International Journal of Cyber Criminology
Vol 12 Issue 1 January – June 2018

Juvenile Delinquency in the Virtual World: Similarities and Differences between Cyber-Enabled, Cyber-Dependent and Offline Delinquents in the Netherlands

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Abstract
This study examines similarities and differences between juvenile delinquents of self-reported cyber-enabled offenses, cyber-dependent offenses, and offline offenses. The study builds on past studies by examining a broad range of online and offline offenses among a national probability sample of Dutch juveniles aged 12-17 years old. Results show that juveniles who report both offline and online offenses have the most high-risk profile. Within the group online delinquents, juveniles who commit both cyber-dependent and cyber-enabled offenses have the highest risk profile. The results further indicate that cyber-dependent delinquents are a distinct group from online delinquents.

Keywords: Online offending, cyber crime, cyber-dependent crime, cyber-enabled crime, risk and promotive factors.

Introduction

Since 2007 police census data have shown a sharp decline in juvenile crime in the Netherlands (Van der Laan & Goudriaan, 2016). Because of this crime drop, the urgency to deal with juvenile crime seems to have decreased, and the focus has shifted to more specific forms of crime, such as high impact crimes. However, official statistics relate

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primarily to traditional offline offenses. One possible explanation for the observed crime drop is that juveniles have shifted from committing traditional offline offenses to online offenses (Tcherni et al., 2016). With the digitalization of society, new ways to commit traditional offline offenses have emerged, as well as opportunities to commit new types of offenses online. This raises the question as to whether 'street criminals' have gone online, or whether we are dealing with a new type of delinquent.

Previous research distinguishes two types of online delinquency: cyber-enabled and cyber-dependent delinquency (Holt & Bossler, 2016; McGuire &Dowling, 2013). Cyber-enabled delinquency refers to 'traditional' offenses that are committed using Information Communication Technology (ICT), and includes acts such as online fraud, extortion, and online stalking. Cyber-dependent delinquency refers to offenses that can only be committed using ICT and that are primarily directed against computer or network resources. This includes acts such as hacking, distributing viruses, and orchestrating DDoS-attacks.

In an attempt to better understand what kind of individual is involved in online delinquency, scholars have now started to examine correlates of online delinquency and their differences and communalities with correlates of offline delinquency. The majority of previous studies have limited their focus to either one or, at most, a small number of online offenses. Regarding cyber-enabled delinquency, research has focused on offenses such as bullying and online harassment (e.g., Kerstens & Veenstra, 2015; Raskauskas & Stolz, 2007; Ybarra & Mitchell, 2004), online child pornography (for an overview, see Babchishin, Hanson & Hermann, 2010), and digital piracy (e.g., Brunton-Smith & McCarthy, 2016; Higgins, 2005; Higgins, Fell & Wilson, 2006; Wolfe & Higgins, 2009). With regard to cyber-dependent offenses, most studies have focused on hacking (e.g., Bossler & Burruss, 2011; Khey et al., 2009; Yar, 2005a). To the best of our knowledge, only one study has focused on a broader range of online offenses, whilst also including offline offenses (Donner, Jennings & Banfield, 2015). Donner and colleagues found that online delinquents were often prone to offline delinquency as well. However, these findings are based on a sample from a specific population, namely undergraduate college students in the US. The question is whether their results can be generalized to a national probability sample of juveniles.

In the current study, we build on previous research by first investigating the extent to which cyber-enabled and cyber-dependent delinquents differ from each other, and secondly the extent to which they differ from offline delinquents. Studying types of online delinquents and their similarities and differences with traditional offline delinquents is important, because if online delinquents are similar to offline delinquents, the same prevention methods could be used for both. However, if differences emerge within and between groups, different approaches regarding prevention and forensic treatment may be required.

To study potential differences between cyber-enabled, cyber-dependent, and offline delinquents, we used the Youth Delinquency Survey (YDS), a cross-sectional self-reported study on a national probability sample of juveniles from the Netherlands (see Van der Laan, Blom & Kleemans, 2009). The YDS contains detailed information on both self-reported online and offline delinquency, and on risk and promotive factors that are related to traditional offline delinquency. Risk factors increase the likelihood of delinquency, whereas promotive factors decrease this likelihood. Determining the differences between

cyber-enabled and cyber-dependent delinquents, and determining the extent to which online delinquents differ from offline delinquents, is done by examining these risk and promotive factors. The main research questions of this study are: *What distinguishes juvenile delinquents of cyber-enabled offenses from juvenile delinquents of cyber-dependent offenses? What distinguishes juvenile delinquents of online offenses from juvenile delinquents of offline offenses?*

1. Theory

Over the last two decades, an increasing body of literature has examined the online delinquent behavior of individuals. However, it remains unclear whether existing criminological theories are useful for explaining online offenses, or whether these offenses represent a new distinctive form of delinquency requiring new explanations (Capeller, 2001; Grabosky, 2001).

