Adolescents' and Young Adults' Online Risk Taking: The Role of Gist and Verbatim Representations

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ABSTRACT

Young people are exposed to and engage in online risky activities, such as disclosing personal information and making unknown friends online. Little research has examined the psychological mechanisms underlying young people's online risk taking. Drawing on Fuzzy Trace Theory, we examined developmental differences in adolescents' and young adults' online risk taking and assessed whether differential reliance on gist representations (based on vague, intuitive knowledge) or verbatim representations (based on specific, factual knowledge) could explain online risk taking. One hundred and twenty two adolescents (ages 13-17) and 172 young adults (ages 18-24) were asked about their past online risk taking behaviour, intentions to engage in future risky online behaviour, and gist and verbatim representations. Adolescents had significantly higher intentions to take online risks than young adults. Past risky online behaviours were positively associated with future intentions to take online risks for adolescents and negatively for young adults. Gist representations about risk negatively correlated with intentions to take risks online in both age groups, while verbatim representations positively correlated with online risk intentions, particularly among adolescents. Our results provide novel insights about the underlying mechanisms involved in adolescent and young adults' online risk taking, suggesting the need to tailor the representation of online risk information to different age groups.

Key words: Adolescent; Fuzzy Trace Theory; Gist and verbatim representation; Online risk taking; young adults.

1. INTRODUCTION

At the age of 12 years old Shevaun Pennington disappeared with 31-year-old Toby Studabaker, who had befriended her online. The case sparked a Europe-wide man hunt and highlighted the potential dangers of internet predators [(1)]. Thankfully, this case ended happily with Shevaun's safe return home. Sixteen-year-old Sasha Marsden was less fortunate. Lured to a hotel on the promise of employment by a man she had met on Facebook, she was brutally sexually assaulted and murdered [(2)]. Despite these high profile cases and increased endeavours to provide online safety education in schools extensive survey data suggest that adolescents are still taking, and are experiencing, online risks. Livingstone and Helsper [(3)] describe how young people, in particular, can be exposed to content risks (commercial, violent, or pornographic content), become victims of cyber-bullying or harassment [(4)], and/or receive unwanted sexual solicitations [(5)]. Surprisingly little research has investigated the psychological mechanisms that underlie adolescent's involvement in risky online activities. The current study aims to fill this gap.

1.1. Young people's exposure to online risks

Thankfully, Shevaun Pennington and Sasha Martin's tragic stories are rare and there are undeniably numerous benefits of using the internet for young people, both educationally and socially [(6)]. A number of studies, however, reveal that young people are exposed to and engage in a range of risky activities online. Livingstone and Bober [(4)] analysed data from over 1,500 9-19 year olds' use of the internet. Over 30% of participants had received unwanted sexual solicitations or bullying comments via email or instant messaging. Up to half of the sample had also been involved in activities identified as risky, such as giving out personal information online, making unknown friends online, and meeting people offline that they had only previously known online. Other studies illustrate the ease by which personal information can be obtained from teenagers. Surveys conducted in different European countries, the

United States, and Singapore have shown that between 13-91% of teenagers (depending on country of origin) supply their personal information to strangers online. Possibly more worrisome, between 9-20% have met online "acquaintances" in person [5,7]. Of these, 9% had gone to the meeting expecting to meet another teenager, only to find that the person they had been communicating with online was actually an adult [8].

Involvement in these risky online activities can increase young people's chances of victimisation [9]. Ybarra et al.'s [5] work has identified nine risky online activities: posting personal information, sending personal information, making rude/nasty comments to others, harassing/embarrassing someone else, meeting someone online, having unknown people on social networking friends lists, deliberately visiting porn sites, talking about sex with those known only online, and downloading from file sharing sites. Seventy-five percent of 10- to 17-year-olds had carried out at least one of those nine activities and 28% did four or more. Those engaging in four or more of these behaviours were 11 times more likely to experience victimisation than those who did none, and seven times more likely than those who partook in one to three of these activities. Given the very real negative consequences of risky online behaviour [10] it is vital to have a better understanding of the factors underlying young people's online risk-taking. Investigating online risk-taking in more detail also nicely chimes with government policy. For example, in the United Kingdom, the Child Exploitation and Online Protection (CEOP) Centre government agency was specially formed to prevent and protect young people from online abuse, and "children's behaviour putting themselves at risk of victimisation" was identified as a primary issue of concern [11].

1.2.Risk taking across development

Some researchers have argued that there is little distinction between offline and online behaviour, in terms of communication, building social relationships, and risk-taking [3]. Others suggest that young people are more likely to take risks online than offline due to the

extent and nature of the world-wide-web [12] and the fact that their online activities are not as strictly monitored as offline behaviour [13]. To date, scant attention has been paid to the psychological mechanisms that might contribute to adolescents' online risk-taking, and few of the models and theories on young people's offline risk-taking have been tested in, and applied to, the online environment [12].

Traditionally, theories of judgement and decision-making suggested that rational and analytical reasoning processes increase throughout childhood and into adulthood aided by increased experience, intelligence, and memory capacity [14]. Yet, a host of empirical studies have shown that risk-taking is particularly prevalent in adolescence compared to childhood and adulthood, especially with regards to behaviours such as smoking, alcohol and drug use, reckless driving, risky sexual-behaviour, and criminal activity [15- 19].

Several theories have tried to explain the increase in risk-taking in adolescence by referring to processes such as sensation seeking and impulsivity [20- 22]. Steinberg et al. [23] argue for a dual neurobiological model comprising of a socio-emotional system and a cognitive-control system. The socio-emotional system develops early, and quickly, in adolescence and is believed to stimulate reward seeking. In contrast, the cognitive-control system matures much more slowly resulting in a developmentally later attainment of impulse control and behavioural inhibition. This unequal maturation of the socio-emotional and cognitive-control systems creates a period of vulnerability to risk-taking starting at around 10 years of age and extending into young adulthood.

Other lines of research propose that risk taking in adolescence can be perceived as rational when individuals believe that the benefits of a risky action outweigh its costs [24]. Consider an adolescent deciding whether to engage in unprotected sex. If the potential risks of the action (e.g., the probability of contracting a sexually transmitted disease) are perceived

as relatively small and the potential rewards (e.g., having a thoroughly good time) outweigh these costs, the individual is likely to engage in the risky action [25].

Many of the objective risks associated with young people's online activities are rather small (e.g., making unknown friends online [5]). However, research suggests that adolescents engage in risky online behaviours despite the fact that they perceive these actions as highly risky with minimal benefits [7, 8]. For example, in relation to online sexual behaviours, such as talking to strangers about sex or sending sexual/naked photos of oneself, adolescent's perceptions of the risks and benefits associated with these behaviours were not predictive of actual behaviour [12, 26]. Baumgartner et al. [12] suggested that this paradox could potentially be explained by Fuzzy Trace Theory due to the theory's focus on non-normative behaviour driven by intuition.

