KrimOJ Kriminologie – Das Online-Journal
Criminology – The Online Journal

No. 2/2020

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Social Media and Delinquency: Exploring the Relation between Online and Offline Interaction with Friends and Online and Offline Delinquency

This study explores the relation between online exposure to delinquent behaviour and time spent online with peers on adolescents' (traditional and digital) delinquent behaviour, controlled for offline exposure to delinquent peers and time spent offline with peers. Survey data were collected among two small samples of adolescents: one of 132 mostly older adolescents (M = 18.6, range = 15-27), and one of 66 younger and low educated youths (M = 16, range = 15-17). The results suggest that for the younger adolescents, online interaction with peers on social media may have a substantial influence on traditional as well as digital delinquent behaviour, but for the older adolescents no statistically independent effects for the online peer variables were found. The study not only warrants further research but also demonstrates the usefulness of new methods and approaches to investigate online as well as offline communication with peers and exposure to peer delinquency.

Keywords: delinquency, social media, peer relations, cybercrime, online interaction, adolescence

Soziale Medien und Jugenddelinquenz: Erkundung der Beziehung zwischen Online- und Offline-Interaktion mit Freund*innen und Online- und Offline Jugenddelinquenz

In dieser Studie wird die Auswirkung von Online-Konsum kriminellen Verhaltens Gleichaltriger und die Zeit, die Jugendliche online mit Freund*innen verbringen, untersucht auf (traditionelle und digitale) Jugenddelinquenz. Dabei wird nach Offline-Einwirkung von delinquenten Gleichaltrigen und Offline-Beschäftigungsdauer mit Freund*innen kontrolliert. Umfragedaten wurden mithilfe von zwei kleinen Stichproben erhoben: die erste besteht aus 132 meist älteren Jugendlichen (M = 18.6, range = 15-27), die zweite aus 66 jüngeren Jugendlichen mit niedrigem Bildungsstand (M = 16, range = 15-17). Die Ergebnisse deuten darauf hin, dass die Online-Interaktion mit Gleichaltrigen in sozialen Medien für die jüngeren Jugendlichen einen erheblichen Einfluss sowohl auf das traditionelle als auch auf das digitale Delinquenzverhalten haben kann. Im Falle der älteren Jugendlichen wurden keine statistisch unabhängigen Effekte für die Online-Gleichaltrigen-Variablen gefunden. Die Studie rechtfertigt nicht nur die weitere Erforschung dieser Thematik, sondern belegt auch den Nutzen neuer Methoden und Ansätze zur Untersuchung der Online- und Offline-Kommunikation mit Gleichaltrigen und der Einwirkung kriminellen Verhaltens durch Gleichaltrige.

Schlagwörter: Jugenddelinquenz; soziale Medien; Freundschaften; Cyberkriminalität; Online-Interaktion; Adoleszenz

https://doi.org10.18716/ojs/krimoj/2020.2.11

1. Introduction

The internet has developed from a place to find and place information to a more open, interactive and user-generated 'Web 2.0'. (O'Reilly, 2007; Beer & Burrows, 2007). It has become one of the most important contexts for social interaction between people (boyd, 2014). In particular adolescents are attracted by social media applications like Facebook, Instagram and Snapchat. In the Netherlands, almost all young people between 12 and 25 years old use at least one type of social media (Van der Veer et al., 2018). In 2015, more than half of the young people used social media between one and three hours a day, and 8 % more than 5 hours a day (Kloosterman & Van Beuningen, 2015).

Social media promise plenty of rewards and opportunities, such as self-expression, identity formation and intimacy. But there are also risks, such as cyberbullying and exposure to harmful content. As social interaction between adolescents increasingly takes place online and may even replace face-to-face interaction in some cases, it is important to understand its consequences for adolescents' behaviour and psychosocial development (Subrahmanyam & Šmahel, 2011; Valkenburg & Piotrowski, 2017). Researchers in the field of criminology have raised the question what online interaction through social media would mean for delinquent behaviour among adolescents (Mikami et al., 2010; Warr, 2002; Weerman et al., 2015). Not only does it offer new opportunities to commit offenses, it also means that adolescent peers may influence each other's delinquent behaviour online, in addition to offline influences.

It is well-known from previous research that having delinquent peers and spending much time socializing with peers is related to an increased probability of delinquent behaviour (Warr, 2002; Hoeben et al., 2016). But whether this is also the case in the online world is largely unexplored. It is possible that online peer processes are merely an extension of what peers already do offline, but peer interaction through social media may also enhance offline processes or have an influence on its own. And what peers do online may have consequences for their offline behaviour, and vice versa, offline interaction may also lead to online offending. The rise of social media and the digital world has strongly complicated the relation between peers and delinquency, and it is necessary to get a detailed understanding of these new dynamics between peers and delinquent behaviour in the online and offline world.

However, despite the tremendous increase in social media use by young people, research on its meaning for juvenile delinquency is still in its infancy. To date, there are only a handful of studies that explored what online interaction with peers means for delinquent behaviour. Some researchers focused on the relationship between online exposure to delinquent or deviant peers on social media and adolescents' own drinking (Huang et al., 2014; Moreno et al., 2012) or delinquent behaviour (McCuddy & Vogel, 2015a; McCuddy & Vogel, 2015b). Other studies focused on the relationship between spending time in online communication with peers and delinquent behaviour (Meldrum & Clark, 2015; Weerman et al., 2015).

Despite these pioneering studies, however, it is unclear whether online exposure to delinquent behaviour has unique effects on adolescents' own delinquent behaviour, or whether there is substantial overlap with the effects of offline exposure to delinquent peers. Also, no study has yet simultaneously investigated online as well as offline exposure to delinquent peer behaviour and unstructured time spent with peers, and its relation with offline as well as online types of delinquency.

The current study investigates these issues through an exploratory survey study among two small samples of Dutch adolescents. One sample consists of 132 respondents from various classes of three secondary schools and one tertiary school, and one dataset includes 66 respondents from one school grade in one urban secondary vocational school. The survey questionnaire was specifically designed to answer the following research question: To what extent are exposure to delinquent behaviour on social media and spending time communicating online with peers related to adolescents' own (offline as well as online) delinquent behaviour – independent from offline interaction with peers? By distinguishing behaviour of peers and time spent with peers, and taking into account (online and offline) context specificity, it becomes possible to connect the results to three different types of peer processes: influence (or socialization), selection and situational processes. Although the study has various limitations (in particular the small and non-representative samples, and the lack of longitudinal data), its findings provide a first indication whether these three different peer processes may also apply to online interaction with peers. It also offers methodological advancement by introducing new ways of measuring exposure to offline as well as online peer delinquency.

2. Peers and Delinquent Behaviour

There is a rich history of criminological research on the relation between peers and delinquent behaviour (see Akers et al., 1979; Haynie, 2001; Haynie, 2002; Hoeben, Meldrum, Walker & Young, 2016; Pratt et al., 2010; Warr, 2002). Having delinquent peers is often regarded as one of the strongest predictors of delinquency among adolescents (Agnew, 1991; Warr & Stafford, 1991), but also spending time with peers in general is related to delinquent behaviour – in particular under unstructured, public and unsupervised conditions (Hoeben, 2016; Osgood et al., 1996; Weerman et al., 2015). While these associations are well documented in the literature, there is an ongoing debate about the underlying mechanisms (see e.g., Knecht et al., 2010; Matsueda & Anderson, 1998; Osgood, Feinberg & Ragan, 2015; Weerman, 2011). Three major perspectives can be distinguished (see Beier, 2014, Weerman, Wilcox & Sullivan, 2018).