Research into this issue was pioneered by Grabosky (2001). According to Grabosky, cyber delinquency is in essence the same as traditional delinquency, the only difference being that it is committed with new technology. Consequently, he argues that traditional criminological theories also apply to offenses occurring in the virtual world. He supports this claim by demonstrating the ability of Cohen and Felson's (1998) routine activity theory (RAT) to explain online delinquency. Since Grabosky made this argument, several scholars have used components of traditional criminological theories to investigate online offenses. Most of this research has relied on RAT (e.g., Holt & Bossler, 2009; Yar, 2005b), Gottfredson and Hirschi's general theory of crime (e.g., Bossler & Burruss, 2011; Buzzel, Foss & Middleton, 2006), and Akers's social learning theory (e.g., Holt, Bossler & May, 2012; Holt, Burruss & Bossler, 2010). Collectively, these studies show that traditional criminological theories are useful for explaining several forms of cyber-enabled offenses (for an overview, see Holt & Bossler, 2014; 2016), such as digital piracy (e.g., Higgins, 2005) and use of online pornography, which is considered a form of deviant behavior (e.g., Buzzel et al., 2006). However, the few studies examining cyber-dependent offenses, such as hacking, offer mixed support for the applicability of traditional theories (e.g., Yar, 2005b; Bossler & Burruss, 2011).

In line with this latter finding, other scholars like Cappeler (2001) suggest that the virtual world contains unique social environments, in which new and distinctive forms of delinquent behavior arise. Consequently, it has been argued that traditional explanations are unsatisfactory for explaining cyber delinquency, and thus new theories are needed. So far, only a few theories exist that focus exclusively on cyber delinquency, such as space transition theory and actor-network theory (for an overview, see Holt & Bossler, 2016). As Holt and Bossler note, "innovative theory creation has largely been absent in the literature over the last decade" (p.95).

In sum, the ongoing debate in criminology suggests that new explanations or theories are needed to explain cyber-dependent delinquency. Yet, to date, there is little empirical research to substantiate these claims, as most studies have only focused on a single type of online delinquency. In the current study, we build on the literature by focusing on both the differences between juvenile delinquents of cyber-enabled offenses and juvenile delinquents of cyber-dependent offenses, and the differences between online delinquents and offline delinquents. To examine these potential differences, we will apply the *risk factor model* (Loeber, Slot & Southamer-Loeber, 2008). The risk factor model, outlined in more detail below, is commonly used for explaining traditional offline delinquency. An

advantage of the risk factor model is that it incorporates characteristics of different life domains, including individual and family characteristics, and characteristics of friends and school. This model is particularly suitable for this study, as our goal is to examine the profiles of online and offline offenders in general, and not to focus on highly specific types of online offenders, such as hackers or online fraudsters. By applying the risk factor model to online delinquents, we are able to provide insight into the extent to which factors in various domains correlate with cyber-enabled, cyber-dependent, and offline delinquency. As such, we aim to provide evidence of whether or not there is a need for new theories to explain online offenses. We expect the risk factor model to be most predictive for juveniles who commit offline offenses (whether or not in combination with online offenses). Moreover, based on the literature on online delinquency, we expect the risk factor model to be more strongly related to juveniles who commit cyber-enabled offenses, compared to juveniles who commit cyber-dependent offenses.

1.1. Risk Factor Model

The risk factor model is based on the (bio) social ecological model of Bronfenbrenner (1979).The general idea behind this model is that different domains influence the likelihood of antisocial and delinquent behavior (Farrington, 2003; Lipsey & Derzon, 1998; Loeber et al., 2008). The domains are generally organized into five broader categories: the individual, family, school, peers, and the community domain.

A variety of factors have been found to increase the likelihood of delinquent behavior. Individual risk factors include impulsivity or defective moral beliefs (Agnew, 2003; Farrington, 2003), unstructured routine activities without the supervision of parents (Osgood & Anderson 2004; Osgood et al., 1996), and (excessive) substance use (Felson, 1998). Another important risk factor is self-control. Self-control has been demonstrated to be one of the most influential correlates of traditional crime, and has also frequently been applied to various forms of cybercrime (e.g., Bossler & Burrus, 2011; Higgins, 2005). Next, certain online activities may place individuals at risk for online delinquency. Past studies suggest that more advanced forms of cyber-dependent crimes, such as hacking, may require higher levels of computer skills (Bossler & Burrus, 2011; Xu, Hu & Zhang, 2013). A factor that may favor the development of these skills is gaming; juveniles, who frequently play online games, may develop more online skills, which are necessary for the (successful) pursuit of cyber-crimes (Xu, Hu & Zhang, 2013).

In the family domain, poor parental bonding, little openness to parents, and the lack of parental supervision have been found to predict delinquency (Rutter, Giller &Hagell, 1998; Stattin & Kerr, 2000). In the school domain, poor academic performance and low attachment to school are examples of risk factors (Junger & Haen Marshall, 1997; Mason & Windle, 2002). The delinquent behavior of friends is considered an important risk factor in the peer domain (Warr, 1993; Weerman, 2011), and poverty and community disorganization are examples of risk factors in the community domain (Hawkins et al., 2000).

In addition to risk factors, scholars have also identified promotive factors (Farrington et al., 2008; Sameroff et al., 1998). Promotive factors reduce the likelihood of negative outcomes, and can counterbalance risk factors. As such, promotive factors can (partially) explain why not all juveniles that are exposed to risk factors become involved in antisocial or delinquent behavior (Farrington & Welsh, 2007; Loeber et al., 2008). Examples of

promotive factors are strong social bonds, pro-social norms, parental support, and a strong attachment to school (Catalano et al., 2004).

