Social Information Processing Links to Cyber-Bullying in Adolescence: A Developmental Perspective

by

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B.Sc., University of Toronto, 2011

Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of

MASTER OF ARTS

in

The Department of Educational Psychology and Leadership Studies

Supervisory Committee

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Abstract

The internet has become an important social context in adolescence, and communicating online with friends has become a natural part of everyday life. The present cross-sectional study examined the effects of social cues and popularity on developing adolescent social cognitions in online settings using a sample of 90, 11- to 14-year-old students from British Columbia, Canada. Participants completed self-report cyber-bullying, cyber-victimization, and cyber-aggression motivation measures. Hostile intent attributions were obtained using an instrument containing 8 hypothetical vignettes, where potentially harmful messages were sent to the protagonist, but the sender's intentions were ambiguous. The results show an increasing cyber-bullying and cyber-victimization trend from early- to mid- adolescence. There was some evidence to suggest that individuals in mid-adolescence were more sensitive to online social cues and popularity. Individuals in mid-adolescence were more likely to engage in cyber-aggressive behavior to obtain a material or social reward. Despite having a small sample size, this study provides a good foundation for further research examining developmental processes that underlie cyberbullying behavior.

Keywords: cyber-bullying, cyber-victimization, adolescence, social information processing, dual process model

Table of Contents

List of Tables

List of Figures

Acknowledgements

First of all, I would like to thank my advisors Drs. Kevin Runions and Joan Martin for their ongoing mentorship, guidance, encouragement, and faith in me. I would be lost without your support. I would also like to thank Dr. Shelley Hymel for her time, helpful comments, and kind words of encouragement.

Ewa Bak, my mother, for always being there from a distance. Words cannot express my gratitude for your patience, flexibility, and love.

Jessica Chuang, who was always there to pick me up and push me forward. Thank you for lending an ear, a hand, a brain, and a smile whenever I needed it.

And last, but not least, to the principals, teachers, and students from Sooke School District 62, who have expressed their interest and offered their time to take part in this research project. I could not continue to do what I am most passionate about without your help.

As individuals enter into adolescence, interpersonal relationships become increasingly important (B.B. Brown, 2004) and communicating with peers online becomes a part of everyday life (Li, Smith, & Cross, 2012). Modern technology offers adolescents a way to stay connected with friends and family, exchange ideas, and meet new friends with common interests (O'Keeffe, Clarke-Pearson & Council on Communications and Media, 2011), but it also changes the way they interact with others. In face-to-face contexts, individuals infer a variety of positive and negative emotions implicitly through non-verbal communication (for a review see Duncan Jr., 1969; Mehrabian 1981). For example, negative emotional reactions evoke specific facial expressions that provide information about an individual's disposition. In most online communication, however, these non-verbal cues are absent, creating ambiguity, and making it more difficult to interpret the emotions, intentions, and motivations of others (Bargh & McKenna, 2003; Runions, 2013; Wallace, 1999). As a result, adolescents may misinterpret benign intentions as hostile and retaliate accordingly, creating a perpetual cycle of cyber-victimization (Runions, 2013). Researchers know little about the way adolescents attribute hostile intentions to others online, as well as the factors that influence these attributions. Furthermore, empirical research examining the links between hostile intent attributions and cyber-bullying behavior is non-existent (Runions, Shapka, Dooley, & Modecki, 2013). In this study, I use a developmental perspective to investigate how social cognitions in online contexts change from early- to mid-adolescence, and to examine the links between adolescent social cognitions and cyber-bullying.

Chapter 1: Literature Review

1.1 The Emergence of Online Social Contexts in Adolescence

For over a decade, the internet has emerged as an important social context for adolescents. In 2003, the Organization for Economic Cooperation and Development (OECD) conducted a large-scale, multinational study examining the online behavior of 15-year-old students. The findings revealed that adolescents spend more time using information and communication technology for socializing than for any other activity (OECD, 2006). Since the OECD conducted this study, adolescents have continued to integrate technology into their social lives and communicating online is progressively becoming a natural part of everyday life (Lenhart, 2015; Li et al., 2012; Valkenburg & Peter, 2011). A recent national survey in the United States shows that 92% of American teens go online daily, 24% of whom report being online "almost constantly" (Lenhart, 2015, p. 16). Adolescents are spending more time online, in large part because of technological advances that have yielded new mobile devices, such as smartphones and tablet computers, which have made the internet easily accessible anywhere and at any time (Lenhart, 2015; Li et al., 2012). Along with improved mobility, the proliferation of social networking platforms with diverse capabilities have given adolescents more opportunities to connect with others through text messages, images, audio recordings, and videos (J.D. Brown & Bobkowski, 2011). As a result, the majority of adolescents report using multiple social media sites and share information with others in a variety of ways (Lenhart, 2015).