The social influence or *socialization* perspective assumes that social influence mechanisms lead adolescents to become delinquent when they have many delinquent peers relative to non-delinquent peers. The classic example of this perspective is Sutherland's (1939) differential association theory. According to Sutherland, people will have a higher probability to commit offenses if their intimate social network contains an excess of "definitions" favourable to delinquency over definitions unfavourable to delinquency. Differential association theory implies that changes in friendship networks of adolescents may result in more or less delinquent behaviour. A more recent example of this perspective is social learning theory (Akers et al., 1979). This theory also assumes that delinquent behaviour is learned through social contacts, not only through the transmission of "definitions", but also by differential behavioural reinforcement by others, and through imitation of delinquent behaviour for which others get rewarded.

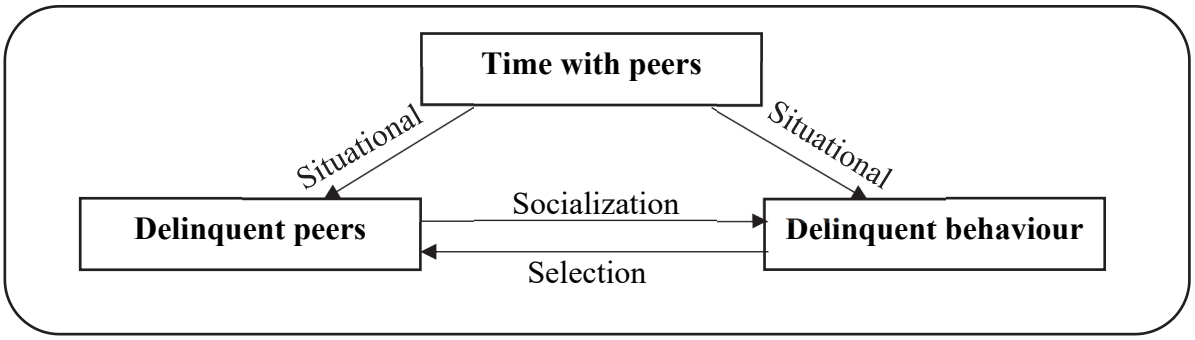
The social *selection* perspective on peers and delinquency posits that the relation between peers and delinquency is not a causal one but the result of friendship preferences. Delinquent adolescents are assumed to select other delinquents as their friends more often, and conversely, non-delinquent adolescents would select other non-delinquents as their friends. The classic example of this perspective is Hirschi's (1969) social control theory, in which an absent or weak bond to society is seen as the main cause of delinquency, and delinquent peers as a

consequence of delinquent behaviour. Another example is the general theory of crime, in which a lack of self-control is the most important explanation of delinquency (Gottfredson & Hirschi, 1990). Individuals with low self-control enjoy similar (risky) activities of all kinds, and low self-control adolescents may prefer to become friends with similar peers or "end up" with similar peers because of socialization problems they experience (Gottfredson & Hirschi, 1990). The underlying assumption in both theories is that (non-)delinquent adolescents make friends that behave similarly. Scholars of this perspective sometimes refer to the saying: "*birds of a feather flock together*" to indicate the process of selection (Glueck & Glueck, 1950; Hirschi, 1969).

The *situational* perspective states that situations or contexts in which adolescents spend time together can cause adolescents and their peers to behave delinquent. One example of this perspective is Osgood et al.'s micro-level adaptation of routine activity theory (Osgood et al., 1996; Osgood & Anderson, 2004). The underlying assumption of this approach is that situations in which peers are together and adult supervision is absent often enhance inducements and opportunities to commit crimes. The availability of unstructured time, the presence of possible co-offenders and the lack of capable guardians can tempt adolescents into delinquent behaviour. According to the theory, it is the contextual situation that explains their delinquent behaviour by increasing opportunity and situational inducements (see also Gerstner & Oberwittler, 2018). Importantly, this means that peers do not have to be delinquent themselves to become a criminogenic factor. Collective processes like anonymity, diffusion of responsibility, and rowdiness may further enhance delinquent behaviour in groups of young people (Warr, 2002).

In summary, all three perspectives suggest that there is a relationship between peers and delinquent behaviour, but they differ from each other in the presumed causal mechanisms behind this relationship. Social influence explanations predict that adolescents have an increased chance to be delinquent when they are exposed to the delinquent behaviour of their peers. Social selection explanations assume that delinquent adolescents have an increased chance to make delinquent friends, but that delinquent behaviour itself is caused by other factors. And scholars from the situational perspective anticipate that spending time with peers under unstructured and unsupervised conditions explains the delinquent behaviour of both adolescents and of their peers. Figure 1 graphically depicts these differences.

Figure 1. Visualization of theoretical perspectives on peers and delinquent behaviour



Of course, each of these causal paths may be present in reality and empirical research finds evidence for all of them (e.g., Haynie & Osgood, 2005; Osgood, Feinberg & Ragan, 2015). This

is one of the reasons that integrative perspectives in criminology combine causal paths that are depicted in Figure 1, e.g. Interactional Theory (Thornberry, 1987) and Situational Action Theory (Wikström et al., 2017). Nevertheless, it is useful to distinguish these paths and investigate which of them is most salient. Only a few studies have investigated each of the three perspectives in concert. Beier (2014) found support for socialization as well as situational mechanisms; and Weerman, Wilcox and Sullivan (2018) found evidence for selection and situational mechanisms but not for socialization. No study yet, investigated these perspectives together with regard to the relation between online peers and delinquency.

3. Previous Research on Social Media and Delinquent Behaviour

As mentioned in the introduction, there is not much research done that is focused on the relation between online interaction with peers on social media and delinquent behaviour. Most of what is available on the online context of delinquency does focus on the internet as a facilitator of cybercrime and cyber-victimization (Holt & Bossler, 2014; Leukfeldt, Kleemans & Stol, 2016; Jewkes & Yar, 2013). These studies focused on the role of online fora and existing criminal networks for cybercrimes among adults, but did not shed light on the role of peers in cyber delinquency among adolescents. There are also several studies that investigated the social media use of gang youth. Pyrooz, Decker and Moule (2015) employed a survey among current-, former- and non-gang members to examine both general and deviant online behaviour on social media. Interestingly, their study suggests that gang members might be using social media even more than non-gang members. Other scholars qualitatively examined social media posts of gang members and problem youth (e.g., Patton, Eschmann & Butler, 2013; Van den Broek, 2013; Storrod & Densley, 2017; Van Hellemont; 2012). Gang members' online behaviour seems to be primarily focused on fulfilling symbolic and social needs, in particular to show "gangness" and gain status (e.g. Van Hellemont, 2012). Often, violent and aggressive behaviour on the internet remains a 'performance' that broadcasts messages to peers and competing groups, but sometimes it fuels violent encounters in the offline world (Lauger & Densley, 2018). In some instances, instrumental motives also play a role in online displays of deviant and delinquent behaviours (Storrod & Densley, 2017).

Recently, a few studies explicitly investigated the relation between online exposure to deviant and delinquent posts on social media and problem behaviour offline (Huang et al., 2014; McCuddy & Vogel, 2015a/b; Moreno et al., 2012). Moreno et al. (2012) used a survey to examine whether high school students' own alcohol consumption is related to exposure to social media pictures of drinking friends. They found that adolescents who are more exposed to such pictures also drink more alcohol themselves. Huang et al. (2014) confirmed this finding and were able to control for past drinking behaviour, which excludes social selection explanations at least to some extent. McCuddy and Vogel (2015a, 2015b) examined more serious types of delinquency, like violence and theft. They employed a survey among university students to examine the relationship between exposure to eight types of offline delinquency on social media and the same eight types of delinquent behaviour as reported by respondents themselves. Their findings suggest that adolescents, who are more exposed to delinquent peers on social media, also commit more offenses themselves. McCuddy and Vogel did not control for offline exposure to delinquent peers, but advise to do so in future research. Digital delinquent behaviour was not included in their study.