Research has shown that the accumulation of risk factors across multiple domains increases the likelihood of negative outcomes, including antisocial and delinquent behavior (Loeber et al., 2008; Stouthamer-Loeber et al., 2002). Studies on promotive factors show that an accumulation of promotive factors reduces the likelihood of negative outcomes (Farrington et al., 2008; Sameroff et al., 1998). Because promotive factors have the ability to buffer the negative influences of risks, scholars have also examined the cumulative impact of risk and promotive factors across different domains. Overall, the more risk factors and the fewer promotive factors present, the higher the likelihood that individuals engage in (serious) delinquent behavior (e.g., Stouthamer-Loeber et al., 2002; Van der Laan et al., 2010). As such, we expect juveniles who commit several types of offenses, both online and offline, the most serious delinquents, to be characterized by the highest risk profile (i.e., most risk factors and fewest promotive factors).

1.2. The Current Study

In this study, we first examine the differences between self-reported cyber-enabled and cyber-dependent delinquents on risk and promotive factors, distinguishing between factors in the individual, family, peer and school domain. Secondly, we test whether these online delinquents differ from offline delinquents on these factors. So far, research on online delinquency has mostly focused on a single type or limited number of online offenses, and/or are based on samples of student populations. Our study builds on and extends this body of literature by examining a broader range of cyber-enabled, cyber-dependent, and offline offenses among a national probability sample of juveniles. This way, we are able to provide a more comprehensive picture of different types of online delinquents, and their differences with offline delinquents. For this purpose, we focus on a variety of risk and promotive factors derived from the risk factor model, and also investigate the cumulative impact of these risk and promotive factors across different domains.

2. Data and Methods

We used data from the most recent wave (2015) of the YDS. The YDS is a cross-sectional, self-report study, conducted every five years among a national probability sample of Dutch juveniles, aged between 10 and 23 years. Within the YDS, a random stratified sampling method was followed. The initial sample was divided into 30 strata, defined by age and ethnic origin, followed by a random selection of juveniles from the Municipal Population Register. Ethnic minorities (Turks, Moroccans, Surinamese and Antilleans/Arubans) and juveniles under twelve (10 and 11-year-olds) were oversampled, as these groups tend to be less likely to participate in survey research.

In the current study, we focused solely on minors aged between 12 to 17 years. We excluded juveniles under the age of twelve, as these individuals cannot be prosecuted by the juvenile justice system in the Netherlands. Young adults (18- to 23-year-olds) were also excluded, as these individuals are prosecuted by the adult justice system in the Netherlands.[5] Between January and June 2015, a total of 2,207 juveniles, aged between 12 and 17 years, were approached to participate in the study. With an unweighted response

[5] Since 2014 legislature has been implemented in the Netherlands which aims to apply juvenile and adult criminal law to 16 to 23-year-olds in a flexible manner.

rate of 61.8%, the final sample consisted of 1,365 juveniles. The sample was largely representative of the target populations. Juveniles from Turkish and Moroccan origin were less likely to participate in the study (response rates respectively 52.2% and 56.2%). However, this underrepresentation is small enough that the data can be considered representative for these groups as a whole (Engelen, Roels & de Heij, 2015). The data were gathered by means of Computer Assisted Personal Interviews (CAPI) and Computer Assisted Self Interviews (CASI), with CASI being used for questions about sensitive information, including self-reported delinquency.

2.1 Dependent Variables

To measure delinquency, we used 27 items on offline delinquency, and 10 items on online delinquency. Offline delinquency items included whether or not a juvenile had been involved in any of the following type of offenses in the 12 months prior to the interview: violent offenses (7 items), property offenses (11 items), vandalism (5 items), distributing narcotics (3 items), and the possession of weapons (1 item). Online delinquency was measured using 10 items, differentiating between cyber-enabled (5 items) and cyber-dependent offenses (5 items). Cyber-enabled delinquency included: threats through text messages, e-mail or chat-box, threats through social media, not supplying goods that have been purchased online, not paying for goods that have been purchased online, and distributing sexual pictures of minors through the internet. Cyber-dependent offenses included: carrying out DDoS attacks, hacking without changing information, hacking and changing information, sending viruses, and changing passwords. For readability, we use the term 'digitized delinquents' to refer to juvenile delinquents of cyber-enabled offenses, and the term 'cyber delinquents' to refer to juvenile delinquents of cyber-dependent offenses.

Juveniles were asked to indicate whether they had ever committed any of these offenses, and if so, how often in the 12 months prior to the interview. Juveniles were coded as delinquents if they reported committing at least one offense in the 12 months prior to the interview (one year prevalence). In total, 23.4% of the juveniles reported that they had committed at least one online offense in the 12 months prior to the interview (N=320). Of those online delinquents, 42.2% reported only cyber offenses (N=135), 32.2% reported only digitized offenses (N=103), and 26.6% reported both cyber and digitized offenses (N=85). These three groups were used to study the differences between cyber and digitized delinquents.[6] To study the differences between online and offline delinquents, four groups were distinguished:[7] a group of non-delinquents (N=796, 58.3%), a group only reporting online offenses (N=85, 6.2%), a group only reporting offline offenses (N=249, 18.2%), and a group that reported both online and offline offenses (N=235, 17.2%).

[6] A factor analysis indicated that the theoretical distinction between cyber-enabled and cyber-dependent delinquency is also observed in the YDS. Based on these findings, we assigned juveniles who participated in the YDS into the three different groups. Note that we excluded juveniles who had not been involved in online offenses in the 12 months prior to the interview (N=1,045; 76.6% of the total sample), because we are interested in the differences between cyber- and digitized delinquents.

[7] Offline delinquency was distinguished as a separate factor in an exploratory factor analysis.