1.3.Fuzzy Trace Theory

Rational choice theories have traditionally emphasised that increases in deliberative decision making, and decreases in intuitive decision making, throughout development, enhance reasoning accuracy [14]. Fuzzy Trace Theory (FTT) [27, 28] has emerged as one of the major alternative paradigms to successfully explain adolescents' and adults' risk taking in domains such as health [29] and sexual behaviours [30, 31]. FTT proposes that people use two different forms of mental representation when making (risky) decisions. Verbatim representations are based on the bottom-line details for events or judgements using exact, quantitative information. Gist representations are based on the meaning of events in light of individual's values and beliefs which create intuitive, qualitative representations.

Drawing on research on the development of memory and decision making, FTT asserts that individual's memories of people, events, and experiences are formed, stored and retrieved such that the essence (or gist representation) of an experience is not extracted from the precise details (or verbatim representation) of an experience [27]. These gist and verbatim,

qualitative and quantitative, representations are created in parallel and can also be retrieved independently, often depending on context driven cues [24]. Verbatim representations are said to fade more rapidly from memory, and therefore people's gist representations tend to be more readily retrieved from memory after an event [24]. Retrieval of gist and verbatim representations can also depend on additional factors, such as affect [32], experience [33], expertise [34], and neurobiological developments affecting sensation-seeking and inhibition control [21].

Studies in the FTT paradigm have shown developmental differences in children's, adolescents', and adults' reliance on gist and verbatim representations. Reyna and Ellis [35] and Reyna et al. [21] found that children relied more on verbatim reasoning weighing up costs and benefits when making risky decisions, whereas adults relied more on gist, but not verbatim, reasoning [32]. Reliance on gist reasoning was still developing in adolescence. Thus, compared to adults, adolescents were more likely to utilise both gist and verbatim reasoning and were therefore also more likely to take risks compared to adults [21].

Reyna and Farley [24] argue that adults intuitively get the gist of situations when forming judgements by retrieving risk avoidant values and principles from memory that have often been influenced by past behaviours and experiences. When making a risky decision, adults prefer to draw upon a hierarchy of gist representations and start any decision making process at the most basic categorical level: Is the action risky or not? [27] At this basic level the exact (verbatim) numerical values are ignored. For example, the prevalence rate of HIV infection in the UK is around 0.13% [36], but individuals rarely consider this figure when deciding whether to have unprotected sexual intercourse. Instead they simply rely on the gist representations that unprotected sex is risky, that HIV/AIDS is a rather catastrophic consequence, and that therefore the risky action should be avoided [21, 32]. While adolescents may also get the gist of the risky situation, driven by higher sensation seeking and lower

impulse control [21] they continue to more systematically consider the pros and cons of the risky action. Have I had unprotected sex before that did not result in any bad consequences? Do I have any friends that have had unprotected sex and yet not contracted HIV? Do I know anyone with HIV? Essentially, adolescents are caught between considerations of mainly weighing the pros and cons of a risky action (or relying on verbatim representations), and mainly relying on gist representations to simply avoid risks [32].

Previous studies [21, 30] have demonstrated that representing information in a verbatim way or engaging in the systematic consideration of cost/benefit trade-off analysis can actually result in higher rates of risk taking. This is particularly true in situations where the perceived likelihood of a risky event taking place is low [27]. Conversely, relying on categorical gist reasoning (such as "Avoid Risk") reduces risk taking behaviour [24, 28]. Thus, stronger reliance on verbatim representations in adolescence can, paradoxically, result in increased risk taking compared to adults, while reliance on categorical gist reasoning ultimately reduces risk taking behaviour in adulthood [24, 28].

Following this line of reasoning, one important question is whether FTT could help explain adolescents' and young adults' online risk taking. To this end, we adapted measures developed by Mills et al. [30] in the context of sexual risk taking. Based on psycholinguistics and memory research [27] these measures aimed at eliciting either gist or verbatim representations in adolescents as an explanation for the contradictory findings that sometimes risk perceptions were positively correlated with risk taking behaviours and sometimes negatively correlated. Participants were presented with questions or statements about a risk behaviour that were specifically worded to cue exact (verbatim) memories of that particular risk behaviour. For example, asking someone to consider the likelihood that they would have a sexually transmitted disease (STD) by the age of 25 would induce that individual to consider their past sexual risk taking behaviour. If they recalled high incidents of risk taking,

such as unprotected sex, then their estimates of the probability of getting an STD would be equally high. Likewise, low risk takers would report low estimates of personal risk from STDs. Such verbatim cues resulted in positive correlations with both risk perceptions and risk-taking behaviours. Conversely, presenting participants with cues designed to elicit global (gist) representations resulted in negative correlations between risk perceptions and risk-taking behaviours because categorical, gist representations are generally risk avoidant. Gist statements which included the word "you" as a grammatically objective, indirect object prompted individuals not to think about their own behaviour but to globally and generally reason about specific risk activities by drawing on intuition and personal beliefs and values. Mills et al [30] were able to show that verbatim cues were indeed positively related to, and reflective of, risk-taking behaviour in adolescents, with true memories guiding risk perceptions which in turn influenced risk-taking. However, adolescents who were more likely to endorse simple gist risk-avoidant principles, such as "If you keep having unprotected sex, risks will add up and you WILL get an STD", perceived more risk associated with certain sexual activities and therefore displayed less risk-taking behaviour [30].

1.4.The present study

The present study had two main aims: firstly to investigate developmental differences in online risk-taking in adolescents and young adults and secondly to assess whether reliance on gist or verbatim representations could explain adolescents' and young adults' online risk taking. We focused on two major online risk taking behaviours identified by previous research: disclosing personal information online, and making 'friends' on social networking sites with unknown people [5, 7]. These risky online behaviours are particularly suited to the FTT framework, as the associated risks are low while the potential benefits (e.g., increasing ones group of friends) are more obvious. We predicted that adolescents would exhibit higher online risk-taking than young adults (Hypothesis 1).

The current study adapted gist and verbatim measures previously used to investigate adolescents' sexual risk-taking behaviour [21, 30] to cue verbatim or gist representations of online risk-taking behaviour. In line with previous research in the FTT paradigm, we expected that gist representations of online risk-taking would correlate with each other and that verbatim representations would correlate with each other, but that there would be no relationship between gist and verbatim representations (Hypothesis 2).

Drawing on previous studies of FTT in the domain of sexual risk-taking [30], we expected that adolescents' past online risk-taking behaviour would be associated with their endorsement of gist and verbatim questions and statements. Specifically, higher endorsement of gist statements should be associated with lower past risk taking, while higher endorsement of verbatim statements should correlate positively with past risk taking. Since past research has not investigated this phenomenon in young adults we explored the relationship between past risk taking and the endorsement of gist and verbatim statements among young adults (Hypothesis 3).

Past research has shown that young adults rely more on gist representations when deciding whether to make risky decisions, whereas adolescents rely on both gist and verbatim representations. We therefore expected that among adolescents both gist and verbatim representations would correlate with future intentions to take online risks, while among young adults only gist representations would correlate with future online risk-taking intentions (Hypothesis 4).