Other researchers investigated the relationship between spending online time with peers and traditional delinquency. As part of a larger research project on the situational aspects of delinquent behaviour, Weerman et al. (2015) examined online time spent with peers. They found that spending more time online with peers is correlated with higher levels of participation in offline delinquency. However, this effect disappeared when offline unstructured socializing was controlled for. Meldrum and Clark (2015) did a similar study. Yet, they found that online time spent with peers is related to relatively high levels of offline delinquency, independent from offline time with peers. It is thus still unclear whether online time spent with peers has any unique effects on delinquent behaviour, or whether there is substantial overlap with the effects of offline time spent with peers. McCuddy and Vogel (2015a/b) did also include time spent on social media, but found no significant effect apart from exposure to delinquent posts on social media. Their study did not include controls for offline time spent in unstructured socializing. Further, all three studies on online time spent with peers did not include online forms of delinquency.

In short, the existing literature suggests that exposure to delinquent peers on social media and, to a lesser extent, spending online time with peers may be related to increased delinquent behaviour. Still, it is unclear how salient these relationships are, whether they also apply to online delinquency, and whether these can be interpreted as unique effects independent from offline peer influences.

4. Current Study and Hypotheses

The current study contributes to the existing literature in several ways. First, the current study examines both traditional and digital delinquent behaviour. This is in line with recommendations of Meldrum and Clark (2015), and allows us to investigate in which contexts different relationships between peers and delinquency exist. Second, as advised by McCuddy and Vogel (2015a, 2015b), this study includes both online and offline peer variables. Third, we include newly developed measures of online and offline exposure to delinquent peers as well as measures of online and offline time spent with peers. Fourth, our methodology enables us to explore directly or indirectly the validity of all three theoretical perspectives on peers and delinquency with cross-sectional data. We follow a similar approach as Beier (2014), who also used cross-sectional data on peers and delinquency in different contexts to test for additive effects of context specificity (but in his case within and outside school, instead of online and offline). Based on the three theoretical perspectives and the specific features of social media, several hypotheses are formulated that can be evaluated with the collected data.

The social influence / socialization perspective predicts that adolescents increasingly commit offenses when more of their friends approve such behaviour or show it to them. Communication on social media may facilitate and further enhance these processes, when friends post pictures or messages about their actual or suggested involvement in delinquency. This means that social media are an additional source of exposure to delinquent behaviour or 'delinquent definitions', next to actual offline exposure and communication. Further, adolescents may be exposed to delinquent behaviour of a much wider group of friends on social media than offline. These may be friends with whom they have weaker ties in the offline world and also unique friends with whom they only communicate on social media – peers they rarely or never meet

face-to-face. This would present again a source of delinquent influence / socialization that is additional to that of offline peers.

Therefore, it is expected that: Adolescents who are more exposed to posts of delinquent behaviour on social media, also commit more traditional and digital delinquent behaviour themselves – independent of offline exposure to delinquent behaviour of peers (H1). Findings that are in line with this hypothesis would provide initial support for online influence / socialization processes.

The situational perspective predicts that unstructured and unsupervised socializing with peers is related to delinquent behaviour among adolescents, even when those peers are non-delinquent. Social media offers an alternative way of socializing beyond hanging around in public places or in nightlife, as it allows adolescents to talk to their friends at any time and at any place. Online time spent with peers has many similarities with offline unstructured socializing, because adult supervision is usually absent and online communication with peers could enhance group processes, thus leading to inducements and opportunities for crime. These processes occur in the virtual presence of a peer group as much as in public space. A deviant or delinquent idea or suggestion posted online may easily spread around through social media and then quickly lead to action. This would not only be true for online offenses, but also for offline crimes. Although the latter may take a while to occur in reality, the processes leading to them would still be situational. Further, as we have seen in research on online behaviour of gang members, hanging around on the internet can also lead to online performances of 'gangness' that often lead to actual acts of delinquency and violence offline.

Therefore, it is expected that: Adolescents who spend more online time with peers on social media, also commit more traditional and digital delinquent behaviour – independent of how much offline time they spend with peers in unstructured socializing (H2). Findings in line with this hypothesis provide support for online situational processes that affect delinquency.

The social selection perspective predicts that delinquent adolescents will make delinquent friends relatively often, but that delinquency itself, and deviant behaviour more generally, is caused by other factors. This would mean that the same causal factors are in play for different types of delinquent behaviour in different situations. Phrased differently, the social selection perspective assumes cross-situational continuity of problem behaviour, and no specific offline or online peer effects (Beier, 2014). This would directly imply a strong association between online and offline delinquency. The social selection perspective would also imply that delinquent friendship choices are based on one's own general behavioural tendencies and characteristics, and this would apply to offline as well as online friendships. This would result in a strong association between offline and online exposure to delinquent peers. Following this perspective, there should be no independent effect of online interaction with peers. Therefore, it would be expected that: Spending online time with peers and exposure to delinquent behaviour on social media are related to adolescents' own traditional and digital delinquent behaviour – but the relation between online peer interaction variables and delinquency will disappear or reduce when controlled for offline time spent with peers in unstructured socializing and offline exposure to delinquent behaviour (H3). The selection perspective is supported if the findings are in line with hypothesis 3.

5. Methods

To investigate our hypotheses, we conducted two relatively small surveys specifically aimed at developing and employing new measurements for investigating the relation between online communication with peers and delinquency. The two surveys included the same questionnaire items but differed in the background of the respondents and the way in which they were recruited. Analysis of the resulting two datasets offer insights in potential differences between different populations of adolescents and modes of data collection. Therefore, the datasets were analysed separately instead of combined together. However, we did perform an extra analysis on a combined dataset, to have the benefit of more statistical power. The results are mostly in line with the findings of the second dataset, and can be found in Appendix 1.
Before collecting the data, we obtained approval for our research design from the Ethics Committee for Legal and Criminological Research (CERCO) at VU University Amsterdam. Both schools and parents of the students were informed about the goals and methods of the study. Parents as well as the approached students could refuse participation in the study. The data were only collected through the surveys and not through (unsolicited) observation of social media profiles. In this way, both harm-based and dignity-based approaches of privacy protection were respected (Zimmer, 2010). The survey questions and other research materials are available upon request.

5.1. Study 1: convenience / older sample

A sample of 132 older adolescents (with an average age of 18.6 years) was obtained through an online survey during the spring of 2016. Participants were recruited via three Dutch secondary schools and one tertiary school (MBO) located in the western part of the Netherlands. We aimed to include students between approximately 16 and 20 years old, as offending is relatively common in this age group (Moffitt, 1993).
Participating students were approached with an advertising message through their school e-mail addresses. In this way, practically no personal information was needed to invite students and minimal effort was required from the schools. The invitation e-mail included information on both content and procedures of the study, emphasizing voluntary participation, anonymity and data security. The same information was repeated on the first page of the online survey. Before starting with the survey questions, respondents were asked to indicate that they understood this information and wanted to participate in the research. It took respondents on average fourteen minutes to finish the survey. As an incentive, they could win a smart camera and register for a summary of the research results. In total, 162 persons reacted on the e-mail and completed the survey (representing around 8 % of all students that received the announcement). After selection on missings, n = 132 respondents were included in the analyses[1].