Numerous studies have documented the rising importance of friendships and romantic relationships in adolescence (Bouchey & Furman, 2003; B.B. Brown, 2004; Collins, 2003; Furman, 2002; for a review see Smetana, Campione-Barr, & Metzger, 2006) and the effect modern communication technology has on them (Blais, Craig, Pepler, & Connolly, 2008;

Valkenburg & Peter, 2007; Subrahmanyam & Greenfield, 2008). Although some authors argue that online communication limits the potential for close peer interactions (Locke, 1998), researchers found little evidence to support this. Most adolescents use the internet to interact with peers from their existing social networks, and they report feeling closer to their friends as a result (Valkenburg & Peter, 2007). Furthermore, the emergence of social networking sites has not only helped adolescents maintain close friendships, but it has also allowed them to expand their social networks and interact with acquaintances who they would not encounter on a regular basis in their offline lives (Reich, Subrahmanyam, & Espinoza, 2012).

In addition to the social benefits associated with maintaining peer relationships, adolescent preferences for online communication may be due to the enhanced control they have over how they present themselves and what they choose to communicate. Valkenberg and Peter (2011) suggest that anonymity, asynchronicity, and accessibility are features specific to online communication that appeal to adolescents and allow them to feel safe and free to express themselves. For example, adolescents who post comments anonymously online may experience a reduced sense of self-awareness and personal responsibility (Joinson, 2001). These deindividuating effects act to mitigate concerns about the reactions and judgments of others (Valkenberg & Peter, 2011). Asynchronicity refers to the temporal lag that is common in online communication. In contrast to face-to-face contexts, adolescents can edit their messages before making them available online for their friends or the public to see (Walther, 2007; Valkenberg & Peter, 2011). Specifically, adolescents can reflect on their online behavior and improve relational outcomes by editing messages that could be misconstrued or cause them to appear foolish, unintelligent, or rude (Walther, 1996; Walther, 2011). Finally, online communication offers adolescents greater access to peers along with the ability to select their audience using

sophisticated security features available on popular social media sites (Subrahmanyam & Greenfield, 2010; Valkenberg & Peter, 2011).

However, the features that attract adolescents to social media can also facilitate cyber-bullying behavior, characterized as the repeated use of communication technology intended to cause harm to a powerless victim (Patchin & Hinduja, 2012). In one article, Runions (2013) argues that anonymity, asynchronicity, and accessibility are just a few of the handful of features that provide individuals with affordances for aggressive online behavior. Adolescents rate anonymous cyber-bullying as the most severe form of bullying as attacks on the victim can happen at any time, giving rise to emotions such as fear and helplessness (Sticca & Perren, 2013). Anonymity is an important factor for the online disinhibition effect, which can lead to cyberbullying by allowing individuals to dissociate from their behaviors and avoid accepting any personal responsibility for the harm they cause (Suler, 2004; Valkenburg & Peter, 2011). Similarly, asynchronicity and accessibility provide adolescents with opportunities to plan revenge or engage in premeditated forms of cyber-bullying behaviors at any time. As Runions (2013) pointed out, quick wit is not a prerequisite for cyber-bullying. The ability to delay responses and have constant access to victims can act to raise adolescents' self-efficacy for aggressive behavior.

The increasing pervasiveness of technology in the lives of adolescents has exposed them to a greater risk of cyber-victimization by peers. For over a decade, researchers have recognized cyber-bullying as a growing problem among adolescents (Jones, Mitchell, & Finkelhor, 2013). Meta-analyses show a mean prevalence rate of 15 percent for cyberbullying involvement (Modecki, Minchin, Harbaugh, Guerra, & Runions, 2014) with a range between 10 and 40 percent (Kowalski, Giumetti, Schroeder, and Lattanner, 2014). Furthermore, recent studies in

Canada (Holfeld & Leadbeater, 2015) and Europe (Tsitsika et al., 2015) show that nearly one in four adolescents report being cyberbullied in the previous year. The recent interest has also led to a substantial number of studies examining its effects (Li et al., 2012). Researchers have shown that involvement in cyber-bullying as either the perpetrator or the victim predicts the development of severe psychosocial consequences, including depressive symptomatology and suicidal ideation (Bonanno & Hymel, 2013; Gini & Espelage, 2014; Hinduja & Patchin, 2010; for a meta-analysis see van Geel, Vedder, & Tanilon, 2014). A study examining media coverage of adolescent suicides between 2003 and 2012 has identified over 40 cases around the world that mention cyber-victimization (Leblanc, 2012). Still, even with the growing concern over cyber-bullying and the respective risks for adolescents, very few studies have taken an explicitly developmental perspective. Research examining the influences of maturing adolescent social cognition in the context of cyber-bullying is scarce and warrants further investigation.