2.2. Independent Variables

To study the differences between (different types of) online and offline delinquents, we examined factors concerning the individual (self-control, alcohol and drug use, gaming, attitude towards delinquency), family (emotional warmth, parental solicitation, parental control), friends (delinquent behavior of peers), and school domain (satisfaction with school). Unfortunately, the YDS does not include questions regarding the community domain.

2.2.1 Individual Characteristics

Self-control was measured by averaging the scores on 11 items, which were derived from the *Early Adolescent Temperament Questionnaire* (EATQ; Rothbart, Ahadi & Evans, 2000). Examples of items are 'When someone tells me to stop doing something, it is easy for me' and 'It takes a lot of effort to get things done on time.' Juveniles were asked to rate how much the statements reflected them. The possible responses ranged from 1 'almost never true' to 5 'almost always true'. The items were (re)coded such that higher scores reflected higher levels of self-control (Cronbach's α=0.71).

Alcohol use was measured using two separate items assessing (1) the number of drinking weekdays (Monday to Thursday) and (2) the number of weekend drinking days (Friday to Sunday). *Drug use* was measured by asking juveniles whether they had ever used drugs, and if so, how often in the 12 months prior to the interview.

Gaming was measured by asking juveniles to indicate how often they play videogames. The response categories ranged from 1 'never' to 6 'almost every day.' A higher score indicates that juveniles play videogames more frequently.

Attitude towards delinquency was measured using eight items that indicate whether juveniles approve of delinquent behavior by peers. Examples of items are 'Can you indicate how wrong it is when someone your age mistreats someone?' and 'Can you indicate how wrong it is when someone your age abuses someone?' The responses ranged from 1 'not wrong at all' to 4 'very wrong.' The answers to these items were averaged, with a higher score reflecting a more positive attitude towards delinquency (Cronbach's α=0.81).

2.2.2 Family characteristics

Three factors concerned the family domain.[8] *Emotional warmth* was measured by averaging six items that were selected from the EMBU-C (Markus et al., 2003). These items reflect experienced emotional support from their parents. Examples are 'Do your parents sometimes tell you that you've done well?' and 'If things are not right for you, do your parents try to comfort you?'. The responses ranged from 1 'never' to 5 '(almost) always'. A higher score reflects a higher level of emotional warmth (Cronbach's α=0.81).

Parental supervision was measured with two scales, derived from Stattin and Kerr (2000). The first scale, *parental solicitation,* consisted of six items. Examples are 'How often

[8]The items about parents were only asked to juveniles who still lived with their parents. We introduced an additional category for those who do not live with their parents (N=26). As a robustness-check we also applied an alternative strategy to deal with these missing values: we replaced the missing values with their respective mean. This alternative analysis did not substantially alter our results.

do your parents talk with your friends when they come over to your house?' and 'How often do your parents ask you to sit and tell them what happened at school on a regular school day?'. The responses ranged from 1 'never' to 5 '(almost) always'. Higher scores indicate higher parental solicitation, i.e., that parents more often inquire about the activities of their children (Cronbach's α=0.65).

The second scale, *parental control,* was measured using five items that concern the degree to which parents regulate the leisure activities of their children. Examples are 'Must you have your parents' permission before you go out during weeknights?' and 'If you go out on a Saturday evening, must you inform your parents beforehand who you will be with and where you will be going?'. Higher scores reflect a higher degree of parental control (Cronbach's α=0.79).

2.2.3 Characteristics of friends

Friends' delinquent behavior was measured using 7 items, asking juveniles to indicate whether any of their friends engaged in any of the following types of offense in the 12 months prior to the interview: vandalism, theft (worth both more and less than 10 euros),[9] breaking and entering, injuring someone, threatening someone online, as well as whether they had experienced police contact. Possible responses were 'none', 'some', 'most' and 'all' of their friends. The final scale was constructed by calculating the mean, with a higher score indicating that juveniles have more friends who have been engaged in delinquency (Cronbach's α=0.69).

2.2.4 School characteristics

Satisfaction with school was measured by asking juveniles to reflect on the following five statements: 'I enjoy going to school', 'I get bored in school', 'I have a nice school', 'I'd rather go to another school' and 'At school I feel at home'. Juveniles could respond with 'totally agree', 'agree', 'not agree/not disagree', 'disagree' and 'totally disagree'. The responses were averaged, with higher scores reflecting more satisfaction with school (Cronbach's α=0.73).[10]

2.2.5 Control variables

Gender was measured by scoring girls 1 and boys 0. We classified the variable age into two groups: 12 to 15yearolds and 16 and 17yearolds. To determine the ethnicity of juveniles we adhered to the definition used by Statistics Netherlands: juveniles with at least one parent born abroad are considered non-native Dutch. Table 1 presents the descriptive statistics for the independent variables included in this study.

[9] Currently, 10 euros is approximately 10 US dollars.

[10] These questions were only asked to juveniles who currently attend school. We included a dummy variable for juveniles who do not attend school (N=29). As a robustness-check we also applied an alternative strategy to deal with these missing values: we replaced the missing values with their respective mean. This alternative analysis did not substantially alter our results.