[1] Since only formative and no reflective measures were used in this study, it was not possible to apply imputation techniques. Most missings were due to the category "don't know" on time use variables.

5.2. Study 2: school-administered / younger sample

To retrieve a sample with a higher response rate than in study 1, we conducted the survey in study 2 in class during school hours. We were able to survey a complete age cohort of 66 respondents (with an average age of 16 years) from three classes from the same year in one school at the end of 2016. The participants were from a pre-vocational secondary school in a large city in the western part of The Netherlands, including relatively many adolescents from ethnic minority backgrounds and disadvantaged neighbourhoods. This provided a sample with a relatively high risk on delinquent behaviour and potential offline and online peer influences – participants who may be less inclined to respond to a survey sent to them through their school e-mail (the sampling approach in Study 1). We carried out the data collection ourselves and introduced the questionnaire to the students to minimize effort for the schools. Again, we provided ample information about content and procedures of the study but we did not collect or asked for identifying information about the participating students. In total, 106 respondents completed the survey in Study 2 (representing a 100 % response rate of the students that were present during data collection). After selection on missings, n = 66 respondents were included in the analyses.

5.3. Measurements

We constructed a short questionnaire that included enough items to construct valid and reliable indicators of two dependent variables (traditional and digital delinquent behaviour) and six independent variables (offline and online time with peers; offline and online exposure to traditional delinquency, and offline and online exposure to digital delinquency).

Traditional delinquency. The first dependent variable was self-reported traditional delinquent behaviour (street crime) in the months since new-year in Study 1, and the months since the beginning of the school year in Study 2. Both periods refer to a period that roughly corresponded to the past three months. Respondents were asked to self-report their offenses in four categories: violence (intentionally hurting someone), theft (from a person or store), vandalism (damaging street objects), and trespassing (entering a building or area without permission). These offenses are relatively common in the selected age group (Van der Laan & Goudriaan, 2016) as compared to other types of delinquent behaviour. In the analyses, the initial answering categories (zero times, one time, two to three times, four to five times, six or more times) were recoded to a binary variable that indicates whether an offense was committed or not. These binary categories were then summed to create a variety scale for self-reported traditional delinquency[2]. The advantage of using a variety scale over the number of offenses in each separate category is a higher reliability and validity of the offending scale (Bendixen, Endresen & Olweus, 2003; Sweeten, 2012).

Digital delinquency. The second dependent variable was self-reported digital delinquent behaviour (cybercrime) in roughly the past three months. A variety scale was compiled, similar to traditional delinquency, by summing whether or not offenses were committed in four categories: cyberbullying/threats (posting mean or threatening messages to someone online), illegal downloading (internet piracy), cyber-vandalism (disrupting a website or app), and cyber-

[2] Since the measures in this study compiled from multiple indicators can be regarded as formative, instead of reflective, it is not meaningful to calculate internal consistency values.

trespassing/hacking (of someone's online account or computer system). These categories were formulated in such a way that they represent digital equivalents to the traditional delinquency items. Cyberbullying is an online version of violence, illegal downloading is an online version of theft, cyber vandalism an online version of vandalism, and cyber trespassing/hacking an online version of trespassing.

Offline time spent in unstructured socializing. To measure face-to-face time spent with peers in unstructured and unsupervised socializing, respondents were asked how many hours per day they hang around in public spaces (street, shopping centre, park) and how many hours per week they participate in nightlife (bar, club, party). There were seven answering categories: (1) less than an hour, (2) one to two hours, (3) two to three hours, (4) three to four hours, (5) four to six hours, (6) six to eight hours, (7) more than eight hours. Nightlife participation was converted from hours per week to hours per day, after which the items were summed. These items were based on previous research by Weerman et al. (2015).

Online time spent on social media. To measure the amount of time that is spent with peers on social media, respondents were asked: "How much time do you spend on social media on a typical day?" This question followed the measurement of Kloosterman and Van Beuningen (2015), but the answering categories, the same as for offline time spent in unstructured socializing, were a bit more detailed.

Offline exposure to peer delinquency (traditional and digital). To measure offline exposure to peer delinquency, we departed from the usual measurement method to ask respondents whether they have friends who engage in particular types of delinquency. Such a measurement indicates a respondents' perception of peer delinquency instead of true involvement of peers in offending. Of course, what adolescents believe about their friends, may also influence their behaviour. However, to investigate socialization processes like transmission of delinquent attitudes, delinquency reinforcement and imitation, it makes more sense to measure more directly whether respondents have actually observed delinquent behaviour of their friends or communicated about it. Further, perceptual measurements of peer delinquency may be biased since people tend to project their own behaviour onto others. This means that it partly measures respondents' own delinquency instead of that of his or her peers (see e.g., Weerman & Smeenk, 2005; Young et al., 2011; Young & Weerman, 2013). Therefore, in our study respondents were asked how often they had actually seen friends commit an offense in real life or heard about it directly from them. We used the same offense categories as for self-reported delinquency. Such specific observations are less susceptible to projecting own delinquent behaviour onto peers. To provide a reference point, an introductory question explained what is meant with face-to-face friends ("people you frequently see in person and hang out with") and asked how many friends respondents have. With the answers, two variety scales were compiled by summing the items for offline exposure to delinquent peers: one for traditional and one for digital delinquency.

Online exposure to peer delinquency (traditional and digital). Respondents were asked how often they had seen or read on social media that friends committed an offense in the same categories as for the self-reported delinquency scales. Similar to the measures for offline exposure to peer delinquency, two variety scales were constructed: one for online exposure to traditional delinquency and one for online exposure to digital delinquency. As a further way to prevent projection of own behaviour, we specifically asked what respondents observed on social media, for example, pictures and status updates indicating delinquent behaviour by peers (see Appendix 2).

Three demographics were included as control variables: sex (male = 1), age (measured in years) and ethnicity (distinguishing a Dutch from other backgrounds). A Dutch background was indicated by having both parents born in the Netherlands, and a non-Dutch by having at least one parent born in another country.

5.4. Analytic Strategy

After reporting the descriptive statistics, a Kendall's Tau-b correlation matrix is presented. This coefficient is a robust alternative to Pearson's product-moment correlations, and is more applicable because of the small sample size and negatively skewed distributions of both dependent and independent variables. To analyse independent relations, negative binomial regression models were estimated, as the variances of the count-based delinquency scales were proportional to their mean. Most respondents reported that they did not commit any of the traditional or digital offenses. We also ran various other types of models, e. g., Tobit regression and other models from the Poisson family. Overall, the results remained the same and therefore only findings from the negative binomial regression analyses are reported. We included a relatively small number of variables in the estimations (only the relevant peer variables and three control variables) to prevent the models to become too complex for our relatively small sample sizes. This resulted in a satisfactory model fit for the various estimations.
The coefficients that resulted from the regression models signify the expected log count of the dependent variables for a one-unit increase in the independent variables. Exponentiation of these coefficients creates the incident rate ratio (IRR), which will be discussed in the results section as it allows for more straightforward interpretation than expected log counts. An IRR greater than 1.00 means a positive effect and an IRR smaller than 1.00 means a negative effect.

6. Results

6.1. Descriptives

Table 1 reports descriptive statistics of all variables which are used for the analysis. In Study 1 (the mid-adolescent sample), 24.2 % of respondents committed at least one traditional offense, and 49.2 % committed at least one digital offense, mostly downloading something illegally. In Study 2 (the older sample), the prevalence of traditional delinquency was much higher. Here, 54.2 % of respondents committed at least one traditional offense, and 50 % of respondents committed at least one digital offense. The mean of the variety scales in Study 1 was 0.41 for traditional offending and 0.70 for digital offending; these were higher in Study 2: 1.32 for traditional offending and 1.12 for digital offending. This means that the rate of delinquent behaviour is higher, as was expected, in the younger and low educated sample. This appears to be the case not only for offline manifestations of delinquency but also for online offenses.