2. METHOD

2.1 Participants

Participants were students from three educational establishments in the South West of England: one secondary school covering the age range 13-18 years, one further education

(FE) college with an age range of 16-19 years, and one university with students ranging in age from 18-24 years, all undergraduate students in Psychology. As Facebook use was a primary component of this study, and Facebook users must be 13 years or over, this was the minimum age stipulated for participant involvement. Informed consent was obtained from the parents of all participants under 18 years old. Those with parental consent, or those over 18 years old, were then invited to participate. No incentives or compensation for involvement was offered to students at the secondary school or FE college. Undergraduate students participated for course credit. Following previous investigations of FTT in the domain of sexual risk taking behaviour [21], participants were grouped into two age groups, adolescents (13-17 years, N=122; 82 Females; M_{age}=15.04 years, SD=1.44) and young adults (18-24 years, N=172; 142 Females; M_{age}=19.15 years, SD=1.10) for analysis. Aside from age and gender, no other demographic information was collected.

2.2 Materials

Participants completed paper booklets containing the questionnaire items designed to examine past online risk taking behaviour, intentions to engage in future risky online behaviour, and gist and verbatim representations. Each participant was given a detailed brief and a consent form to sign.

2.2.1 Gist and verbatim representations of online risk taking. For the current study we closely adapted previous measures of gist and verbatim representations developed by Mills et al. [21, 30] to study adolescents' sexual risk taking. For example, Mill et al.'s gist item "If you keep having unprotected sex risks will add up and you WILL get pregnant or get someone else pregnant" [30], became "If you keep giving out your personal details online to people you don't know, risks will add up and you WILL have your details stolen and abused". Similarly, "Better not to have sex than risk getting HIV/AIDS" [21, 30], became "Better not to give out personal information online than risk having my identity stolen". All gist and verbatim

measures were pilot tested prior to the main study (results available upon request). A full list of the gist and verbatim questions and statements can be found in Appendix I.

Participants were presented with three individual measures to assess their use of **gist representations** in relation to risky behaviours online; the *Categorical Risk* measure, the *Gist Principles* measure, and *Global Risk Perception* measure. The *Categorical risk* measure included nine questions to measure gist reasoning, for example "If you keep giving out your personal details online to people you don't know, risks will add up and you WILL have your details stolen". Participants indicated their agreement with the statements on a 5-point Likert scale from 0 (*strongly disagree*) to 4 (*strongly agree*) and scores across the nine items were averaged ($\alpha = .75$). Strongly agreeing to these statements indicated participants perceived higher risk compared to those participants who strongly disagreed.

The *Gist principles* measure contained 14 statements (e.g., "Better to not accept unknown "friends" online than risk being bullied or harassed") presenting global statements relating to online risk. Participants were asked to tick the statements they endorsed and leave blank those they did not endorse. A higher number of endorsements reflected higher risk perceptions. Four items were reverse scored and the number of endorsements summed ($\alpha = .64$).

Global risk perception measures included two questions aimed at assessing gist-based perceptions of risks ("Overall for YOU which best describes the risks of giving out your personal details online?" and "Overall for YOU which best describes the risks of making friends online with people you do not already know offline?") measured on a four point scale of *none* (0), *low* (1), *medium* (2), and *high* (3). These two questions were found to be significantly correlated, $r(292)=.472$, $p<.001$, and therefore scores were combined and averaged to create one *Global Risk Perception* variable.

Participants were presented with two measures aimed at assessing their use of **verbatim representations**. *Specific risk* involved two verbatim-focused questions which were specifically worded to assess participant's perceptions of their own future risk from using the internet. Participants were asked to rate, on a 5-point Likert scale scored from 0 (*very unlikely*) to 4 (*very likely*), the statements "I am likely to have my personal details stolen and used against me in the next 6 months", and "I am likely to be bullied or harassed online in the next 6 months by a person I do not know offline" ($\alpha = .81$). As these two measures significantly correlated, $r(295)=.678$, $p<.001$, they were summed and averaged to create one *Specific Risk* variable ($\alpha = .81$). For the *Quantitative risk* scale participants were asked "What are the chances that your personal information has been stolen?" and then indicated their answer on a scale ranging from 0% - 100%**.**

2.2.2 Past online risk taking and intentions to take online risks. Participants were asked to indicate whether or not they had ever given out personal information online, or made friends with someone they knew only online in the past 12 months. Two variables were created: "Past online risk taking: Shared personal information" and "Past online risk taking: Made unknown friends" both coded as 0 ("no") and 1 ("yes").

Four questions measured participants' intentions to take online risks, assessing whether they intended to give out their personal information, make unknown friends, communicate with unknown people in chat rooms, or share personal information with people they only knew online in the coming year. Participants answered on a 5-point Likert scale scored from 0 (*very unlikely*) to 4 (*very likely*). These four intentions measures were found to correlate significantly with each other. Therefore scores were summed and averaged to create an *Online Risk Intentions* variable ($\alpha = .72$).

2.3 Procedure

The study received ethical clearance from the university's behavioural ethics committee. Students from the secondary school and the FE college were tested in groups during morning registration periods. After students personally gave consent to participate, they were seated at separate tables and asked to complete the questionnaire in silence. Once questionnaires were completed each participant was provided with a debrief document.

For the undergraduate students, the questionnaire was converted into a web based survey which could be accessed through the University's participant recruitment scheme. Respondents were invited to participate in the research study and instructed to click on a web link for more information. The participant information sheet was presented on screen and students were asked for consent by ticking a check box. Participants were instructed only to consent and continue if they were between 18-24 years old. The participant was then guided through the questionnaire pages completing each individual measure. At the end of the survey a debrief with more detailed description of the aims of the research was given to participants.

3 RESULTS

3.1 Adolescents' and young adult's online risk-taking

Table I shows the percentage of participants in each age group who had taken online risks in the past by sharing personal information or making unknown friends. X^2 tests revealed that adolescents were significantly more likely than young adults to have disclosed personal information online in the past 12 months, χ^2 (1) = 27.57, p<.001. However, adolescents and young adults were equally likely to have made unknown friends in the preceding year, χ^2 (1) = 1.68, p=.195 (see Table 1). An independent samples t-test revealed that adolescents had significantly higher intentions to take online risks in the future than young adults, t(294)=2.43, p=.016.

3.2 Relationships of gist and verbatim measures

Fuzzy Trace Theory predicts that the two verbatim measures of risk perception (Specific Risk and Quantitative Risk) should positively correlate with each other as should the three gist measures of risk perception (Categorical Risk, Gist Principles, and Global Risk Perception). However, gist and verbatim measures should not correlate with each other. Table II shows the intercorrelations between all verbatim and gist measures. Both the Specific Risk and Quantitative Risk verbatim measures were significantly and positively correlated. All three gist measures were also significantly and positively correlated. However, while neither the Categorical Risk nor Gist Principles gist measures were correlated with either of the verbatim measures, the gist variable Global Risk Perception showed a significant relationship with both verbatim measures.