1.2 The Development of Cyber-Bullying Behavior

Researchers still have a poor understanding of the links between adolescent development and cyberbullying behavior. For the most part, developmental research has focused on cyberbullying trends, however, these studies have produced inconsistent findings. For example, some studies report an increase in cyber-bullying as adolescents age (Bauman, 2012; Kowalski & Limber, 2007; Smith et al., 2008; Ybarra & Mitchell, 2008), while others report a decreasing trend (Dehue, Bolman, & Völlink, 2008; Ševčíková & Šmahel, 2009; Slonje & Smith, 2008). A few other studies have failed to identify any age effects on cyberbullying (Elledge, et al., 2013; Genta et al., 2012; Juvonen & Gross, 2008; Tippet & Kwak, 2012).

A highly cited review and meta-synthesis by Tokunaga (2010) suggests that the incoherence in the literature may be due to a curvilinear relationship between cyber-bullying and

age where cyber-bullying behavior rises during early-adolescence, peaks in mid-adolescence, and declines as the individual reaches adulthood. A careful examination of the literature by Tokunaga (2010) provides some support for the curvilinearity argument. According to Tokunaga, studies that fail to show any significant age effects used samples with broad age ranges around the peak years in middle adolescence. Furthermore, recent cross-sectional studies provide some evidence to support the existence of a curvilinear cyber-bullying trend (Ortega, Elipe, Mora-Merchan, Calmaestra, & Vega, 2009; Jones et al., 2013; Williams & Guerra, 2007; for a review see Cassidy, Faucher, & Jackson, 2013). The curvilinearity argument offers an elegant resolution for the mixed findings, and can have important implications for developing intervention and prevention programs. For example, understanding when adolescents are most vulnerable for cyber-bullying can help researchers and practitioners target specific age groups for effective prevention and intervention efforts.

There is growing consensus that the frequency of cyber-bullying increases over the course of early adolescence, peaking at a 13-14 years. Recent longitudinal cyber-bullying research has added valuable insights into the development of risk factors (e.g. school bullying, impulsivity, narcissism, problem behavior, etc.; Fanti, Demetriou, & Hawa, 2012; Modecki, Barber, & Vernon, 2013; Sticca, Ruggieri, Alsaker, & Perren, 2013) and protective factors (e.g. family, peer, and school support; Fanti et al., 2012). Yet, scientists have not adequately addressed why individuals are particularly vulnerable to cyber-bullying perpetration and victimization during mid-adolescence. Only one study has attempted to tap into the developmental processes that drive these behaviors. Previous research has shown that children's moral reasoning and their ability to anticipate negative emotions following a moral transgression improves with age (Krettenauer, Malti, & Sokol, 2008; also see Malti & Ongley, 2014), and

researchers have argued that a fully integrated moral identity develops in adolescence (see Krettenauer, 2012). Based on the moral development literature, Perren and Gutzwiller-Helfenfinger (2012) hypothesized that age moderated the relations between morality and cyberbullying. In their study, 564 students between the ages of 12 and 21 responded to an online questionnaire with items that examined cyberbullying behaviors, level of moral disengagement, moral emotions, and moral values. The results showed that all measures of morality except for moral disengagement were associated with cyber-bullying behavior. There were no significant results for the moderating role of age, but this may be due to the analytical approach. The authors exclusively examined linear age trends, however, due to the observed curvilinearity in cyber-bullying behavior, investigating non-linear developmental trends may have been more appropriate for their sample. Still, the formation of a moral identity could possibly contribute to the decline in cyber-bullying behavior from mid-to late-adolescence, and warrants further examination.

While no other study has investigated the developmental socio-cognitive factors that could account for age differences in cyberbullying behavior, researchers have proposed several possible explanations for the observed trends. For example, Cross and colleagues (2012) suggest that in contrast to individuals in middle adolescence, younger adolescents devote less time online to social interactions, and spend the majority of their time on the internet playing games or working on educational activities. As peer relationships become more important in adolescents' lives, they begin experimenting with different forms of social media and seeking out new ways to interact with others, building peer networks, and sharing information about their personal thoughts, feelings, and experiences (Kowalski & Limber, 2007). This is in line with research showing that online self-disclosure increases during the early adolescent years before stabilizing

in middle adolescence (Valkenburg, Sumter, & Peter, 2011). Moreover, new ways of communicating may be more appealing in middle adolescence due to the increasing popularity of the medium among same-aged peers. Since individuals in middle adolescence use the internet more frequently than younger adolescents (Li et al., 2012), they may have larger networks of peers with whom they can connect with using various social networking sites and mobile device applications. The ability to capitalize on new social networking technology, as well as a greater presence on the internet, may contribute to increased cyber-aggression among individuals in mid-adolescence (Kowalski & Limber, 2007; Salmivalli & Pöyhönen, 2012).

1.3 Adolescent Neurocognitive Development

Understanding the relations between cyber-bullying and adolescent neurocognitive development could provide valuable insights into the developmental mechanisms associated with the cyberbullying trends found in research. Yet, very little research has focused on these links. A growing body of literature suggests that important neuropsychological changes take place in adolescence (Blakemore, 2008; Kuhn, 2009; Spear, 2013) and that these changes have significant effects on adolescent cognition and behavior, particularly in interpersonal contexts (Steinberg, 2005; Steinberg & Morris, 2001; Strang, Chein, & Steinberg, 2013). The development of adolescent socio-cognitive faculties raises some compelling questions about their abilities to process social information, especially in online contexts where features of online communication allow social encounters to be anonymous, public, asynchronous, and void of emotional feedback (Slonje & Smith, 2008).