Table 1. Descriptive statistics

	Study 1 (n = 132)			Study 2 (n = 66)		
	Mean	**SD**	**Range**	**Mean**	**SD**	**Range**
Dependent variables						
Traditional delinquency	0.41	0.88	0 – 4	1.32	1.50	0 – 4
Digital delinquency	0.70	0.92	0 – 4	1.12	1.44	0 – 4
Independent variables						
Online time spent on social media	3.68	1.77	1 – 7	4.79	1.88	1 – 7
Offline time spent in unstructured socializing	2.43	1.60	1.14 – 8.00	3.88	1.62	1.14 – 7.43
Online exposure to traditional delinquency	0.63	1.07	0 – 4	1.55	1.45	0 – 4
Online exposure to digital delinquency	1.07	1.15	0 – 4	1.49	1.39	0 – 4
Offline exposure to traditional delinquency	0.70	1.17	0 – 4	1.45	1.51	0 – 4
Offline exposure to digital delinquency	1.00	1.11	0 – 4	1.42	1.54	0 – 4
Control variables						
Sex (male = 1)	0.27	—	0 – 1	0.50	—	0 – 1
Age	18.55	2.27	15 – 27	15.98	0.73	15 – 17
Ethnicity						
Dutch native background	0.79	—	0 – 1	0.05	—	0 – 1
Non-western background	0.18	—	0 – 1	0.89	—	0 – 1
Western background or unknown	0.03	—	0 – 1	0.06	—	0 – 1

The amount of time spent with peers is also higher for the respondents in Study 2 than for those in Study 1, both for offline time spent hanging around with peers and online time spent on social media. On average respondents in Study 1 spent approximately one and a half hours per day in offline unstructured socializing, in Study 2 almost four hours per day. On average respondents spent around three hours per day online on social media in Study 1; in Study 2, the average time spent on social media is around four hours per day (M = 4.79, SD = 1.88).
In Study 1, offline exposure to at least one offense by delinquent peers was reported by 35.6 % of respondents for traditional delinquency and 59.8 % for digital delinquency. Again, these figures were higher in Study 2: respectively 63.6 % for traditional delinquency and 60.6 % for digital delinquency. The same pattern could be found for online exposure to at least one offense by delinquent peers. In Study 1 this was reported by 36.4 % of respondents for traditional delinquency and 62.1 % for digital delinquency, whereas in Study 2, no less than 66.7 % of the respondents reported online exposure to traditional delinquency, and 69.7 % to digital delinquency.

6.2. Correlations

Table 2 shows the Kendall's tau-b correlation matrix for the dependent and independent variables in Study 1.

Table 2. Kendall's tau-b correlation matrix for Study 1 (n = 132)

	1	2	3	4	5	6	7	8
1. Traditional delinquency	1.000	—	—	—	—	—	—	—
2. Digital delinquency	0.435***	1.000	—	—	—	—	—	—
3. Online time spent on social media	0.092	0.086	1.000	—	—	—	—	—
4. Offline time unstructured socializing	0.252***	0.116	0.163*	1.000	—	—	—	—
5. Online exposure to traditional delinquency	0.520***	0.303***	0.147*	0.221**	1.000	—	—	—
6. Online exposure to digital delinquency	0.236**	0.441***	0.027	0.087	0.372***	1.000	—	—
7. Offline exposure to traditional delinquency	0.566***	0.368***	0.064	0.179*	0.487***	0.379***	1.000	—
8. Offline exposure to digital delinquency	0.444***	0.543***	0.069	0.063	0.269***	0.470***	0.484***	1.000

Note. * $p < .05$; ** $p < .01$; *** $p < .001$

Most of the correlations are significant (which could have been expected), however, there is no significant correlation between online time spent on social media and both traditional and digital self-reported delinquency. On the other hand, online exposure to traditional delinquency has a strong positive correlation with self-reported traditional delinquency ($\tau = 0.520$). Similarly, online exposure to digital delinquency has a strong positive correlation with self-reported digital delinquency ($\tau = 0.441$). Interestingly, the correlations between online and offline exposure to traditional delinquency and to digital delinquency were high but far from perfect ($\tau = 0.487$ and 0.470). This means that, for a substantial part, respondents are differentially exposed to delinquent peers online and delinquent peers offline. The correlation between online time spent on social media and offline time spent in unstructured socializing is relatively low ($\tau = 0.163$, $p = .013$). This suggests that involvement in hanging around with peers online differs substantially from involvement in hanging around offline for most adolescents.

Table 3 shows the Kendall's tau-b correlation matrix for the dependent and independent variables in Study 2. These correlations are stronger than in Study 1. In contrast to the findings for Study 1, online time spent on social media now has a positive correlation with both traditional ($\tau = 0.251$) and digital ($\tau = 0.206$) self-reported delinquency. Online exposure to traditional delinquency has a strong positive correlation with self-reported traditional delinquency ($\tau = 0.639$) and similarly, online exposure to digital delinquency has a strong positive correlation with self-reported digital delinquency ($\tau = 0.642$). But also in Study 2, we see that the correlation between offline and online exposure to the two forms of delinquency is not absolute, though somewhat stronger than in Study 1 ($\tau = 0.748$ for traditional delinquency; $\tau = 0.718$ for digital delinquency). And again in Study 2, the relation between offline time spent hanging around and online time on social media is very weak and non-significant ($\tau = 0{,}145$).

Table 3. Kendall's tau-b correlation matrix for Study 2 (n = 66)

	1	2	3	4	5	6	7	8
1. Traditional delinquency	1.000	—	—	—	—	—	—	—
2. Digital delinquency	0.629***	1.000	—	—	—	—	—	—
3.Online time spent on social media	0.251*	0.206*	1.000	—	—	—	—	—
4. Offline time unstructured socializing	0.234*	0.225*	0.145	1.000	—	—	—	—
5.Online exposure to traditional delinquency	0.639***	0.439***	-0.005	0.193*	1.000	—	—	—
6. Online exposure to digital delinquency	0.536***	0.642***	0.166	0.190*	0.519***	1.000	—	—
7.Offline exposure to traditional delinquency	0.617***	0.441***	0.088	0.298**	0.748***	0.495***	1.000	—
8.Offline exposure to digital delinquency	0.553***	0.617***	0.134	0.309**	0.516***	0.718***	0.674***	1.000

Note. * $p < .05$; ** $p < .01$; *** $p < .001$

6.3. Multivariate models

Table 4 presents the negative binomial regression results for self-reported traditional (Model 1) and digital delinquency (Model 2) in Study 1.

Model 1 shows that for Study 1, online exposure to traditional delinquency has no statistically significant relationship with self-reported traditional offenses (*IRR* = 1.209, $p = .132$), while the effect of offline exposure is substantial and significant (*IRR* = 1.583, $p < .001$). Although the estimated effect of online exposure is positive, and might be even substantive (the 95 % confidence interval for the *IRR* ranges to 1.548), the non-significance means that we cannot be confident of such an effect, independent from offline exposure to traditional delinquency and other predictors. The statistically significant coefficient for the offline exposure effect means that a one unit increase on the scale of offline exposure to traditional delinquency (every extra offense type observed from peers) increases the expected count of traditional offenses by 58%. The effect of online time spent on social media on traditional delinquent behaviour is also statistically insignificant for Study 1 (*IRR* = 1.164, $p = .080$). We also find no statistically significant effect of offline time spent in unstructured socializing on traditional delinquency (*IRR* = 1.068, $p = .418$). With regard to the control variables, we see that the expected count of traditional offenses is significantly higher for males than for females (*IRR* = 2.222, $p = .032$). Age and ethnicity have no significant effects.