Due to the intercorrelations of the gist and verbatim measures, we conducted a principal component analysis on all five (three gist and two verbatim) measures with orthogonal rotation (varimax). Two components, incorporating all five items, had eigenvalues over 1 and together accounted for 62.90% of the variance. Table III shows the factor loadings after rotation suggesting that all three gist measures loaded onto component 1 (gist component) and both verbatim measures loaded onto component 2 (verbatim component).

3.3 Future intentions to take online risks

Table IV shows the intercorrelations between the gist component, verbatim component, past online risk-taking: sharing personal information, past online risk-taking: making unknown friends, and future intentions to take online risks, separately for adolescents and young adults. Among adolescents, the gist representations component correlated significantly negatively with online risk intentions, and the verbatim representations component correlated significantly positively with online risk intentions. Both past online risk taking measures correlated positively and significantly with online risk intentions. Past

online risk taking also correlated positively and significantly with verbatim representations, but tended to correlate negatively with gist representations.

Among young adults, gist representations correlated negatively and significantly with online risk intentions. Both past online risk taking measures also correlated significantly and negatively with online risk intentions. Importantly, there was no significant correlation between verbatim representations and online risk intentions for young adults.

To assess the roles of age group, past online risk taking behaviour, and gist and verbatim representations on future intentions to take online risks, hierarchical linear regressions were conducted. In Step 1 the independent variables of age, past risk taking: sharing personal information and past risk taking: making unknown friends were entered. In Step 2 the gist component and verbatim component were additionally entered. Step 3 additionally included the interaction terms of Shared of Personal Information x Age, Made Unknown Friends x Age, Gist Component x Age, and Verbatim Component x Age. Results can be found in Table V.

The first regression model showed that age and past risk taking behaviours significantly predicted intentions to take online risks, $\Delta R^2 = .03$, ΔF (3,287) = 2.82, p=.039. Age negatively predicted intentions to take online risk; that is adolescents showed stronger intentions to take online risks than young adults. Past risky behaviours (both in terms of disclosing personal information and making unknown friends online) did not significantly predict future intentions to take risk online.

The results of the second regression model showed that the gist and verbatim components additionally predicted online risk intentions, $\Delta R^2 = .21$, $\Delta F(2, 285) = 38.65$, $p < .001$. Gist reasoning negatively predicted intentions to take risks online while verbatim reasoning about risk positively predicted online risk intentions. The results of the third regression model showed that the interactions between the Past Risk Taking: Sharing

Personal Information x Age and Past Risk Taking: Making of Unknown Friends x Age additionally predicted online risk intentions, $\Delta R^2 = .13$, $\Delta F(4, 281) = 13.69$, $p < .001$ (see Table V). As shown in Figure 1, those adolescents who shared personal information in the past were more likely to take online risks in the future. However, among young adults, those who had shared personal information showed lower online risk intentions than those who had not shared personal information. A similar pattern emerged for past risk taking: making unknown friends. Among adolescents, those who had engaged in past online risks showed higher online risk intentions, whereas among young adults those who had engaged in past online risk taking exhibited lower online risk intentions (see Figure 2).

4 DISCUSSION

Online relationships that result in the abduction and murder of teenagers, like Shavaun Pennington [(1)] and Sasha Martin [(2)], are rare. Yet, media reports are rife with stories of young people taking their own lives due to cyber-bullying [(37)] or being blackmailed by abusers into performing sexual acts and self-harming on live webcam links [(38)], highlighting how online exposure can potentially be harmful to young people. Although a growing body of research has turned its attention towards this rather novel domain, there is a dearth of empirical studies examining psychological factors influencing adolescents' and young adults' online risky behaviours. This study examined how representations of risk affect adolescents' and young adults' online risk-taking behaviour.

Previous research has shown that adolescents are generally more likely to engage in off-line risky behaviour compared to young adults [(21, 22)]. Our first objective was to evaluate whether a similar age effect could be found for online risk taking. Results indicated, first, that adolescents took significantly more online risks in the past with the disclosure and sharing of personal information, and showed stronger intentions to take online risks in the future compared to young adults. Although both age groups were equally as likely to have made

unknown friends in the past 12 months, adolescents had made ten times more unknown friends online, on average, compared to young adults. Adolescents also stated that they were more likely to engage in future online risky activities including making unknown friends, disclosing personal information, communicating in chat rooms with strangers, and sharing personal information with strangers, compared to young adults. Our data, thus, provides further evidence that adolescence might represent a precarious period with regard to risk taking behaviour, whether it is offline or online.

The relatively equal propensity of both age groups to make unknown friends online is certainly worth further investigation, since domain-specific risk-taking research has alluded to the fact that some aspects of social risk-taking continue to increase into adulthood and only subside in middle age [39]. Additionally, the young adults in our study may have been responding to their social environment, such that the novelty of going to university opened up new social networking opportunities to link with individuals and interest groups. Further research could investigate whether non-university students of the same age are as likely to make unknown friends online.

Building on Fuzzy Trace Theory (FTT) [21,30], the present study was designed to assess whether adolescents' and young adult's mental representations of risk, exemplified by gist or verbatim statements, were related to past and intended online risk taking behaviour. As argued by FTT, verbatim representations are quantitative and are based on precise details for events or judgements. Gist representations, on the other hand, are qualitative and intuitively draw on the essence or meaning of events. Following Mills et al.'s [30] earlier work, reliance on verbatim or gist representations was manipulated by wording questions and statements to either cue precise memories of online risk taking (verbatim representations) or to cue global principles associated with online risk taking (gist representations).

Findings were concordant with our prediction and previous research of adolescent risk perceptions and risk taking [30], such that 13-17 year olds who were more likely to reason about online risk by drawing on gist representations were less likely to have engaged in online risk-taking in the previous 12-months. In contrast, adolescents who reasoned by drawing on verbatim representations of online risk were more likely to have engaged in risky activities online in the previous 12-months. Our results highlighted that this was not the case for the young adult group; there were no significant associations between reasoning style and past behaviours. While we made no predictions in this respect for the young adult group it would be reasonable to expect that, given young adult's increased dependence on gist reasoning, as proposed by FTT, that some association would be found. Potentially, however, for this age group, a change in reasoning style during the period with which we were measuring past risk-taking behaviour (i.e. the past 12 months) could make any specific relationships difficult to identify. For example, a decision to disclose personal information 12 months ago which was made by drawing on verbatim representations would not necessarily be in-keeping with current decision making if the individual(s) had moved to a more gist based reasoning process.

Another unexpected finding was that while past risk-taking behaviour showed a positive relationship with future risk-taking intentions for adolescents, there was a negative relationship between past risk-taking and future intentions for the young adult group. These findings could potentially be explained by the experience individuals had with the online environment. Research suggests that young people perceive some online behaviours as high risk [8] even though objective risks are low [5]. However, Hertwig and Erev [40] proposed that when making decisions based on experience, people tend to underestimate the risks associated with rare events. Therefore, when induced to draw specifically on one's own personal experiences of making unknown friends or giving out personal information online

(that is using verbatim representations) adolescents may have had very few (if any) past negative experiences with making unknown friends online on which to base their risk estimations. It would therefore seem reasonable that young people who had had very little experience of bad outcomes associated with making unknown friends online would underestimate risk and consequently show stronger intentions to engage in risky behaviours in the future. The opposite may have been true for the young people who had gained potentially more experience in the online environment. Future research should therefore explore the importance of past experience for online risk taking in more depth.