A major theoretical framework used to examine the ontogenetic processes that influence behavior is the dual systems model, which highlights the importance of three changes in adolescence: changes in prefrontal gray and white matter, improved prefrontal connectivity to

subcortical areas, and the development of dopaminergic activity in the brain (Steinberg, 2010). This model suggests that developmental changes in dopaminergic activity and self-regulatory competence affect motivational processes related to social behavior. Over the course of development, the rapidly maturing dopaminergic system interacts with slowly maturing regulatory system, producing differences in risky and reckless behaviors among individuals in early-, mid-, and late-adolescence (Steinberg, 2010).

Research has shown that over the course of adolescence, significant changes occur in the prefrontal cortex, an area of the brain that is crucial in the management and regulation of cognitive processes (Kuhn, 2009) and processing of implicit social cues (Critchley, et al., 2000). At the onset of puberty, the prefrontal cortex undergoes synaptogenesis – a proliferation of synaptic connections (Kuhn, 2009). Early histological post-mortem studies (Huttenlocher, 1979) and recent MRI studies (Giedd, et al., 1999; Giorgio et al., 2010; Paus 2005) report a concomitant increase in gray matter density from puberty until its peak at 11- to 12- years of age. Although synaptogenesis ensures that the brain establishes proper connections, and is essential to a healthy development in adolescence (Spear, 2013), researchers suspect the addition of excess synapses adulterate cognitive processing. For example, studies have found a pubertal dip in performance on various measures of social information processing such as face recognition tasks (Carey, Diamond, & Woods, 1980) and emotion recognition tasks (McGivern, Andersen, Byrd, Mutter, & Reilly, 2002). Accordingly, researchers speculate that the overproduction of neuronal synapses reduces information processing efficiency, as signals get lost in the 'noise' caused by the surplus of neuronal connections (Blakemore, 2008).

The proliferation of synaptic connections marks the beginning of adolescent neuro-development in the prefrontal cortex. According to MRI studies, gray matter growth follows a

curvilinear trajectory (Giedd, et al., 1999; Giorgio, et al., 2010; Paus, 2005). Following synaptogenesis, the adolescent brain undergoes a wave of synaptic pruning, which reduces gray matter density by eliminating inefficient, energetically costly, neuronal synapses (Spear, 2013). At the same time, synaptic pruning creates efficient, adult-like neural circuits by strengthening frequently used synaptic connections (Blakemore & Choudhury, 2006; Spear, 2013). The removal of weak synapses and conservation of strong connections improves the efficiency of neural networks by making signals stronger while simultaneously limiting the amount of background 'noise' (Blakemore, 2008).

Cognitive processing efficiency also improves as white matter density increases throughout adolescence and into adulthood (Blakemore & Choudhury, 2006; Giorgio et al., 2010; Paus, 2010; Spear, 2013). Supporting glial cells surround the axons of neurons with a white, fat-enriched, dielectric substance called myelin. Myelin sheaths insulate the axon improving connectivity between various brain regions by accelerating the speed of electrical transmission and facilitating the flow of information (Paus, 2010; Spear, 2013). In contrast to the dynamic curvilinear growth pattern of frontal and parietal gray matter, white matter develops relatively slowly, and undergoes linear growth over time (Blakemore & Choudhury, 2006, Giedd et al., 1999; Giorgio et al., 2010; Paus 2010). Extant neuroimaging research has shown that although younger adolescents have larger volumes of gray matter in the prefrontal cortex than older adolescents, the opposite is true for white matter (Sowell et al., 1999). Over the course of adolescence and into adulthood, the morphological changes in the prefrontal cortex allow for better information processing efficiency with improved connectivity to other brain regions. In turn, the linear maturation of the prefrontal cortex improves higher-order executive functions related to self-regulatory competence (see Cauffman et al., Steinberg, 2008).

In comparison to the relatively slow development of the prefrontal cortex and related regulatory abilities, the socio-affective system in the prefrontal and subcortical areas begins to develop shortly after the onset of puberty (Teicher, Andersen, & Hostetter, 1995; Sisk & Zehr, 2005) leading to an early-adolescent peak in dopaminergic activity (Sisk & Zehr, 2005; Steinberg, 2008). Significant areas associated with the dopaminergic circuitry, including the amygdala, nucleus accumbens, the orbitofrontal cortex, prefrontal cortex, and the superior temporal sulcus (E.E. Nelson, Liebenluft, McClure, & Pine, 2005; Steinberg, 2008), play an integral role in motivational processes related to adolescent socio-emotional development (Casey, Getz, & Galvan, 2008; Ernst, Romeo, & Andersen, 2009; Luciana, Wahlstrom, Porter, & Collins, 2012). Specifically, dopaminergic activity in these areas triggers the behavioral activation system, which modulates goal directed and reward seeking approach behavior (Chambers, Taylor, & Potenza, 2003; Wahlstrom, White, & Luciana, 2010). Thus, a salient reward or goal in the environment activates the dopaminergic system, which causes adolescents to experience feelings of excitement and a desire to pursue it (Wahlstrom, Collins, White, & Luciana, 2010).