Model 2 shows that for digital delinquency, there is a significant positive effect of offline exposure to digital delinquency on self-reported digital offenses (*IRR* = 1.550, $p < .001$), which means that a one unit increase on the scale of offline exposure to digital delinquency increases the expected count of digital offenses by 55 %. In contrast, online exposure to digital delinquency has no statistically significant relationship with self-reported digital offenses in Study 1 (*IRR* = 1.104, $p = .391$). This means that controlled for offline exposure to digital delinquency

and other predictors, there is no independent effect of exposure to online posts of digital offenses on self-reported digital delinquent behaviour. Again we find no effect of offline time spent with peers (*IRR* = 0.981, *p* = .780), as well as no effect of online time spent on social media on digital delinquent behaviour (*IRR* = 1.101, *p* = .142). None of the control variables are significant in the model for digital delinquency.

Table 4. Negative binomial regression models for Study 1 (n = 132)

	Model 1: Self-reported traditional delinquency		**Model 2: Self-reported digital delinquency**	
	IRR	*SE*	*IRR*	*SE*
Intercept	0.561	1.869	1.234	1.148
Independent variables				
Offline time spent in unstructured socializing	1.068	0.082	0.981	0.070
Online time spent on social media	1.164	0.087	1.101	0.066
Offline exposure to traditional delinquency	1.583***	0.127	—	—
Offline exposure to digital delinquency	—	—	1.550***	0.114
Online exposure to traditional delinquency	1.209	0.126	—	—
Online exposure to digital delinquency	—	—	1.104	0.116
Control Variables				
Sex (male)	2.222*	0.372	1.434	0.253
Age	0.879	0.097	0.906	0.059
Ethnicity (Native/other = ref)				
Non-western background	0.865	0.374	1.115	0.265
McFadden's R^2		0.325		0.213
Log likelihood		-74.115		-116.691
χ^2 (*df*)	71.176 (7) ***		63.307 (7) ***	

Note. *IRR* = incident rate ratio; *SE* = standard error; * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$.

All in all, the findings from the regression models for Study 1 do not offer support for hypothesis 1 as well as hypothesis 2, which state that online exposure to delinquent peers and online time spent with peers on social media are independently related to own delinquent behaviour. Instead, there is more support for hypothesis 3 that there are no correlations between online exposure and delinquency when controlled for offline interaction with peers.

Table 5 presents the negative binomial regression results for self-reported traditional (Model 3) and digital delinquency (Model 4) in Study 2. In contrast to the findings of Study 1, Model 3 does show a substantially positive and statistically significant effect of online exposure to traditional delinquency on self-reported traditional offenses (*IRR* = 1.452, *p* = .011). This means that for every extra type of traditional offense that respondents were exposed to on social media, there is a 45 % expected increase in self-reported traditional delinquency – even when controlling for offline exposure to traditional delinquency. Model 3 also shows a positive and significant effect of online time spent on social media on traditional delinquent behaviour (*IRR* = 1.170, *p* = .021), while the effect of offline time in unstructured socializing remains insignificant in Study 2. This means that a one unit increase in spending time on social media increases the expected count of traditional offenses by 17 %, even when controlled for offline time spent in unstructured socializing. Of the control variables, only ethnicity was a significant

predictor, showing that for respondents with a non-western background the expected count of traditional offenses was significantly lower than for others (*IRR* = 0.460, *p* = .045).

Table 5. Negative binomial regression models for Study 2 (n = 66)

	Model 3: Self-reported traditional delinquency		**Model 4: Self-reported digital delinquency**	
	IRR	*SE*	*IRR*	*SE*
Intercept	0.483	2.635	0.512	2.806
Independent variables				
Offline time spent in unstructured socializing	1.002	0.075	0.954	0.086
Online time spent on social media	1.170*	0.068	1.048	0.078
Offline exposure to traditional delinquency	1.238	0.150	—	—
Offline exposure to digital delinquency	—	—	1.450**	0.133
Online exposure to traditional delinquency	1.452*	0.147	—	—
Online exposure to digital delinquency	—	—	1.399*	0.138
Control Variables				
Sex (male)	0.973	0.261	0.873	0.278
Age	0.979	0.160	0.978	0.174
Ethnicity (Native/other = ref)				
Non-western background	0.460*	0.388	0.679	0.401
McFadden's R^2		0.250		0.256
Log likelihood		-78.437		-72.033
χ^2 (*df*)		52.220 (7) ***		49.504 (7) ***

Note. IRR = incident rate ratio; *SE* = standard error; * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$.

The findings presented in Model 4 show that, in contrast to the findings of Study 1, there is also a positive significant effect of online exposure to digital delinquency on self-reported digital offenses (*IRR* = 1.399, *p* = .015), even when controlling for offline exposure to digital delinquency – which also had a positive and significant effect (*IRR* = 1.450, *p* = .005). This means that for every extra type of digital offense that respondents were exposed to on social media, the expected count of self-reported digital delinquent behaviours increases by 40 %. For digital delinquency, however, the effect of online time spent on social media is insignificant (*IRR* = 1.048, *p* = .536), which is also the case for offline time spent with peers (*IRR* = 0.954, *p* = .589). Further, none of the control variables is a significant predictor in model 4.

All in all, in contrast with Study 1, the findings from the regression models for Study 2 do offer strong support for hypothesis 1 that adolescents who are more exposed to posts of delinquent behaviour on social media are also more involved in delinquent behaviour themselves – this is true for traditional as well digital types of delinquency. There is also partly support for hypothesis 2, that spending online time with peers is related to delinquency independent from time spent with peers offline. This only applies to traditional types of delinquency but surprisingly not to digital offenses. Finally, hypothesis 3 is less supported in Study 2.

In summary, the correlations that were found in the two exploratory studies resemble each other, but the results of the regression models are quite different. In both studies, online exposure to traditional as well as digital delinquency of peers is strongly correlated with both forms of delinquency that is reported by the respondent him or herself. Online and offline exposure to peer delinquency are also correlated with each other, but far from absolute, and there is only a weak correlation between time with peers offline (unstructured socializing) and online (on social media). In Study 1, online exposure to delinquency of peers (traditional as well as digital) does not have an effect on own delinquency, independent from offline exposure to peer delinquency. In contrast, in Study 2, we did find statistically significant effects for online exposure to delinquency of peers, independent from offline exposure. These effects were substantial and comparable with the effects of offline exposure to peer delinquency. In both studies, we did not find many effects of time spent with peers on both types of delinquency. Only in Study 2, we found an independent and significant effect of online time spent with peers on social media on traditional forms of delinquency.

7. Discussion

While it is well known that adolescents commit more offenses when they have delinquent friends and spend much time hanging around with their friends in general, criminologists have wondered how this translates to the online world of social media (Mikami et al., 2010; Warr, 2002; Weerman et al., 2015). The current study explored to what extent online exposure to delinquent peers and time spent on social media are related to self-reported delinquency, independent of offline exposure to delinquent peers and time spent in unstructured socializing. We collected survey data from two different samples, which differed in age and education. In both samples, respondents were as much exposed to peer delinquency (offline as well as online) in the virtual world as they were offline. Respondents in both samples also spent more time online with peers than offline. This illustrates the increased importance of social media for the adolescents of today. As expected, the younger and lower educated sample (Study 2) was relatively more involved in delinquent behaviour. However, we did not find evidence for a 'digital divide' (DiMaggio et al., 2001) in which lower educated youths would make less use of the Internet. In contrary, the lower educated group spent more time with peers online and was also relatively more involved in online delinquency.