Table 1. Descriptive statistics of independent variables used in this study

	N	Min.	Max.	Mean	Sd.	α	N items
Individual domain							
Self-control	1,364	1.6	5.0	3.6	0.6	0.71	11
Alcohol week days	1,362	0.0	4.0	0.1	0.3	-	1
Alcohol weekend days	1,361	0.0	3.0	0.2	0.6	-	1
Drug use	1,365	0.0	1.0	0.1	0.3	-	1
Gaming	1,365	1.0	6.0	3.6	2.0	-	1
Attitude towards delinquency	1,364	1.0	4.0	1.6	0.5	0.81	8
Family domain							
Emotional warmth	1,365	2.0	5.0	4.6	0.5	0.81	6
Parental solicitation	1,338	1.2	5.0	3.2	0.7	0.65	6
Parental control	1,317	1.0	5.0	4.1	0.9	0.79	6
Friend domain							
Friends' delinquent behavior	1,365	0.0	11.0	0.8	1.4	0.69	7
School domain							
Satisfaction with school	1,336	1.0	5.0	3.9	0.8	0.73	5
Control variables	N	%					
Gender							
Boys	698	51.1					
Girls	667	48.9					
Age							
12- to 15-year-olds	944	69.2					
16- to 17-year-olds	421	30.8					
Ethnicity							
Native Dutch	326	23.9					
Non-native Dutch	1,039	76.1					

2.2.6 Risk and promotive factors

To capture the influence of risk and promotive factors on juveniles' delinquent behavior, we dichotomized the independent variables. The first variable indicates whether a risk factor is present (1) or absent (0) and the second variable indicates whether a promotive factor is present (1) or absent (0). The risk and promotive factors were conceptualized based on juveniles' scores on the distribution on each variable. Scores below the 25th percentile or above the 75th percentile were used to designate either a risk or promotive effect, depending on the meaning of the pole of the scale. These cutoff points were based on earlier studies that have used the risk factor model (e.g., Stouthamer-Loeber et al., 2002).

Most of the scales in this study have both a risk and promotive component (i.e., self-control, attitude towards delinquency, parental emotional warmth, parental solicitation, parental control, and satisfaction with school). However, there are also variables without a

promotive component. For instance, the majority of juveniles indicated having no delinquent friends (62.9%). Also, alcohol and drug use were rarely reported by juveniles (see Table 1). We have therefore decided to dichotomize these variables into a neutral (0) and a risk component (1). For the variable gaming, we decided to only include a risk component, because high scores on this variable are not unusual for juveniles.
To capture the counter-balancing effect of promotive factors, we calculated an overall cumulative risk-promotive scale. In each domain, we summed the significant risk effects and then subtracted the significant promotive effects found in the bivariate analyses. Each domain score was trichotomized into a promotive score (below the 25th percentile; score −1), a risk score (above the 75th percentile; score 1), and a neutral score (in-between; score 0). We then summed the three domain scores into an overall cumulative promotive-risk scale, with a low score indicating promotive effects on all four domains and a high score risk effects on all four domains (range from -3 to 4).[11]

2.3 Analytical Strategy

As our dependent variable is categorical with more than two categories, we employed multinomial logistic regression analyses. The results of these analyses are expressed in terms of marginal effects. A marginal effect of a dichotomous variable reflects the probability that juveniles with a particular characteristic compared to juveniles who lack that characteristic belong to a specific group of delinquents. A marginal effect of 0.22, for instance, indicates that the presence of a particular factor (e.g., drug use) is associated with a 22 percent increase likelihood that a juvenile belongs to a certain group of delinquents. The sum of the marginal effects in each row is zero (Borooah, 2002; Liao, 1994).

To assess whether the marginal effects differ from each other, we relied on the p-values of the multinomial logistic regression analyses. By changing the reference category, we were able to examine whether the estimated effects differed significantly from each other across all groups. Significant differences between groups are indicated with the letters 'a' through 'd', with the letter 'a' referring to the first group in the table and the letter 'd' referring to the last group[12].

3. Results

In order to gain more insight into the types of juveniles involved in online delinquency, we first compared the characteristics of cyber delinquents, digitized delinquents, and juveniles who reported both cyber and digitized offenses. Subsequently, we assessed the overlap with offline delinquency by examining the extent to which these different groups of online delinquents (i.e., the group of cyber delinquents, the group of digitized delinquents, and the group who reports both cyber and digitized offenses), also engaged in offenses offline. Lastly, we compared the characteristics of online delinquents with the characteristics of non-delinquents, offline delinquents, and those who are engaged in both online and offline offenses.

[11] The minimum score on the overall risk-promotive scale is -3, because there are no promotive factors in the friend domain.

[12] The estimated effects were considered statistically significant if the corresponding p-value was below 0.1 ($p<0.1$ is labeled with one letter and $p<0.05$ with two letters). For readability, we did not distinguish between $p<0.05$ and $p<0.01$.

3.1 Differences between cyber delinquents and digitized delinquents

Table 2 presents the results of the multinomial logistic regression analysis for cyber delinquents, digitized delinquents and juveniles who reported both cyber and digitized offenses. We conducted the analyses with all risk, promotive and control variables. For reasons of parsimony, we only show effects that differ significantly between groups.

The findings indicate that juveniles who were involved in both cyber and digitized delinquency have a more severe risk profile than juveniles who specialized in either cyber or digitized offenses. Cyber delinquents appear to have a less severe risk profile compared to both digitized delinquents and the group who reported both cyber and digitized offenses.