Mills et al. [30] argued that gist representations are meant to be prospective and "guide real-life decision making" (p. 433) in that simple values and decision rules concerning a specific risky behaviour will deter individuals from engaging in that behaviour. The present findings lend support to their assertion: Individuals who were more likely to endorse simple global statements such as "Avoid Risk", or "Better to never give out personal information online than risk having my identity stolen", were less likely to intend to engage in these activities in the future. The opposite was found for verbatim representations: Individuals who were more likely to endorse verbatim representations showed greater proclivities to intend to engage in future online risky behaviour.

With this in mind, it could be argued that it is past behaviour that drives the preference for gist or verbatim reasoning. That is, individuals who are more risk taking will subsequently reason in a verbatim style, while those who are more risk averse will tend to reason in a gist style. However, if this was the case then we would expect to see the same pattern of correlations between past risk taking and gist reasoning (negative correlation) and past risk taking and verbatim reasoning (positive correlation) for both adolescents and young adults. Indeed, on the basis that young adults would be expected to have a potentially longer history of risk taking behaviour on which to draw upon, the relationship with verbatim

reasoning should be stronger. We found the opposite to be true highlighting that it is the differential recall of past behaviour (induced by the verbatim statements) and values and beliefs about the same behaviour (induced by gist statements) which drive risk perceptions and future risk taking behaviour. Therefore, two individuals with the same rate of past risk taking behaviour can have different risk perceptions and future risk-taking intentions depending on whether they consider that risky behaviour utilising verbatim or gist reasoning.

Following developmental research in the FTT paradigm [21] we predicted that young adults' intentions to take online risks would be mainly based on gist representations, whereas adolescents would rely on both gist and verbatim representations. In line with FTT, adolescents' online risk taking was based both on gist and verbatim representations, while the influence of verbatim representations on risk taking decreased for young adults. Consequently, increased gist reasoning was protective of risk-taking for all participants, but a stronger reliance on verbatim reasoning, as displayed by adolescents, predicted increased intentions to take risks online.

Our study is not without limitations. As has been highlighted in previous research, [12] the novelty of investigating online risky behaviour, particularly with young people, necessarily utilises measures either adapted from paradigms used in offline environments or newly created ones. As such, further improvement through additional testing is needed. This could potentially affect the findings of this study in terms of its measure of FTT but also its applicability to the online environment. For example, the current study adapted the gist and verbatim measures developed by Mills et al. [30] to examine adolescents' sexual risk taking. While we found similar correlations between the gist and verbatim measures as Mills et al. [30] (i.e., all gist measures significantly correlated with each other, all verbatim measures significantly correlated with each other, no relationship between gist and verbatim measures), the gist measure Global Risk Perceptions showed significant positive correlations with the

other gist, as well as verbatim, measures. The specific wording of this question states "for YOU which best describes the risks of giving out your personal information/making unknown friends online?" which could possibly induce individuals to think more about their own past behaviour rather than about global representations. Mills et al. [30] suggest that this question should elicit a gist response, but they also add that it is possible that verbatim cues can be retrieved from this type of questioning. Certainly, the categorising of the global risk perceptions question as a purely gist-cue is not supported and should be further investigated. This could be done by assessing whether more global responses to this question are produced if the word "you" is removed from the sentence. As with other studies [30], our investigation was hypothetical by nature and did not measure actual behaviour. It would be extremely useful to examine adolescents' and young adults' actual online behaviour and assess whether gist or verbatim representation of information helps modify their online activities.

Despite these limitations, our findings have a number of important implications. First, in line with previous results [5], a large percentage of young people (over 50% of all age groups) admitted taking online risks such as disclosing their personal information to strangers, and making friends with people on social networking sites whom they did not already know offline. The data also reveal that the main facets of FTT, namely the utility of gist based intuition and verbatim based analysis of risk-taking judgements, can be applied to the online environment. Certainly, the gist measures of online risk-taking showed protective properties when related to future intentions to engage in risky online behaviour for both age groups, and the use of increased verbatim reasoning was predictive of increased online risk intentions in adolescents. These may serve as important factors in online training and education for both preventative and protective measures.

Concordant with our findings that participants who endorsed simple gist values were also more risk-averse, previous research into flood risk-perception and risk-communication

has highlighted that individuals displaying high prevention-focussed beliefs are more highly motivated by prevention-focussed risk communications [41]. Furthermore, in the same way that FTT has been supported through investigations into the framing bias [21,42] Terpstra, Zaalberg, de Boer and Botzen [43] have shown that negatively framed risk communication messages are more informative and influential than positively framed messages. Risk communication messages are more effective when processed heuristically than systematically [44]. Recent risk prevention interventions, specifically based on FTT, have been successful in the reduction of sexual risk taking in a large sample of US high school students [45]. Specifically, Reyna and Mills [45] enhanced an existing risk-reduction programme (RTR programme) in order to incorporate facets of gist reasoning that could be more easily memorised, incorporated into individual's personal values and beliefs, and also be more easily retrieved, compared to verbatim knowledge (RTR+ programme).The emphasis of the risks involved in engaging in sexual behaviour was moved from a quantitative focus on the probability of under-age pregnancy or sexually-transmitted infection, to a qualitative focus on the essential meaning of risk and understanding of risk-avoidant attitudes. A one-year follow up of participants revealed that those who had participated in the RTR+ programme were significantly less likely to have engaged in risky sexual behaviour, or intending to engage in this behaviour, compared to those on the RTR and control programme. Certainly, since risk prevention messages have been shown to be effectively communicated via social networking sites [46] communication of risk in an online environment about online risk is an area warranting further investigation.

Developing and imparting more gist based knowledge, in order to engage more intuitive thinking about online risk-taking, may well help to protect young people against some of the dangers involved in certain online activities. Currently internet safety education has become far more widespread, not only for young people in schools but also for teachers

in training and parents, but requires wider implementation and effectiveness [10]. Further research on young people's online risk taking will not only help identify the decision making processes involved when making risky decisions about online activities, but also help develop more effective education strategies that can encourage young people to reap the benefits of the virtual world while also protecting them against potential threat.