The findings further show that online exposure and to a lesser extent online time spent with peers on social media are indeed correlated with traditional as well as digital types of delinquency. It also became clear that online exposure to delinquent peers is correlated with offline exposure, but not perfectly, and that the amount of time on social media is only weakly correlated with time spent unstructured socializing offline. This means that online interaction with peers is not only an extension of the offline peer group, and that it has enough potential to matter for the etiology of delinquent behaviour. Similar results were found with regard to the association between online and offline delinquency: the correlation is substantial but far from perfect. This means that traditional and digital forms of delinquent behaviour are not necessarily the outcome of an underlying general tendency to break the law, but that it is meaningful to distinguish them in research.

We did not find statistically sound support for an independent effect of online exposure to delinquent peers and neither for online time on social media in Study 1. Study 1 offers more

support for the hypothesis that the effect of online interaction with peers is partly redundant and a consequence of peer selection mechanisms, than for the other hypotheses.
Study 2 on the other hand offered quite strong support for an independent role of online exposure to delinquent peers and time on social media. In particular, the estimated effects of online exposure to delinquent peers on traditional as well as digital delinquency are substantive and of similar strength as the estimated effects of offline exposure to delinquent peers. This supports the idea that, at least for the kind of adolescents that were included in Study 2, online communication may offer additional observations of exposure to delinquent behaviour of peers, additional communication about it, or additional peers that offer examples of delinquent behaviour. More generally, Study 2 offers more support for hypotheses 1 and 2, both positing that online interaction with peers has an independent effect on delinquent behaviour.
This difference between studies 1 and 2 is surprising, but may be explained in various ways. First, the small sample size and exploratory nature of the study may be responsible for the differences between the two studies. It is possible that larger sample sizes would have resulted in more similar findings and more significant effects. Second, the difference in respondent recruitment methods in the studies may explain differences in results. Study 1 was self-administered through school e-mail and may have attracted participants that are not representative for the whole population. Sample 2 was administered in-person among low educated urban adolescents and did include all adolescents that were approached, but does not represent the complete population of young people. Third, the prevalence and variety of delinquency as well as exposure to peer delinquency and time spent with peers is much higher in Study 2 than in Study 1. This means that perhaps potential effects were easier to detect in Study 2.
Nevertheless, the estimated effect sizes for online interaction with peers were considerably higher in Study 2 than in Study 1, which means that there may be a substantive difference between the studies that need to be explained. Here, the different make-up of the two samples with regard to demographics may offer an explanation. In the sample of Study 1, females are overrepresented and respondents come from different types of education, while Study 2 consists of lower educated urban adolescents. Perhaps more importantly, the average age is about three years higher in Study 1 than the average age for Study 2. It might well be that online communication with peers is more important and influential for the behaviour of 16-year-olds than it is for 19-year-olds. This may be an age effect, because in particular young people spend a lot of time on social media. But it also may be a cohort-effect, because the importance and use of social media has still increased in the last couple of years.
Also notable are the findings from Study 2 that online time on social media is mainly related to traditional delinquency. This may be an illustration of the notion that the online and offline world of adolescents are increasingly intertwined (boyd, 2014), and that role models and peer processes that can lead to deviant behaviour in the real world increasingly occurs on the internet. This may be the result of suggestions or provocations (like 'dares') posted online that lead to delinquency in the offline world, or by performing gangness and aggressiveness online that need to be substantiated by true criminal action or violence. How these processes actually take shape and lead to a relation between time spent online and traditional delinquency is a subject for future research.
Another consequence of the intertwinedness between the offline and online world may be that adolescents also communicate face-to-face about their digital behaviour. The strong relation we find in Study 2 between offline exposure to digital delinquency and own digital offending may be illustrative of this.

If these findings hold in future research, it would have important consequences for theoretical thinking about the relation between peers and delinquency. It would mean for example, that for some groups of adolescents, online exposure to delinquency of peers might have an influence on own behaviour through the same social influence mechanisms that are assumed to work for offline exposure to peer delinquency. So, when adolescents are exposed to delinquent posts by friends on social media, it may give them a signal that such behaviour is okay (Sutherland, 1939) or shows them a role model which may lead to imitation (Akers et al., 1979). Adolescents may be exposed to delinquent behaviour of friends with whom they are relatively weakly tied on social media or even unique online friends on social media: peers they rarely or never meet face-to-face. At the same time, these processes may be less salient for other, in particular older, adolescents.

Somewhat surprisingly, we did not find an effect of offline time spent in unstructured socializing with peers. This is not in line with many studies that do find a relation between delinquency and the amount of unstructured socializing and more generally time spent with peers (Osgood et al., 1996; Hoeben et al., 2016). We do find a relatively modest relation between time in unstructured socializing and delinquency, but no significant independent effects. It is possible that the absence of a substantive effect is due to limitations in data or measurement. We used two questions about time use in which respondents had to report the amount of hours they spent a day in certain circumstances, which may have been too difficult to estimate. However, this is not very different from some other studies that did find significant effects, although some of them used more sophisticated (and extensive) measures of time use. It is also possible, however, that the influence of unstructured socializing has become less salient for the new generation of adolescents who spent more time on the Internet, also when they are together with their friends in real life. Another possibility is that the new measurement of exposure to peer delinquency captured part of the criminogenic influences of unstructured socializing. Future research, with larger samples and more extensive measures of time use and peer interaction is needed to evaluate the validity of our findings with regard to unstructured socializing.

We did find some support for the existence of situational processes that are active through time spent with peers on social media, although only in Study 2, and only with regard to traditional types of offenses that are committed offline. Spending a lot of time on social media may be related to increased involvement in traditional offending, in the same way as spending time hanging around on the street or in nightlife was supposed to offer opportunities and inducements for crimes (Osgood et al. 1996). Nowadays, social media allow for socializing in unstructured and unsupervised conditions at any time and any place, in particular with new mobile technologies like tablets and smartphones. This also means that young people can be online, when they are in the company of peers at the same time. In such circumstances, criminogenic ideas and opportunities seen on social media can lead very quickly to traditional delinquency in the real world. It may also be harder to distance oneself from the peer group if a person is communicating with them online all the time (Lim et al., 2013). This may lead to an enhancement of the kind of group processes that stimulate delinquent behaviour among adolescents (Warr, 2002). Future research is needed to shed more light on the presence of these suggested processes.

We want to highlight several limitations of the current study that should be addressed in future research. First of all, an important limitation is the small sample size of the study, which limits statistical power and possibilities for detailed analyses. In Study 1, the response rate was very low. Although this is not necessarily a problem (see e.g., Ashley and Presser (2016; Picket et

al., 2018), it means that the sample will contain relatively more adolescents who neatly answer their school e-mail and may be less inclined to break the law. Study 2 had a much better participation rate but was relatively small and contained only included adolescents with a relatively low level of education. Although this offered the possibility to explore our research questions among a relatively high risk group, it is not possible to generalize the findings to the complete population of adolescents. Future research is needed with larger samples and participation rates. Preferably, such studies should strive for a more representative cross-section of the adolescent population than we were able to achieve in this exploratory study.