Table 2 shows that, in general, cyber delinquents were less inclined to endorse positive attitudes towards crime, less likely to experience little parental solicitation, to have delinquent friends and to be highly satisfied with school. Cyber delinquents were also found to have a higher likelihood of experiencing both *low* and *high* levels of parental control.[13]

Table 2. Multinomial logistic regression relating risk and promotive factors with different types of online delinquents - marginal effects, *N*=317

	Marginal effects (and S.E.)								
	Cyber delinquents			Digitized delinquents			Cyber and digitized delinquents		
	b	se	sig.	b	se	sig.	b	se	sig.
Intercept	42.0			33.6			24.4		
Individual domain									
Attitudes towards crime									
Risk	-13.1	6.2	cc	-2.2	5.8	cc	15.2	5.3	aa; bb
Family domain									
Parental solicitation									
Risk	-12.6	7.7	cc	-2.5	7.5		15.1	7.9	aa
Parental control									
Promotive	13.3	8.1	b	-11.2	6.8	a	-2.1	6.3	
Risk	16.2	7.9	cc	-6.1	7.0		-10.1	5.9	aa
Friend domain									
Friends' delinquent behavior									
Risk	-12.5	6.9	c	4.6	6.2		7.8	5.6	a
School domain									
Satisfaction with school									
Promotive	-15.4	7.6	c	7.5	8.3		7.9	8.0	a
Gender (1=female)	-16.2	7.1	cc	4.9	6.7		11.3	6.1	aa
Age (1= 16 and 17-year-olds)	-1.0	7.4		-8.7	6.6	c	9.7	6.4	b

Significant differences between the groups are indicated with the letters a through c.
One letter = p<0.1; Two letters = p<0.05

[13] A similar finding was obtained from the bivariate analysis. Therefore, these findings seem to imply that the relationship between parental control and cybercrime is curvilinear.

Comparing the characteristics of cyber delinquents with that of digitized delinquents, only one statistically significant difference was found. Cyber delinquents were found to have a higher likelihood of experiencing high levels of parental control, as compared to juveniles who only reported digitized offenses.

Compared with the group who reported both cyber and digitized offenses, cyber delinquents were found to have a lower likelihood of having positive attitudes towards delinquency, of experiencing little parental solicitation, of having delinquent friends, and of being highly satisfied with school. At the same time, cyber delinquents were found to have a higher probability of experiencing little parental control and were less often girls than those who reported both cyber and digitized offenses.

We find fewer differences between digitized delinquents and juveniles who reported both cyber and digitized offenses. The group of digitized delinquents and the combination group only differed with regard to their attitudes towards delinquency and age. Juveniles with positive attitudes towards delinquency and 16 and 17 year olds were found to have a higher likelihood of belonging to the combination group than to the group of digitized delinquents.

3.2 Offline delinquency among online delinquents

Table 3 shows the likelihood of offline delinquency, among cyber delinquents, digitized delinquents, and those who reported both cyber and digitized offenses. The results showed a strong overlap between online and offline delinquency. The overlap was strongest for juveniles who reported digitized offenses and for juveniles who reported both cyber and digitized offenses. Of the digitized delinquents, nearly three-quarters (73.8%) also reported offenses offline. Of those who reported both cyber and digitized offenses, 91.5% also reported offenses offline. For cyber delinquents, the overlap was less strong: 37.8% of the cyber delinquents exclusively engaged in cyber offenses.

Table 3. The prevalence of offline delinquency among cyber delinquents, digitized delinquents and those who report both cyber- and digitized offenses

	No offline offenses		Offline offenses	
	N	%	N	%
Cyber delinquents	51	37.8	84	62.2
Digitized delinquents	27	26.2	76	73.8
Cyber- and digitized delinquents	7	8.5	75	91.5

3.4 Differences between online and offline delinquents

Table 4 presents the results of the multinomial logistic regression analyses for the four groups of delinquents (i.e., the non-delinquents, online delinquents, offline delinquents, and those who reported both online and offline offenses). Again, we only show factors that differed significantly between the groups.

The results indicate some differences between online delinquents and the other groups. Overall, we found online delinquents to have a less severe risk profile than juveniles who reported both online and offline offenses, but to have a more severe risk profile than non-delinquents. The group who reported both online and offline offenses were characterized by the most high-risk profile.

Table 4. Multinomial logistic regression relating risk and promotive factors with different types of online and offline delinquents - marginal effects, *N*=1.337

	Marginal effects (and S.E)											
	Non-delinquents			Online delinquents			Offline delinquents			Online and offline delinquents		
	b	se	sig.	b	se	sig.	b	se	sig.	b	se	sig.
Intercept	62.4			6.7			19.5			11.3		
Individual domain												
Self-control												
Promotive	11.4	3.7	cc; dd	-1.5	1.8		-5.2	2.9	aa	-4.6	2.3	aa
Risk	-15.9	4.3	bb; dd	5.2	2.4	aa; c	0.9	3.1	b; dd	9.8	2.7	aa; cc
Alcohol weekend days												
Risk	-11.5	5.0	cc	2.5	2.5		7.5	4.0	aa	1.6	2.5	
Drug use												
Risk	-23.8	7.7	cc; dd	-2.1	2.6	d	14.0	6.2	aa	11.8	4.9	aa; b
Gaming												
Risk	1.3	3.7		2.6	1.8	dd	-1.2	2.8		-2.7	1.9	bb
Attitudes towards crime												
Promotive	20.5	3.8	bb; cc; dd	-2.9	1.8	aa	-7.5	3.1	aa; d	-10.1	2.0	aa; c
Risk	-12.3	3.7	cc; dd	-1.8	1.5	dd	4.2	2.9	aa; dd	9.9	2.4	aa; bb; cc
Family domain												
Parental emotional warmth												
Risk	7.0	4.2	c	-0.5	1.9		-5.7	2.9	a	-0.8	2.2	
Friend domain												
Friends' delinquent behavior												
Risk	-29.7	3.2	bb; cc; dd	3.3	1.7	aa; dd	9.5	2.6	aa; dd	16.8	2.4	aa; bb; cc
School domain												
Satisfaction with school												
Promotive	0.4	3.7		0.7	1.8		1.3	3.0		-2.3	2.2	
Risk	-10.6	4.2	cc; dd	-1.7	1.7	cd	7.5	3.4	aa;b	4.8	2.4	aa; b
Gender (1=female)	5.1	3.7	ccc	2.9	1.8	cc	-9.7	2.8	aa; bb; dd	1.7	2.0	cc
Age (1= 16 and 17-year-olds)	8.3	3.7	c; d	-1.1	1.7		-4.1	2.8	a	-3.1	1.9	a
Ethnicity (1=Non-native)	-8.5	3.6	cc	0.7	1.6		6.1	2.6	aa	1.7	1.9	

