	.004	.033
[2] MASC2		1	.546**	.190**	.016	.068**	.016	.079**	.019	.023	.024	.022	-.017	.001
[3] MASC3			1	.267**	.117**	.163**	-.006	.028	-.005	-.004	-.007	-.018	-.054*	-.050*
[4] FEM1				1	.349**	.261**	-.007	-.042	-.068**	-.046	-.046	-.026	-.048	-.111**
[5] FEM2					1	.503**	-.071**	-.072**	-.030	-.041	.004	-.028	-.007	-.036
[6] FEM3						1	-.036	-.033	-.007	-.046	-.026	-.046	.035	.043
[7] PARATT1							1	.537**	.492**	.459**	.423**	.588**	.190**	.181**
[8] PARATT2								1	.610**	.462**	.385**	.517**	.139**	.198**
[9] PARATT3									1	.578**	.474**	.547**	.133**	.167**
[10] PARATT4										1	.604**	.601**	.172**	.120**
[11] PARATT5											1	.672**	.154**	.102**
[12] PARATT6												1	.140**	.117**
[13] EDUATT1													1	.523**
[14] EDUATT2														1
[15] EDUATT3														
[16] PEERATT1														
[17] PEERATT2														
[18] PEERATT3														
[19] PEERATT4														
[20] COMMIT1														
[21] COMMIT2														
[22] COMMIT3														
[23] COMMIT4														
[24] COMMIT5														
[25] BELEDU1														
[26] BELEDU2														
[27] BELEDU3														
[28] BELEDU4														

[29] BELEDU5														
[15]	**[16]**	**[17]**	**[18]**	**[19]**	**[20]**	**[21]**	**[22]**	**[23]**	**[24]**	**[25]**	**[26]**	**[27]**	**[28]**	**[29]**
.058*	.017	.052*	.039	.074**	.031	.066**	.023	-.008	.041	.130**	.188**	.243**	.130**	.167**
.037	.072**	.079**	.009	.086**	.072**	.029	.026	-.012	.018	.075**	.078**	.099**	.010	.078**
-.009	.019	.033	.070**	.090**	-.032	.000	-.001	-.065**	-.041	.046	.083**	.120**	.040	.048
-.056*	-.034	.003	.052*	.058*	-.095**	-.087**	-.098**	-.133**	-.111**	-.030	-.027	.113**	.061*	.020
.041	-.120**	-.105**	-.019	-.083**	-.079**	-.108**	-.067**	-.105**	-.078**	-.099**	-.058*	.040	.090**	-.056*
.109**	-.115**	-.105**	-.020	-.064*	-.026	-.069**	-.021	-.095**	-.053*	-.033	-.041	.035	.111**	-.063*
.179**	.074**	.107**	.098**	.073**	.179**	.216**	.194**	.189**	.184**	.117**	.083**	.068**	.090**	-.032
.136**	.126**	.158**	.115**	.116**	.158**	.177**	.204**	.167**	.175**	.133**	.110**	.055*	.086**	.013
.139**	.062*	.089**	.076**	.044	.144**	.179**	.179**	.172**	.176**	.097**	.064*	.028	.101**	.033
.109**	.057*	.074**	.034	.076**	.100**	.121**	.115**	.133**	.136**	.103**	.059*	.033	.079**	-.008
.156**	.046	.086**	.069**	.071**	.136**	.185**	.174**	.195**	.160**	.111**	.071**	.041	.079**	.038
.132**	.070**	.131**	.098**	.106**	.164**	.208**	.191**	.216**	.193**	.135**	.103**	.066**	.061*	.018
.432**	-.002	.014	.028	.002	.150**	.159**	.138**	.072**	.087**	.020	-.015	.005	.062*	-.090**
.584**	.071**	.067**	.096**	.027	.210**	.205**	.182**	.153**	.139**	.117**	.069**	.032	.078**	-.035
1	.021	.032	.076**	-.007	.168**	.194**	.198**	.160**	.140**	.049	.033	.036	.074**	-.019
	1	.682**	.334**	.396**	.058*	.040	.062*	.022	.061*	.012	-.004	-.062*	-.033	.028
		1	.408**	.485**	.045	.075**	.071**	.052*	.062*	.059*	.043	.007	.000	.051*
			1	.350**	.069**	.088**	.088**	.030	.042	.076**	.098**	.091**	.067**	.058*
				1	.018	.042	.016	.004	-.008	.034	-.011	-.022	-.022	.023
					1	.395**	.304**	.341**	.339**	.120**	.119**	.036	.094**	.032
						1	.505**	.338**	.333**	.118**	.114**	.044	.083**	.019
							1	.383**	.415**	.090**	.091**	.046	.092**	.010
								1	.510**	.144**	.127**	.064*	.066**	.073**
									1	.133**	.138**	.044	.096**	.044
										1	.732**	.495**	.383**	.273**
											1	.600**	.384**	.366**
												1	.486**	.382**
													1	.238**
														1