Another limitation is the cross-sectional nature of this study. While social influence, social selection and situational explanations could be investigated indirectly, longitudinal research is necessary to give more precise answers to the question which of these mechanisms is dominant in offline and online contexts and under what conditions. For example, social selection assumes that delinquent adolescents will make delinquent friends, while social influence assumes that having delinquent friends will make one more delinquent over time. To investigate this more accurately, at least two measurement-points are necessary. Classroom-based social network data are recommended as well to investigate these issues, so that the friends of respondents also participate in the research themselves. In this way the tendency of respondents to project their own behaviour onto their peers, and thereby falsely assuming similarity, can be avoided (Young & Weerman, 2013). Nevertheless, we did advance our measurement of peer delinquency by asking specifically about specific observations and communication of delinquent peer behaviour, offline as well as online.

A final limitation we want to mention is the less than optimal measurement of our dependent and independent variables. In our exploratory survey, we wanted to keep the questionnaire as short as possible, but future research might include more items to grasp involvement in traditional as well as digital delinquency and offline and online exposure to peer delinquency more completely. We experimented with a more direct way of asking whether respondents actually observed or heard about delinquent behaviour of their peers. This type of questioning appeared to work well and resulted in clear associations with delinquency. Nevertheless, these measurements may be improved further by scrutinizing in more detail what respondents actually heard or saw in the real world and online. Finally, we employed rather crude measures for offline and online time with peers (unstructured socializing and time on social media). Future research may use adapted versions of space time budget methods (see e.g., Wikström et al., 2012; Hoeben et al., 2014), and/or include more detail, in particular about the online activities on social media and online interaction with peers.

These limitations mean that we cannot formulate definitive conclusions about the salience of online manifestations of the three types of peer processes we distinguished. As we have indicated in the beginning, this is an exploratory study, which was also aimed at investigating the feasibility of using new survey methods to investigate the relation between online interaction with peers and delinquency. The conclusions are tentative and further research is needed to corroborate them.

Despite these limitations, however, we believe that the current study offers a welcome addition to the scarce previous literature on social media and delinquent behaviour. While previous studies on this subject only examined traditional offenses (McCuddy & Vogel, 2015a/b; Meldrum & Clark, 2015; Weerman et al., 2015), the current study also included digital delinquency. Moreover, it attempts to investigate the effects of online interaction with peers over and above traditional, offline peer effects and it tried to differentiate between underlying mechanisms of

similarity in delinquent behaviour between adolescents and their online peers. This strategy may be a good start for a better understanding of the risks of social media, without depicting adolescents as passive consumers nor adopting a dystopian approach of social media.

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Appendix 1: Results for the combined sample

Appendix Table 1. Descriptive statistics for the combined sample

	Study 1 and 2 combined (n = 198)		
	Mean	SD	Range
Dependent variables			
Traditional delinquency	0.71	1.20	0 – 4
Digital delinquency	0.84	1.13	0 – 4
Independent variables			
Online time spent on social media	4.05	1.87	1 – 7
Offline time spent in unstructured socializing	2.91	1.74	1.14 – 8.00
Online exposure to traditional delinquency	0.93	1.28	0 – 4
Online exposure to digital delinquency	1.21	1.25	0 – 4
Offline exposure to traditional delinquency	0.95	1.34	0 – 4
Offline exposure to digital delinquency	1.14	1.28	0 – 4
Control variables			
Sex (male = 1)	0.34	—	0 – 1
Age	17.69	2.25	15 – 27
Ethnicity			
Dutch native background	0.54	—	0 – 1
Non-western background	0.42	—	0 – 1
Western background or unknown	0.04	—	0 – 1

Appendix Table 2. Kendall's tau-b correlation matrix for Study 1 and 2 combined (n=198)

	1	2	3	4	5	6	7	8
1. Traditional delinquency	1.000	—	—	—	—	—	—	—
2. Digital delinquency	0.513***	1.000	—	—	—	—	—	—
3.Online time spent on social media	0.200***	0.122*	1.000	—	—	—	—	—
4. Offline time unstructured socializing	0.308***	0.147***	0.216*	1.000	—	—	—	—
5.Online exposure to traditional delinquency	0.617***	0.365***	0.141*	0.221**	1.000	—	—	—
6. Online exposure to digital delinquency	0.370**	0.552***	0.100	0.087	0.448***	1.000	—	—
7.Offline exposure to traditional delinquency	0.610***	0.395***	0.064	0.273***	0.616***	0.433***	1.000	—
8.Offline exposure to digital delinquency	0.479***	0.571***	0.069	0.144***	0.372***	0.571***	0.555***	1.000

Note. * $p < .05$; ** $p < .01$; *** $p < .001$

Appendix Table 3. Negative Binomial Regression Models for Study 1 and 2 combined (n=198)

	Model 5: Self-reported traditional delinquency		**Model 6: Self-reported digital delinquency**	
	IRR	*SE*	*IRR*	*SE*
Intercept	1.968	1.414	1.698	1.048
Independent variables				
Offline time spent in unstructured socializing	1.017	0.054	0.970	0.053
Online time spent on social media	1.103*	0.050	1.105	0.046
Offline exposure to traditional delinquency	1.337**	0.094	—	—
Offline exposure to digital delinquency	—	—	1.444***	0.089
Online exposure to traditional delinquency	1.387***	0.092	—	—
Online exposure to digital delinquency	—	—	1.274**	0.082
Control Variables				
Sex (male)	1.339	0.216	1.119	0.182
Age	0.856*	0.076	0.901	0.056
Ethnicity (Native/other = ref)				
Non-western background	0.802	0.277	0.956	0.215
In second study	1.167	0.258	0.849	0.232
McFadden's R^2		0.293		0.249
Log likelihood		-160.109		-191.574
χ^2 (*df*)		132.594 (8) ***		127.095 (8) ***

Note. IRR = incident rate ratio; *SE* = standard error; * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$. The variable 'in second study' indicates whether respondents in the second study sample have a different level of delinquency, net of the other variables included in the regression model.

Appendix 2: Items for online exposure to peer delinquency

Young people often use social media to let their friends know what they are doing or what they did. This could be a photo, text message or other type of posted content.
In the past months since the new year started, how often did you see or read on social media that your online friends did the following things? (for example, on Facebook, WhatsApp, Instagram)

1. Hurt or injured someone on purpose?
☐ 0 times ☐ 1 time ☐ 2 to 3 times ☐ 4 to 5 times ☐ more than 6 times

2. Stole something from a store or person?
☐ 0 times ☐ 1 time ☐ 2 to 3 times ☐ 4 to 5 times ☐ more than 6 times

3. Damaged or besmirched something on the street on purpose? (for example bicycles traffic signs graffiti)
☐ 0 times ☐ 1 time ☐ 2 to 3 times ☐ 4 to 5 times ☐ more than 6 times

4. Entered a building or area without permission? (for example a house, construction site, enclosed grounds)
☐ 0 times ☐ 1 time ☐ 2 to 3 times ☐ 4 to 5 times ☐ more than 6 times

5. Downloaded something illegally? (for example music, movies, games, software)
☐ 0 times ☐ 1 time ☐ 2 to 3 times ☐ 4 to 5 times ☐ more than 6 times

6. Posted a mean or threatening message online about someone?
☐ 0 times ☐ 1 time ☐ 2 to 3 times ☐ 4 to 5 times ☐ more than 6 times

7. Tried to disrupt a website or app for other users? (for example, through fake accounts, DDoS attacks, spamming, sending viruses/malware)
☐ 0 times ☐ 1 time ☐ 2 to 3 times ☐ 4 to 5 times ☐ more than 6 times

8. Accessed the computer or online account of someone without that person's permission?
☐ 0 times ☐ 1 time ☐ 2 to 3 times ☐ 4 to 5 times ☐ more than 6 times