The dual-systems model asserts that the spike in dopaminergic activity driving reward-oriented action, in conjunction with immature self-regulatory abilities, underlies sensation seeking, risky, and reckless behavior, particularly in mid-adolescence (Fareri, Martin, & Delgado, 2008; Somerville, Jones, & Casey, 2010; Steinberg, 2008). In line with this framework, studies have shown that dopaminergic activity in the socio-affective system, particularly in the nucleus accumbens, peaks in early-adolescence (Bjork et al., 2004; Galvan, Hare, Voss, Glover, & Casey, 2007; Luciana et al., 2012; Steinberg, 2008) leading to increases in reward sensitivity (Urošević, Collins, Muetzel, Lim, & Luciana, 2012) and risky behavior (Matthews, Simmons,

Lane, & Paulus, 2004). Furthermore, synaptic pruning and the myelination of axons slowly bolster the cognitive control system through improved synaptic efficiency and connectivity between cortical and subcortical areas (Steinberg, 2008; Steinberg et al., 2008). According to Steinberg and colleagues (2008), "the temporal gap between the arousal of the socio-emotional system, which is an early adolescent development, and the full maturation of the cognitive system, which occurs later, creates a period of vulnerability to risk taking during middle adolescence" (p.1764).

1.4 Neuropsychological Development and Cyber-bullying

Examining the socio-cognitive development in adolescence, as well as the related neuropsychological changes, may be a useful approach for cyberbullying research. Especially during adolescence, social status and acceptance are powerful natural rewards (Luciana, et al., 2012; Paus, 2005), thus communicating with peers online may rely on the socio-affective and cognitive control systems. For example, research has shown that the presence of peers activates the dopaminergic circuitry, especially in early- and mid-adolescence, which motivates reward-seeking approach behavior in face-to-face contexts (Albert, Chein, & Steinberg, 2013; Ernst et al., 2009). Yet, in online contexts, adolescents have constant access to their peer networks, and make much of their online behavior public for their peers to see. Thus, any online social behavior, such as texting, posting a comment, or sharing a video, along with the perpetual presence of peers, may also activate the dopaminergic system. In early- and mid-adolescence, when the cognitive control system is still immature, the presence of peers may induce a reward-sensitive motivational state increasing the immediate appeal of temporary benefits associated with risky choices (Albert et al., 2013; Chein, Albert, O'Brien, Uckert, & Steinberg, 2011). Researchers have shown that the presence of peers activates the reward circuitry and increases

risk-taking behavior in adolescents, but not adults who are equipped with better regulatory abilities to suppress the reward system (Chein et al., 2011).

In addition to motivating reward-seeking behaviors, the socio-affective system also influences the way adolescents process social cues, make social judgments, and attribute intentions to others (Somerville, 2013; Steinberg, 2008). Although no research has yet examined how adolescents process social information in online settings, researchers have argued that several important features of online communication could influence perceptions of others' intentions and behavioral responses (Runions et al, 2013). For example, the lack of social cues and the use of visuals can obscure the message, which can lead to interpretations of hostile intent. When adolescents perceive a threat, anonymity and the online disinhibition effect can facilitate aggressive responses, especially when the cognitive control system is still immature.

Attenuated non-verbal communication in online settings may have implications for social interactions, particularly in adolescence. Longitudinal neuroimaging studies provide evidence to show that compared to children and adults, adolescents exhibit higher levels of neural activation to non-verbal social stimuli, such as facial expressions (Burnett, Sebastian, Cohen Kadosh, & Blakemore, 2011; Pfeifer et al., 2011; Somerville, 2013). One fMRI study presented 19 adolescents and 11 adults with a series of scenarios involving intentional or consequential actions to investigate the neuropsychological correlates related to intention attributions (Blakemore, den Ouden, Choudhury, & Frith, 2007). Whereas intentional scenarios required participants to think about their own intentions (i.e. you are in the cinema and have trouble seeing the screen, do you move to another seat?'), consequential scenarios involved natural occurrences (i.e., a huge tree suddenly comes crashing down, does it make a loud noise?). Scenarios involving intentional action elicited a greater response in the prefrontal cortex in

adolescents than adults, and activation of the superior temporal sulcus in adults only. The researchers argue that inefficient processing and higher cognitive demands in adolescence may have led to greater activation of the prefrontal regions. Furthermore, the superior temporal sulcus is involved in predicting and interpreting the behavior of others (Pelphrey, Morris, & McCarthy, 2004), so the finding that only adults showed activation in this region suggests that adults may be more likely to select responses based on an evaluation of others' intentions. The ability to recruit this region of the brain to attribute intentions to others may be a result of better connectivity among brain regions.