REFERENCES

1. Weathers H. The innocent victim, 12, of an internet paedophile describes: "The abduction that ruined my life". Mail Online. [Internet]. 2008 Aug 12. [2014 Jun 4]; Femail: [about 2 p]. Available from http://www.dailymail.co.uk/femail/article-1044150/The-innocent-victim-12-internet-paedophile-describes-The-abduction-RUINED-life.html

2. Evans B. Police study Facebook page of 16-year old girl murdered in frenzied stabbing as 22-year old man is charged with her killing. The Daily Mail. [Internet]. 2013 Feb 3. [cited 2014 Jun 4]; News: [about 3 p]. Available from http://www.dailymail.co.uk/news/article-2272824/Sasha-Marsden-Police-study-Facebook-page-16-year-old-girl-murdered-frenzied-stabbing-22-year-old-man-charged-killing.html.
3. Livingstone S, Helsper E. Taking risks when communicating on the internet: the role of offline social-psychological factors in young people's vulnerability to online risks. Inf Commun Soc. 2007; 10(5): 619-643.
4. Livingstone S, Bober M. (2004). [cited 2014 Jun 4]. *UK children go online: surveying the experiences of young people and their parents [online]*. London: LSE Research Online. Available from http://eprints.lse.ac.uk/archive/00000395.
5. Ybarra ML, Mitchell KJ, Finkelhor D, Wolak J. Internet prevention messages: Targeting the right online behaviors. Arch Pediatr Adolesc Med. 2007 Feb; 161: 138-145.
6. Valkenberg PM, Peter J. Online communication among adolescents: an integrated model of its attraction, opportunities, and risks. J Adolesc Health. 2011 Feb; 48(2): 121-127.
7. Livingstone S, Haddon L, Görzig A, Ólafsson K. (2011). *Risks and safety on the internet: The perspective of European children. Full Findings*. LSE, London: EU Kids Online. Available from http://www.lse.ac.uk/media%40lse/research/EUKidsOnline/EU%20Kids%20II%20(2009-11)/EUKidsOnlineIIReports/D4FullFindings.pdf
8. Liu AK, Khoo A, Ang PH. Factors Influencing Adolescents Engagement in Risky Internet Behavior. Cyberpsychology Behav. 2005 Dec; 8(6): 513-520.

9. Liu C, Ang RP, Lwin MO. Cognitive, personality, and social factors associated with adolescents' online personal information disclosure. J Adolesc. 2013 Aug; 36(4): 767-776.

10. Byron T. Safer children in a digital world: A report on the Byron Review – Children and new technology. Final Report. [Internet]. Nottingham: Department for Children, Schools and Families; 2008 Mar 27. [cited 2014 Jun 4]. Report No. PP/D16(7578)/03/08/xx. Available from http://media.education.gov.uk/assets/files/pdf/s/safer%20children%20in%20a%20digital%20world%20the%202008%20byron%20review.pdf.

11. Child Exploitation and Online Protection (CEOP) Centre. Annual Review 2010-11 and Centre Plan 2011-12. [Internet]. Final Report. London: CEOP; [2011?]. [cited 2014 Jun 4]; p. 13. Available from http://ceop.police.uk/Documents/ceopdocs/Annual%20Rev2011_FINAL.pdf. http://www.unh.edu/ccrc/pdf/CV293_NJOV3%20Prosecution%20Study%20Methodology%20Report_1-18-13.pdf.

12. Baumgartner SE, Valkenberg P, Peter J. Assessing Causality in the relationship between adolescents' risky sexual online behaviour and their perceptions of this behaviour. J Youth Adolesc. 2010 Oct; 39(10): 1226-1239.

13. Livingstone S, Helsper EJ. Parental mediation of children's internet use. J Broadcast Electron Media. 2008; 52(4): 581-599.

14. Evans JS. (2008). Dual-Processing accounts of reasoning, judgment, and social cognition. Annu Rev Psychol 2008 Jan; 59: 255–278.

15. Blum RW, Nelson-Mmari K. The health of young people in a global context. J Adolesc Health. 2004 Nov; 35(5): 402-418.

16. Centers for Disease Control and Prevention. Youth Risk Behavior Summaries United States 2011: Morbidity and Mortality Weekly Report. [Internet]. Surveillance summaries Vol. 61 No. 4. Atlanta (GA): Department of Health and Human Services, Office of Surveillance, Epidemiology, and Laboratory Services; 2012 Jun 8. [cited 2014 Jun 4]. Report No. MMWR 2012:61. Available from http://www.cdc.gov/mmwr/pdf/ss/ss6104.pdf.
17. Currie C, Zanotti C, Morgan A, Currie D, de Looze M, Roberts C, Samdal O, Smith OR, Barnekow V, editors. Social determinants of health and well-being among young people: Health behaviour in school aged children (HBSC) study: International Report from the 2009/10 survey. [Internet]. Health Policy for Children and Adolescents No. 6. Copenhagen; WHO Regional Office for Europe. 2012. [cited 2014 Jun 4]. Available from http://www.euro.who.int/__data/assets/pdf_file/0003/163857/Social-determinants-of-health-and-well-being-among-young-people.pdf?ua=1.
18. Quinn PD, Fromme K. Subjective responses to alcohol challenge: a quantitative review. Alcohol Clin Exp Res. 2011 Oct; 35(10): 1759-1770.
19. Zweig JM, Durbenstein-Lindberg L, Alexander McGinley K. Adolescent health risk profiles: The co-occurrence of health risks among females and males. J Youth Adolesc. 2001 Dec; 30(6): 707-728.
20. Donohew L, Zimmerman R, Cupp PS, Novak S, Colon S, Abell R. Sensation seeking, impulsive decision-making and risky sex: Implications for risk taking and design of interventions. Personal Individ Differ. 2000 June; 28(6): 1079-1091.
21. Reyna VF, Estrada SM, DeMarinis JA, Myers RM, Stanisz JM, Mills BA. Neurobiologial and memory models of risky decision making in adolescents versus young adults. J Exp Psychol. 2011 Jun; 37(5): 1125-1142.

22. Steinberg L. A social neuroscience perspective on adolescent decision making. Dev Rev. 2008 Mar; 28(1): 78-106.

23. Steinberg L, Albert D, Cauffman E, Banich M, Graham S, Woolard J. Age differences in sensation seeking and impulsivity as indexed by behaviour and self-report: Evidence for a dual systems model. Dev Psychol. 2008 Nov; 44(6): 1764-1778.

24. Reyna VF, Farley F. Risk and rationality in adolescent decision making: Implications for theory, practice and public policy. Psychol Sci Public Interest. 2006; 7(1): 1-44.

25. Fromme K, Katz EC, Rivet K. Outcome Expectancies and Risk-Taking Behavior. Cogn Ther Res. 1997 Jan; 21(4): 421-442.

26. Baumgartner SE, Valkenberg P, Peter J. Unwanted online sexual solicitation and risky sexual online behaviour across the lifespan. J Appl Dev Psychol. 2010a Nov-Dec; 31: 439-447.

27. Reyna VF, Brainerd CJ. Fuzzy-trace theory: An interim synthesis. Learn Individ Differ. 1995; 7(1): 1-75.

28. Reyna VF, Brainerd CJ. Dual processes in decision making and developmental neuroscience: A fuzzy-trace model. Dev Rev. Sept 2011; 31(2-3), 180-206.

29. Reyna VF. A theory of medical decision making and health: Fuzzy-trace theory. Med Decis Making. 2008 Nov; 28: 850-865.

30. Mills B, Reyna VF, Estrada S. Explaining contradictory relations between risk perception and risk taking. Psychol Sci. 2008; 19(5): 429-433.

31. Reyna VF, Adam MB. Fuzzy Trace theory, risk communication, and product labelling in sexually transmitted diseases. Risk Analysis. 2003 Apr; 23(2): 325-342.