Significant differences between the groups are indicated with the letters a through d.
One letter = p<0,1; Two letters = p<0,05

We found non-delinquents to have the lowest risk profile regarding the presence of promotive factors and the absence of risk factors. This holds true in particular for factors in the individual, friend, and school domain. Within the family domain, we found only one factor that significantly distinguished non-delinquents from offline delinquents.

Compared to non-delinquents, online delinquents were found to have a more severe risk profile. Low levels of self-control and having delinquent friends were associated with a higher likelihood of belonging to the group of online delinquents than the group of non-delinquents. Juveniles who disapprove of delinquency were more likely to belong to the group of non-delinquents.

A few differences were observed between the group of online delinquents and the group of offline delinquents. Juveniles with low levels of self-control were found to have a higher probability of belonging to the group of online delinquents than belonging to the group of offline delinquents. Furthermore, the group of online delinquents contained a higher percentage of girls. Having low satisfaction with school, on the other hand, was associated with a higher probability of belonging to the group of offline delinquents than to the group of online delinquents.

More differences were found between the group of online delinquents and the group who reported both online and offline offenses. Online delinquents were more likely to play video games as compared to the combination group. However, online delinquents were characterized by a lower likelihood of using drugs, approving of delinquency, having delinquent friends, and having low satisfaction with school. As such, these findings suggest

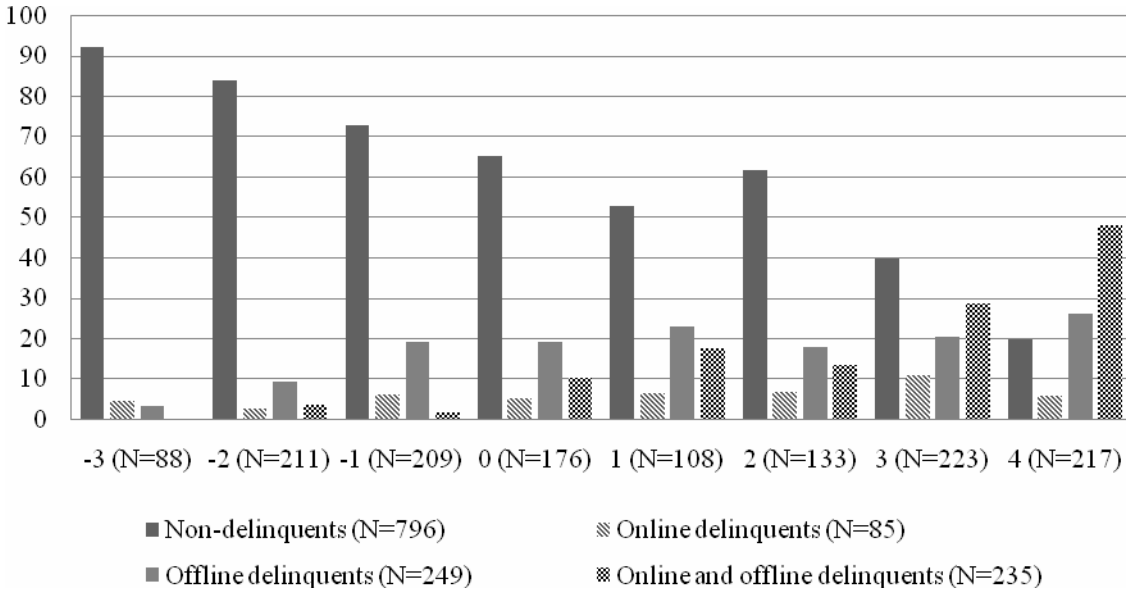
that online delinquents have a less severe risk profile compared to juveniles who reported both online and offline offenses.

The group of offline delinquents and the group who reported both online and offline offenses differ from each other on several characteristics. Juveniles in the combination group were found to have a higher likelihood of having low levels of self-control, of approving of delinquency, and of having friends that are engaged in delinquency. In addition, the combination group contained a higher percentage of girls compared to the group of offline delinquents.

3.5 The counterbalancing effect of promotive factors on risk factors

Lastly, we examined the counter-balancing effects of promotive factors on risks across the four domains by calculating an overall cumulative promotive-risk scale. Figure 1 shows for each score on of the overall scale, the percentage of non-delinquents, online delinquents, offline delinquents, and those who reported both online and offline offenses.

Figure 1. The overall cumulative risk-promotive scale for four groups of delinquents.