Research has shown that peer acceptance and social dominance goals activate the socio-affective system and affect social information processing during adolescence (Guyer, Choate, Pine, & E.E. Nelson, 2011). Dopaminergic activity in the cortical and subcortical areas of the brain motivates reward-oriented, approach behaviors to form friendships (Güroğlu et al., 2008), gain social acceptance, and attain popularity among peers (Crone & Dahl, 2012). For example, a neuroimaging study by Guyer and colleagues (2011) found that peer acceptance activates the striatal regions of the brain, which are important in processing social rewards. Although adolescent desirability ratings of their peers did not moderate the relationship between striatal activity and peer acceptance, participants still reported more happiness when a desirable peer provided positive feedback. On the other hand, social feedback from undesirable peers activates areas in the prefrontal cortex involved in reappraising social stimuli. When less desirable peers provide positive feedback, adolescent interest ratings of these peers are amenable to change. Upon learning about a less desirable peer's positive feedback, strong peer acceptance goals may motivate adolescents to update initial assessments about whether or not they liked the peer.

Researchers have long known that attaining popularity is an important goal in adolescence (Smetana et al, 2006). Interacting with popular peers may be more rewarding than interacting with less popular peers as high status peer affiliations may provide adolescents with a social advantage. The earliest developmental studies investigating perceptions of peer groups found that individuals begin placing a greater importance on high status group affiliations in early- and mid- adolescence (Gavin & Furman, 1989). Recent studies were able to replicate these findings as well. LaFontana and Cillessen (2010) presented a large sample of children and adolescents with hypothetical dilemmas and asked them to choose between a behavior that would enhance their status and one that would provide other beneficial outcomes. Their findings show that the importance of popularity peaked in late middle school years (i.e., mid-adolescence). Although more research is required, these studies provide some evidence to suggest that the highly active reward circuitry may contribute to the mid-adolescent preoccupation with social status.

Still, researchers know very little about the role of social status in online settings where it may be more salient. In addition to prior knowledge about a peer's social networks and social dominance that contribute to perceptions of popularity (Parkhurst & Hopmeyer, 1998), adolescents with social media accounts can access their peers' profiles where they can obtain information about the number of friends and followers their peers have. Furthermore, many social media sites allow individuals to respond to uploaded images and videos with 'likes' or 'upvotes', which are positively valenced indicators of approval for the uploaded material. These 'votes' of approval are visible to others online and may correspond with the individual's social standing. For example, popular adolescents may receive more likes and upvotes on social media sites because they have many friends and followers who have access to their shared uploads.

Similarly, positive feedback for uploaded images and videos in the form of comments may also indicate popularity to others online. As popularity goals become increasingly important in mid-adolescence, online popularity salience may have a large influence on adolescent perceptions of hostility and behavioral response decisions. During this period of development, engaging in aggressive or sensation-seeking behavior to achieve powerful status goals may be worth the risk, as the immature cognitive control system struggles to regulate the reward-oriented socio-affective system (see Hawley, 2003; 2007; also see Mayeux, Sandstrom, & Cillessen, 2008; Steinberg, 2008).

The increasing importance of popularity from early- to mid-adolescence may increase concern over peer rejection. The public nature of the online context, as well as heightened ambiguity caused by a lack of social cues may contribute to this concern. Mounting social anxieties and hyper-vigilance towards social threats may increase hostile intention attributions and result in acts of rage or revenge (Davis & Reyna, in press). As social status goals peak in reward value, the socio-affective system may overwhelm the immature cognitive control system and curb the regulation of emotional and behavioral responses (Silvers et al., 2012). In an fMRI study examining rejection in adolescence and adulthood, the researchers told participants to play a game of catch online with two other players (Sebastian et al., 2011; Sebastian, Viding, Williams, & Blakemore, 2010). In this 'Cyberball' task, participants in the inclusion condition had possession of the ball for a third of the time. In contrast, participants in the exclusion condition were equally included for the first eight throws of the game, and completely excluded for the remaining fifty throws. The researchers found that individuals in both early- and mid-adolescence were hypersensitive to peer rejection, as indicated by significantly lowered mood in the ostracism condition, and that rejection sensitivity decreases into adulthood (Sebastian et al.,

2011; Sebastian et al., 2010). Furthermore, the study showed that individuals in mid-adolescence had greater state anxiety than younger adolescents and adults at baseline, which may indicate a vulnerable period for social anxiety in mid-adolescence (Sebastian et al., 2010). These results suggest that, especially in mid-adolescence, individuals may be prone to perceiving messages online as threats. Furthermore, cyber-bullying may affect individuals in mid-adolescence more strongly than younger adolescence and adults, which can lead to higher levels of depressed mood and anxiety.