32. Rivers SE, Reyna VF, Mills B. Risk taking under the influence: A fuzzy-trace theory of emotion in adolescence. Dev Rev. 2008 Mar; 28(1): 107-144.

33. Reyna VF, Chick CF, Corbin JC, Hsia AN. Developmental reversals in risky decision making: Intelligence agents show larger decision bias than college students. Psychol Sci. 2014 Jan; 25: 76-81.

34. Reyna VF, Lloyd FJ. Physician decision making and cardiac risk: Effects of knowledge, risk perception, risk tolerance, and fuzzy processing. J Exp Psychol: App. 2006; 12: 179-195.

35. Reyna VF, Ellis SC. Fuzzy-trace theory and framing effects in children's risky decision making. Psychol Sci. 1994 Sept; 5(5): 275-279.

36. Health Protection Agency. HIV in the United Kingdon. [Internet]. 2008 Report. London: Health Protection Agency, HIV and Sexually Transmitted Infections Department, Centre for Infections; 2008 Nov. [cited 2014 Jun 4]. Available from http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1227515298354.

37. Topping A, Coyne E. Hannah Smith suicide: MPs call for education in social-media awareness. The Guardian. [Internet]. 2013 Aug 7. [2014 Jun 4]; Cyberbullying: [about 5 p]. Available from http://www.theguardian.com/society/2013/aug/07/hannah-smith-suicide-cyberbullying-ask-fm-twitter.

38. Child Exploitation and Online Protection (CEOP) Centre. Children treated like 'slaves' to perform sexual acts. [Internet]. 2013 Sept 20. [cited 2014 Jun 4]. Media Centre: CEOP Press Release. Available from http://ceop.police.uk/Media-Centre/Press-releases/2013/Children-treated-like-slaves-to-perform-sexual-acts-/.

39. Rolison JJ, Hanoch Y, Wood S, Liu PJ. Risk-taking differences across the adult life span: A question of age and domain. Journals of Gerontology, Series B: Psychol Sci and Soc Sci. [In press]

40. Hertwig R, Erev I. The description-experience gap in risky choice. Trends Cogn Sci. 2009; 13: 517–523.

41. De Boer J, Botzen WJW, Terpstra T. Improving flood risk communication by focussing on prevention-focussed motivation. Risk Analysis, 2014; 34(2), 309-322.
42. Tversky A. Kahneman D. The framing of decisions and the psychology of choice. Science, 1981; 211(4481), 453-458
43. Terpstra T, Zaalberg R, de Boer J, Botzen WJW. You have been framed! How antecedents of information need mediate the effects of risk communication messages. Risk Analysis, 2014; 34(8), 1506-1520
44. Visschers VHM, Meertens RM, Passchier WWF, de Vries NNK. Probability information in risk communication: A review of the research literature. Risk Analysis, 2009; 29(2), 267-287
45. Reyna VF, Mills BA. Theoretically motivated interventions for reducing sexual risk taking in adolescence: A randomised controlled experiment applying fuzzy-trace theory. J Exp Psychol: General, 2014; 143(4), 1627-1648
46. Verruen S, Gutteling JM, de Vries PW. Enhancing self-protective behaviour: Efficacy beliefs and peer feedback in risk communication. Risk Analysis, 2013; 33(7), 1252-1264

Table I. Frequency (and %) of Past Online Risk Taking and Mean Online Risk Intentions by Age Group

	Age group	
Variable	Adolescents	Young adults
Past online risk taking: Shared personal information	81 (66%)	60 (35%)
Past online risk taking: Made unknown friends	80 (65%)	99 (58%)
Online risk intentions	1.58 (.93)	1.33 (.84)

Table II. Inter-correlations of Gist Measures (Categorical Risk, Gist Principles, Global Risk Perceptions) and Verbatim Measures (Specific Risk Perceptions, Quantitative Risk) for Online Risk Taking

Variable	Categorical Risk	Gist Principles	Global Risk Perceptions	Specific Risk Perceptions
Categorical Risk				
Gist Principles	.437**			
Global Risk Perceptions	.255**	.177**		
Specific Risk Perceptions	.069	.014	.154**	
Quantitative Risk Perceptions	.075	.039	.169**	.509**

*p<.05. **p<.01.

Table III. Results of Principle Component Analysis for the Gist and Verbatim Measures (N=292)

	Rotated Factor Loading	
Item	Gist Component	Verbatim Component
Categorical Risk (Gist)	.83	.02
Gist Principles (Gist)	.80	-.07
Global Risk Perception (Gist)	.51	.31
Specific Risk Perception (Verbatim)	.03	.85
Quantitative Risk (Verbatim)	.06	.85
Eigenvalue	1.76	1.38
% of variance	35.24	27.66

Table IV. Intercorrelations of Gist and Verbatim Components, Past Online Risk-Taking and Future Online Risk Intentions for Adolescents and Young Adults.

Variable	1	2	3[a]	4[a]	5
			Adolescents		
1. Gist component	--				
2. Verbatim component	-.14	--			
3. Past online risk-taking: Sharing personal information[a]	-.24**	.19*	--		
4. Past online risk-taking: Making unknown friends[a]	-.12	.23*	.08	--	
5. Online risk intentions	-.38**	.34**	.28**	.52**	--
			Young adults		
1. Gist component	--				
2. Verbatim component	.12	--			
3. Past online risk-taking: Shared personal information[a]	.07	-.05	--		
4. Past online risk-taking: Made unknown friends[a]	.07	-.003	.01	--	
5. Online risk intentions	-.38**	.15	-.27**	-.26**	--

[a] Spearman correlations

*p<.05. ** p<.001.

Table V. Results of Hierarchical Regression Analysis Predicting Online Risk Intentions.

	Independent Variables	Online Risk Intentions	
		β	R^2, *F*, *df1*, *df2*, *p*
Step 1			
	Age	-.15*	.03, 2.82, 3, 287, .039
	Shared personal information	-.02	
	Made unknown friends	.07	
Step 2			.24, 38.65, 5, 285, .001
	Age	-.19**	
	Shared personal information	-.06	
	Made unknown friends	.04	
	Gist Component	-.38**	
	Verbatim Component	.25**	
Step 3			.36, 13.69, 9, 281, .001
	Age	-.09	
	Shared personal information	-.02	
	Made unknown friends	.12*	
	Gist Component	-.27**	
	Verbatim Component	.20**	
	Shared personal information x Age	-.16**	
	Made unknown friends x Age	-.33**	
	Gist Component x Age	-.07	
	Verbatim Component x Age	.01	