The results suggest that the more promotive and fewer risk factors, the higher the percentage of non-delinquents. This corroborates the findings of earlier studies that have used this overall risk-promotive scale (e.g., Stouthamer-Loeber et al., 2002; Van der Laan et al., 2010). For offline delinquents and those who reported both online and offline offenses an inverse relationship was found: the more risk and fewer promotive domains, the higher the percentage of offline delinquents and juveniles who reported both online and offline offenses. The online delinquents fell in-between the other groups: the percentage of online delinquents only increased slightly with more risk and fewer promotive domains.

Together, these results support our previous findings: online delinquents have a more high-risk profile than non-delinquents, but a less high-risk profile compared to juveniles who report both online and offline offenses.

4. Discussion

The purpose of the current study was to identify differences between digitized delinquents and cyber delinquents, and to examine differences between them and traditional, offline delinquents. For these purposes, we used data from the 2015 wave of the Youth Delinquency Survey (YDS), a cross-sectional study with a national probability sample of juveniles aged 12 to 17 years in the Netherlands, containing detailed information on both self-reported online and offline delinquency, and risk and promotive factors.

The results of our study suggest differences between juveniles who reported only online offenses and juveniles who also reported offline offenses, regarding risk and promotive factors. Juveniles who report both offline and online offenses have the most high-risk profile, in comparison to juveniles who only commit online offenses and juveniles who only commit offline offenses. This finding supports the assumption that the risk factor model primarily provides an explanation for more serious delinquency (Loeber et al., 2008). Furthermore, evidence is found for a counter-balancing effect of cumulative risk and promotive factors. The more risk domains and fewer promotive domains that were experienced, the higher the percentage of juveniles that committed both offline and online offenses. This implies that for these juveniles, preventions and interventions across multiple domains are required. Within the group of online delinquents, juveniles who commit both cyber and digitized offenses had the highest risk profile.

Our findings suggest that cyber delinquents are a distinct group from online delinquents. Cyber delinquents have the least severe risk profile: they report more promotive factors and fewer risk factors compared to other groups of online delinquents. Furthermore, cyber delinquents are the group least likely to also commit offline offenses. These findings support the findings of Yar (2005b), and Bossler and Burruss (2011). They too found mixed support for the applicability of traditional theories to cyber-dependent delinquency. As such, our results imply that whilst traditional criminological theories can be used for explaining cyber-enabled delinquency, new theories may be needed for the explanation of cyber-dependent delinquency.

Our finding that online delinquents, and cyber delinquents in particular, have the lowest risk profile in terms of risk and promotive factors may, however, indicate a lack of relevant risk factors to characterize these delinquents. To determine profiles of online delinquents we relied on the existing risk factor model (Loeber et al., 2008). This model was designed for understanding why juveniles commit offenses offline, but not necessarily online. The results of our study suggest that some of these risk factors do apply to self-reported online delinquency. Yet, in particular for cyber delinquents, we found few significant associations with the risk and promotive factors. This supports the suggestion that delinquents of cyber-dependent offenses are in need of a typological approach that specifically explains this type of delinquency (Capeller, 2001). However, instead of, as some have suggested, developing a new theory, an alternative approach is to expand the risk factor model to include a digital domain. Digital risk and promotive factors, such as social media use, digital activities, and programming skills, are often related to cyber-dependent delinquency (Bossler & Burrus, 2011), but are mostly missing in research on

online delinquency. In addition, in order to verify whether our results hold when using data sources other than self-reported data, we recommend future studies investigate how police and judicial records can be used to distinguish offline delinquency from online delinquency. Furthermore, it would be of interest to explore whether alternative (online) sources, such as data from social media, can be used to measure or predict online delinquency.

Conclusion

In conclusion, the results of this study provide a first insight into the differences between juvenile delinquents of cyber-enabled and cyber-dependent offenses, and into the extent to which they differ from traditional offline delinquents. Based on self-report data from a national probability sample of Dutch juveniles, we showed that juvenile cyber delinquents are a distinct group compared to juvenile digitized delinquents and to juveniles who report both cyber and digitized offenses. Given that the prevention and treatment of juvenile delinquency is primarily focused on traditional offenses, it remains to be seen whether existing interventions are also effective in preventing juveniles from committing cyber-dependent offenses.

Limitations and Directions for future research

Although this is the first comprehensive study on the characteristics of juvenile online delinquents using a national probability sample of juveniles, the findings and implications should be viewed in light of some limitations. First, the data we used are based on self-report data. Self-report data has the advantage that it supplies information on delinquency that is not known to the police or justice system. However, the use of self-reports also has limitations. For instance, juveniles maybe reluctant to reveal criminal activities, which may lead to an under-representation of more serious forms of delinquency (Weijters, Van der Laan & Kessels, 2016). Moreover, self-reports may be affected by respondents' recall errors, if a long period of time since the delinquent act has elapsed (Junger-Tas & Haen Marshall, 1999). Second, the cross-sectional nature of this study precludes temporal inferences. As such, the various risk and promotive factors may not only cause juvenile delinquency, but they may also be the result of juveniles' engagement in delinquency. It is feasible, for instance, that juveniles who commit offenses develop a more positive attitude towards delinquency. In addition, in criminological literature, there is an ongoing debate on whether peer delinquency is a cause or consequence of delinquent behavior (Weerman, 2011). To study temporal order, longitudinal data are required. Lastly, although many of the factors in previous research were also addressed in the current study, we knew little about the internet behavior of juveniles. In various studies, different aspects of internet behavior have been identified as strong predictors of online risk behavior among juvenile delinquents (Kerstens & Veenstra, 2015). With this in mind, we recommend future research specifically focuses on factors that are related to online behavior.

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