1.5 Social Information Processing and Hostile Intent Attributions

Neuropsychological development of socio-affective and cognitive control systems may underlie changes in adolescent socio-cognitive abilities online. As motivation for popularity and social acceptance increase from early- to mid-adolescence, adolescent sensitivity to various social cues may fluctuate accordingly. Furthermore, improvements in regulatory abilities may influence adolescents' response evaluations and decisions, which may ultimately lead to differences in behavioral reactions among different age groups. The social information processing (SIP) model is a major theoretical framework used to examine these abilities, and has received much attention in the study of bullying (Camodeca, Goossens, Schuengel, & Meerum Terwogt, 2003) and aggression (e.g. Dodge et al., 2003; Dodge & Coie, 1987). A recent article by Runions et al. (2013) proposed using the SIP model as a framework for the study of cyber-aggressive behavior. They argue that this model may lead to significant discoveries as the encoding and interpretation, goal selection, and response selection phases of the SIP model may differ in online contexts. Although, the online context has changed the landscape of social interaction for youth, very few studies have examined the links between hostile intent attributions and cyberbullying involvement (Barnett, Nichols, Sonnentag, & Wadian, 2013;

Pornari & Wood, 2010). Thus, there is a need for more research to disentangle the cognitive-developmental correlates of cyberbullying.

According to Crick and Dodge (1994), the SIP model describes the multi-step cognitive operations for reacting to situational cues and selecting an appropriate behavioral response. SIP operations occur in sequence beginning with encoding the cues from the environment. During this step, individuals selectively attend to the environmental cues, make judgments about the intentions of others, and assess whether they can successfully achieve their goals. In online contexts, adolescents may encode the content of a message, but they may also attend to the use of images and emoticons (i.e., images commonly used in text-based communication, often to convey emotions or tone), popularity cues, the use of emoticons, the length of the message, etc. Individuals then interpret these cues in the second step of SIP. Specifically, they give meaning to the situation by conducting a causal analysis, making inferences about the intentions of others, assessing their own social goals, evaluating the situation in terms of past experiences, or determining the significance of an exchange for self- and others (Crick & Dodge, 1994). Thus, the use of emoticons, for example, may have meaningful effects on intent interpretations.

Whereas steps one and two involve interpreting cues from the environment, steps three through six are concerned with response evaluations and decisions. The third step of SIP involves the selection of goals or desired outcome in any given situation. Runions et al. (2013) proposed that certain features of communication technology affect the way individuals evaluate their goals. For example, the perception of an audience and the ability to remain anonymous can change the way adolescents approach agentic goals (related to power) and communality goals (related to belonging). On the one hand, social media exposes individuals to a wider audience of peers, which can serve as an opportunity for youths to assert their power by humiliating their

victims. On the other hand, if individuals favour communality goals, anonymity allows them to act aggressively without being concerned about the social consequences commonly associated with aggressive behaviour. The selection of goals then motivates the individual to think about possible courses of action in the fourth step of SIP. The individual evaluates their options in terms of outcome expectations and self-efficacy in the fifth step, and selects the behavior that they believe will allow them to accomplish their goal. In mid-adolescence, disparate maturation of the socio-affective and cognitive control systems may result in the selection of goal-oriented cyber-aggressive behaviors regardless of the risks and consequences. Once the individual has made a decision about how they should respond, they enact the behaviour in the final step (Arsenio & Lemerise, 2004).

The SIP model has been largely neglected in research on cyber-aggression despite its heavy influence on research examining social interactions and aggression in children and adolescence (Dooley, Pyżalski, & Cross, 2009). Yet, the lack of SIP research on cyber-bullying is also surprising because it may have a better ecological validity in online contexts. Critics have argued that such situational ambiguities do not exist in real-life social interactions as paralinguistic cues (e.g. facial expressions, body posturing, tone of voice) are easily accessible in face-to-face contexts (Runions et al., 2012). Runions and his colleagues (2012) argue that ambiguity created by an absence of social cues in online contexts is unparalleled in face-to-face contexts. Furthermore, individuals process other social information such as emoticons, punctuation, and the use of capital letters, which researchers believe may sometimes obscure the message further (Runions et al., 2012). For example, people use smiling emoticons to indicate a positive overtone, but when an individual uses this positively-valenced emoticon in conjunction

with an offensive message, readers may question the intentions of the sender. As a result, online communication may mirror the experimental conditions often used in the study of SIP processes.