**. Correlation is significant at the 0.01 level (2-tailed).

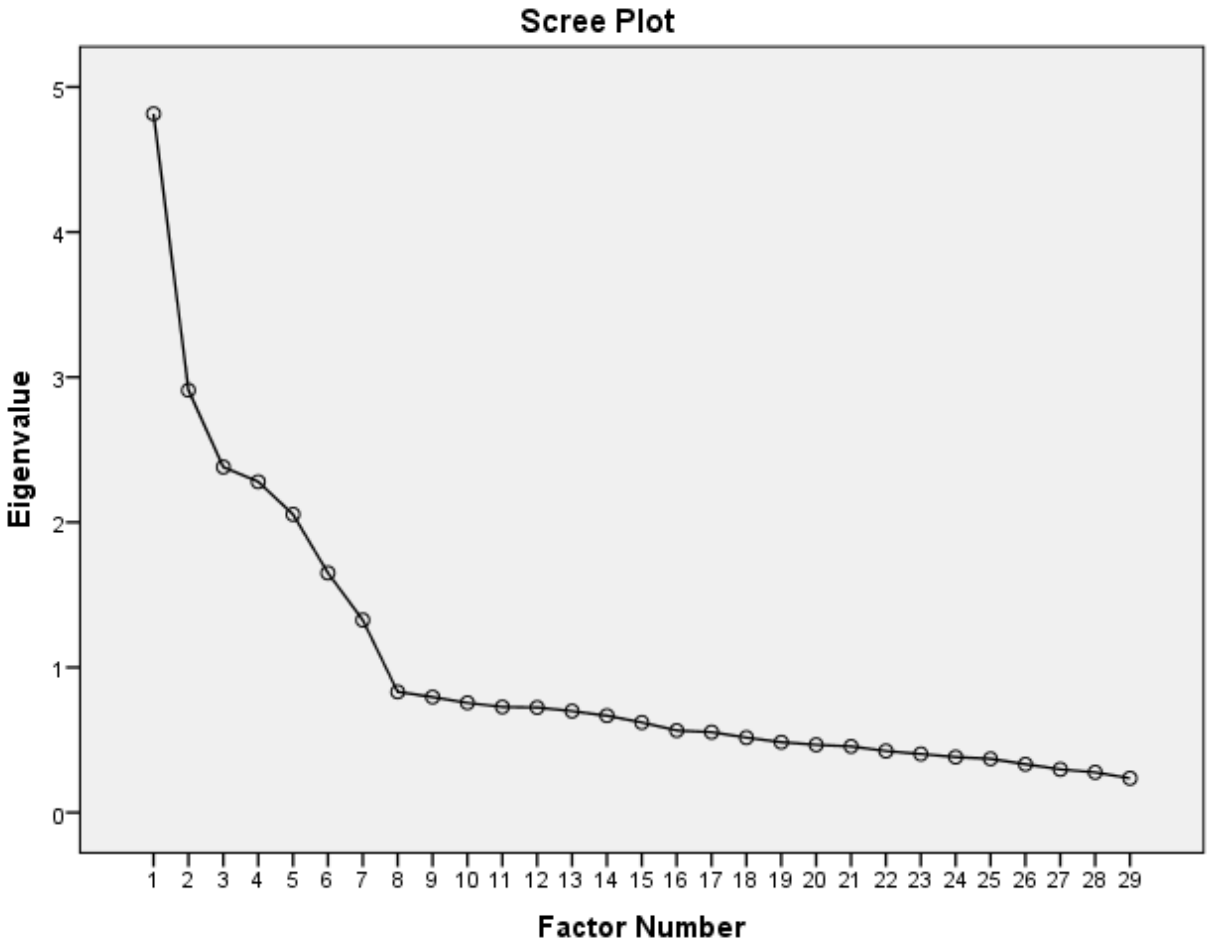
*. Correlation is significant at the 0.05 level (2-tailed).