* $p<.05$ ** $p<.01$

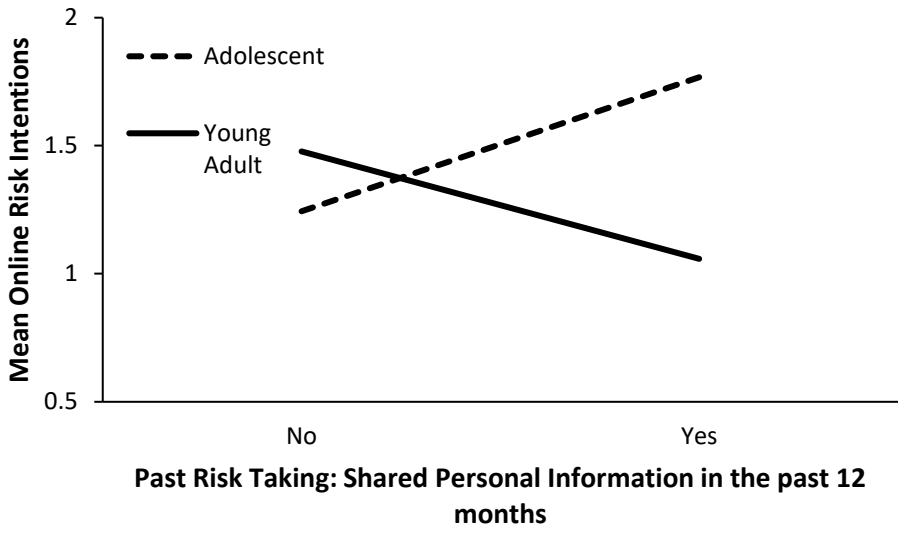

Fig. 1. Interaction of Past Risk Taking: Shared Personal Information online in the past 12 months and age predicting online risk intentions for adolescents and young adults

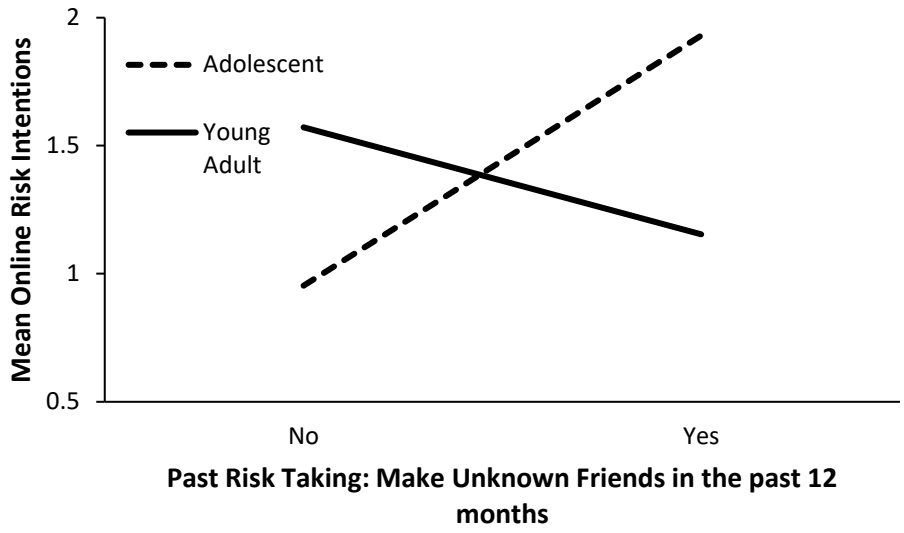

Fig. 2. Interaction of Past Risk Taking: Made Unknown Friends online in the past 12 months and age predicting online risk intentions for adolescents and young adults

Appendix 1

Gist and verbatim items and response scales to assess sexual risk perceptions in Mills, Reyna and Estrada (2008) and to assess online risk-perceptions in the present study.

Scale	Items for sexual risk taking (see Mills, Reyna & Estrada, 2008)	Items for online risk taking
	Gist Measures	
Categorical Risk (0 = *Strongly Disagree* – 4 = *Strongly Agree*)	Even low risks happen to someone; It only takes ONCE to get pregnant or get an STD; Once you have HIV-AIDS there is no second chance; Even if you use condoms, eventually you'll get an STD if you have sex enough; Even low risks add up to 100% if you keep doing it; If you keep having unprotected sex, risks will add up and you WILL get an STD; If you can't handle getting protection, you are not ready for sex; When in doubt about having sex, delay or avoid it; If you keep having unprotected sex, risks will add up and you WILL get pregnant or get someone else pregnant	If you keep giving out your personal details online to people you don't know, risks will add up and you WILL get bullied or harassed; When in doubt about giving out personal information online delay or avoid it; If you keep giving out your personal details online to people you don't know, risks will add up and you WILL have your details stolen and abused; Even low online risk-taking adds up to 100% if you keep doing it; It only takes ONCE to give up your personal information online for it to be misused; Even low risks happen to someone; Even if you only communicate online with people you know, eventually you will get bullied or harassed if you use the internet enough; Once someone has your personal details, there is no second chance; If you cannot handle protecting your personal information, you are not ready to use the internet
Gist Principles (Participants asked to tick the statements they endorsed – (R) denotes reverse scoring)	Avoid risk; Better to be safe than sorry; I have a responsibility to myself to wait to have sex; I have a responsibility to my parents/family not to have sex; Better to not have sex than hurt my parents/family; I have a responsibility to my partner not to put him/her at risk; I have a responsibility to God to wait to have sex; Better to not have sex then risk getting HIV-AIDS; Better to not have sex than risk	Better not to accept unknown "friends" online than risk being bullied or harassed; Better to focus on school work than communicating for fun online; Avoid risk; Better to be safe online than sorry; Better to never give out personal information online than risk having my identity stolen; Better to wait to use the internet when you are not ready to deal with the risks; I have a responsibility to my family to

	getting pregnant or getting someone pregnant; Better to focus on school than have sex; Better to wait than to have sex when you are not ready; Better to have fun (sex) while you can (R); Having sex it better than losing a relationship (R); Having sex it worth risking pregnancy (R); Known partners are safe partners (R)	not give out my personal details to people I don't know online; Better not to accept unknown friends online than to hurt my family; I have a responsibility to myself to keep my personal details private; Better to have fun (accept lots of friends online) while you can (R); Known online friends are safe friends (R); Accepting unknown friends online is better than having no friends at all (R); Accepting unknown friends online is worth risking getting bullied or harassed (R); Giving out my personal information online is worth the risk of losing my identity (R)
Global Risk (0 = *None*, 1 = *Low*, 2 = *Medium*, 3 = *High*)	Overall, for you, which of the following best describes the risk of having sex?	Overall for **you**, which best explains the risks of giving out your personal information online? ; Overall for **you**, which best explains the risks of making friends online with people you do not already know offline?
	Verbatim measures	
Specific risk (0 = *Very Unlikely* – 4 = *Very Likely*)	I am likely to get pregnant (or get someone pregnant) in the next 6 months; I am likely to have an STD by age 25; I am likely to have an STD in the next 6 months; I am likely to have HIV-AIDS by age 25; I am likely to have HIV-AIDS in the next 6 months	I am likely to have my personal details stolen and used against me within the next 6 months; I am likely to be bullied or harassed online in the next 6 months by a person I do not know offline
Quantitative risk (Participants asked to indicate risk on an analogue scale from 0% - 100%)	What are the chances that you have an STD?	What are the chances that your personal information has been stolen?