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.802
Bartlett's Test of Sphericity	Approx. Chi-Square	15197.358
	df	406
	Sig.	0.000

Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	4.815	16.604	16.604	4.229	14.583	14.583	3.696
2	2.910	10.033	26.637	2.366	8.160	22.743	2.580
3	2.381	8.210	34.847	1.931	6.658	29.401	2.784
4	2.280	7.861	42.707	1.622	5.592	34.993	2.085
5	2.054	7.084	49.791	1.754	6.048	41.042	2.148
6	1.651	5.692	55.483	1.223	4.219	45.260	1.773
7	1.326	4.573	60.056	.870	3.000	48.260	1.546
8	.831	2.866	62.922				
9	.796	2.745	65.667				
10	.756	2.606	68.273				
11	.728	2.509	70.782				
12	.724	2.496	73.278				
13	.699	2.410	75.688				
14	.667	2.302	77.990				
15	.620	2.139	80.129				
16	.565	1.949	82.078				
17	.554	1.909	83.987				
18	.516	1.779	85.766				
19	.484	1.670	87.437				
20	.466	1.608	89.045				
21	.456	1.571	90.615				
22	.424	1.461	92.077				
23	.403	1.391	93.467				
24	.382	1.318	94.786				
25	.370	1.275	96.061				
26	.332	1.146	97.207				
27	.297	1.026	98.232				
28	.277	.954	99.186				
29	.236	.814	100.000				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Factor Number

Pattern Matrix

	Factor						
	1	**2**	**3**	**4**	**5**	**6**	**7**
PARATT6	.830						
PARATT4	.794						
PARATT5	.742						
PARATT3	.715						
PARATT1	.638						
PARATT2	.624						
BELEDU2		.889					
BELEDU1		.790					
BELEDU3		.700					
BELEDU4		.497					
BELEDU5		.420					
COMMIT5			.678				
COMMIT3			.673				
COMMIT4			.647				
COMMIT2			.603				
COMMIT1			.504				
PEERATT2				.893			
PEERATT1				.760			
PEERATT4				.542			
PEERATT3				.478			
EDUATT2					.868		
EDUATT3					.667		
EDUATT1					.620		
MASC2						.800	
MASC3						.708	
MASC1						.569	
FEM2							.784
FEM3							.636
FEM1							.408

Reliability Statistics

Variable	Cronbach's Alpha	N of Items
Masculinity	.732	3
Femininity	.614	3
Parental Attachment	.870	6
Attachment to Education	.757	3
Peer Attachment	.742	4
Commitment to Education	.759	5
Belief in Education	.796	5

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
MASCULINITY	Equal variances assumed	1.280	.258	32.106	3186	.000	.68945	.02147	.64735	.73156
	Equal variances not assumed			32.106	3184.288	.000	.68945	.02147	.64735	.73156
FEMININITY	Equal variances assumed	.405	.525	25.731	3186	.000	.40022	.01555	.36972	.43072
	Equal variances not assumed			25.731	3185.999	.000	.40022	.01555	.36972	.43072
ATTPAR	Equal variances assumed	107.742	.000	-26.958	3186	.000	-.66908	.02482	-.71775	-.62042
	Equal variances not assumed			-26.958	2993.539	.000	-.66908	.02482	-.71775	-.62042
ATTPEER	Equal variances assumed	17.970	.000	12.789	3186	.000	.22436	.01754	.18996	.25875
	Equal variances not assumed			12.789	3141.586	.000	.22436	.01754	.18996	.25876
ATTTEACH	Equal variances assumed	421.119	.000	-34.379	3186	.000	-.74523	.02168	-.78773	-.70272
	Equal variances not assumed			-34.379	2556.314	.000	-.74523	.02168	-.78773	-.70272
COMMEDU	Equal variances assumed	19.447	.000	18.409	3186	.000	.30837	.01675	.27552	.34121
	Equal variances not assumed			18.409	3143.275	.000	.30837	.01675	.27552	.34121
BELEDU	Equal variances assumed	.942	.332	14.030	3186	.000	.39467	.02813	.33951	.44982

	Equal variances not assumed			14.030	3177.304	.000	.39467	.02813	.33951	.44982
INV_EDU	Equal variances assumed	.494	.482	2.827	3186	.005	.960	.340	.294	1.627
	Equal variances not assumed			2.827	3184.293	.005	.960	.340	.294	1.627
DIG_PIRA	Equal variances assumed	452.497	.000	13.298	3186	.000	1.332	.100	1.135	1.528
	Equal variances not assumed			13.298	2572.374	.000	1.332	.100	1.135	1.528
DIG_PIR2	Equal variances assumed	304.666	.000	9.696	3186	.000	.798	.082	.637	.959
	Equal variances not assumed			9.696	2617.156	.000	.798	.082	.637	.959
SER_DEL1	Equal variances assumed	42.581	.000	4.484	3186	.000	.416	.093	.234	.598
	Equal variances not assumed			4.484	3124.623	.000	.416	.093	.234	.598
SER_DEL2	Equal variances assumed	37.637	.000	3.381	3186	.001	.241	.071	.101	.381
	Equal variances not assumed			3.381	3066.909	.001	.241	.071	.101	.381
STATUS1	Equal variances assumed	77.084	.000	-6.533	3186	.000	-.642	.098	-.835	-.450
	Equal variances not assumed			-6.533	3064.966	.000	-.642	.098	-.835	-.450
STATUS2	Equal variances assumed	.631	.427	-1.456	3186	.146	-.141	.097	-.331	.049
	Equal variances not assumed			-1.456	3185.937	.146	-.141	.097	-.331	.049

LOG_INCOME	Equal variances assumed	.039	.843	.772	3186	.440	.01229	.01592	-.01892	.04350
	Equal variances not assumed			.772	3185.917	.440	.01229	.01592	-.01892	.04350
PEER_DEL	Equal variances assumed	.912	.340	-.893	3186	.372	-.05834	.06535	-.18648	.06980
	Equal variances not assumed			-.893	3178.446	.372	-.05834	.06535	-.18648	.06980
CYBCLUBW	Equal variances assumed	34.508	.000	2.931	3186	.003	.044	.015	.015	.073
	Equal variances not assumed			2.931	3172.454	.003	.044	.015	.015	.073
Computer using time in a day (hours)	Equal variances assumed	3.584	.058	1.743	3186	.081	.181	.104	-.023	.384
	Equal variances not assumed			1.743	3178.640	.081	.181	.104	-.023	.384
PCINTCAF	Equal variances assumed	283.505	.000	8.094	3186	.000	.071	.009	.054	.088
	Equal variances not assumed			8.094	2543.369	.000	.071	.009	.054	.088

Descriptive Statistics – Male Sample

	Minimum	Maximum	Mean	Std. Deviation
DIGITAL PIRACY	1	10	2.113	3.482
DIGITAL PIRACY	1	10	1.269	2.836
DIGITAL PIRACY	1	10	1.800	3.311
DIGITAL PIRACY	1	10	1.907	3.513
DIGITAL PIRACY	1	10	2.330	3.751
STATUS DEL	1	10	1.730	3.057
STATUS DEL	1	10	1.513	2.960
STATUS DEL	1	10	2.176	3.473
STATUS DEL	1	10	2.855	3.858
STATUS DEL	1	10	3.889	4.110
SERIOUS DEL	1	10	.841	1.990
SERIOUS DEL	1	10	.490	1.764
SERIOUS DEL	1	10	.248	1.147
SERIOUS DEL	1	10	.246	1.262
SERIOUS DEL	1	10	.151	.931

Descriptive Statistics – Female Sample

	Minimum	Maximum	Mean	Std. Deviation
DIGITAL PIRACY	1	10	.753	1.973
DIGITAL PIRACY	1	10	.449	1.698
DIGITAL PIRACY	1	10	.852	2.358
DIGITAL PIRACY	1	10	.844	2.311
DIGITAL PIRACY	1	10	1.110	2.660
STATUS DEL	1	10	1.928	3.141
STATUS DEL	1	10	1.432	2.752
STATUS DEL	1	10	1.519	2.854
STATUS DEL	1	10	1.831	3.136
STATUS DEL	1	10	1.913	3.205
SERIOUS DEL	1	10	.887	2.137
SERIOUS DEL	1	10	.347	1.471
SERIOUS DEL	1	10	.146	.946
SERIOUS DEL	1	10	.102	.698
SERIOUS DEL	1	10	.048	.426

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