Researchers have shown a robust relationship between hostile intent attributions and aggressive behaviour (Arsenio, Adams, & Gold, 2009; Crick & Dodge, 1996; Orobio de Castro, Veerman, Koops, Bosch, & Monshouwer, 2002; Orobio de Castro, Verhulp, & Runions, 2012). Although no studies replicate these results for cyber-aggression, it is likely that children and adolescents who often engage in cyber-aggression are also more likely to attribute hostile intentions to others online. Only a few studies have examined the links between cyber-bullying and SIP. In one study, a sample of 159, 12- to 14-year olds completed a 26-item Peer Aggression/Victimization Questionnaire, and a 40-item questionnaire assessing moral disengagement, hostile attribution bias, and outcome expectancies (Pornari & Wood, 2010). The results of this study only showed a concurrent relationship between hostile intention attributions and cyber-victimization, which suggests that cyber-victimized adolescents may perceive threats more readily in their daily lives. The authors failed to find a relationship between cyber-bullying and hostile intent attributions. As cyber-bullying is a proactive form of aggression, the researchers suggest that cyber-bullies may not have a deficit in encoding and interpreting social cues, and instead show more problems with goal-oriented response selection that happens in the later stages of social information processing. Other researchers have made similar conclusions and suggested that problems associated with risky decision-making and a willingness to harm others contribute to proactive aggression (Arsenio et al., 2009).

In addition to not finding a relationship between cyber-bullying and hostile-intent attributions, the researchers also failed to find age-effects for hostile intent attributions. The measures used to examine hostile intent attributions may account for these results. Traditionally,

researchers have measured hostile intent attributions using hypothetical stories describing an ambiguous social situation where there is a negative outcome for the protagonist. The researchers would then ask participants whether the negative outcome was an accident, or if another character in the story intentionally harmed the protagonist (Arsenio et al., 2009; Crick & Dodge, 1996; Dodge & Coie, 1987; Orobio de Castro et al., 2002; see Runions et al., 2013). This ambiguity forces children and adolescents to construct their own representations of the situation using only the social cues available in the vignette (Dodge, 1980). The study by Pornari and Wood (2010) examined by hostile intention attributions with a four-item scale measure containing statements like "other kids are always trying to start a fight with me." High scores on this measure may not just be tapping into adolescents' social cognitions, but also reflect adolescents' experiences in social situations. Thus, cyber-victimized adolescents may not have any deficiencies in encoding and interpreting social cues. Instead, they may score highly on Pornari and Wood's measure because the statements are accurate descriptions of their daily lives.

Another study examined how previous victimization and attitudes toward teasing influence intent attributions for ambiguous Facebook messages in early- to mid- adolescence (Barnett, et al., 2013). The researchers presented a sample of 69, grade 6 to 8 students, with four ambiguous teases and asked the students to report their emotional and behavioral reactions. The researchers found that previous victimization and negative attitudes towards teasing predicted hostile intent attributions for ambiguous Facebook messages, which in turn predicted negative emotions and aggressive or avoidant behavior.

The SIP model has emerged as a viable framework for the study of cyber-bullying (Runions et al., 2013), but researchers have yet to consider developmental influences on social information processing (Barnett et al., 2013). This is not surprising as studies examining the

developmental correlates of SIP across the lifespan are limited, and these studies have often focused on younger children (e.g. Runions & Keating, 2007). Still, research examining the links between cyber-bullying and SIP may help explain why recent research in the developmental sciences have found evidence for a developmental curvilinear trajectory of cyber-aggression (Ortega et al., 2009; Tokunaga, 2010; Williams & Guerra, 2007).

Given the developmental changes that occur between early- and mid-adolescence, there is reason to believe that age differences in SIP exist. However, there are only a few, if any, studies examining broad developmental changes in adolescent SIP. One study examined the social information processing patterns in a sample of 624, 9- to 12- year old participants (Crick & Dodge, 1996). In this study, the researchers used a hypothetical situation instrument containing six vignettes that described an ambiguous provocation. The participants responded to two questions about the provocateur's intent. One multiple-choice question that assessed hostile intent attributions asked participants to select one of four possible reasons (two benign and two hostile) for the harm caused in the vignette. The second questions asked participants if the provocateur's intentions were hostile, or if what happened in the story was an accident. The results of the story showed that proactively aggressive children, who were identified through teacher reports, evaluated aggressive acts more positively than their non-proactively aggressive counterparts did. A second finding showed that hostile intent attributions predicted reactive aggression, as reported by teachers. A final finding of this study showed that preadolescents attribute more hostile intent attributions, and evaluate aggression less negatively, than individuals in early adolescence. Furthermore, results obtained using a social goal instrument showed that participants in early adolescence preferred relational to instrumental goals more often than preadolescents. These results provide evidence for the existence of developmental

differences in hostile attributions. It is possible that varying preferences for goals produce differences in the way preadolescents and individuals in early adolescence perceive threats and, in turn, attribute hostile intentions to others.

A second large-scale study conducted by D.A. Nelson and Crick (1999) examined the role of SIP in face-to-face contexts in 887, 10- to 12-year-old. In this study, the researchers used peer nominations to assess prosocial and aggressive tendencies and a hypothetical situation instrument to assess intent attributions, feelings of distress, goal clarification and response decisions. The measures used to assess intent attributions and distress feelings consisted of ten hypothetical stories in which a provocation occurred, but the intent of the provocateur was ambiguous. The findings show that in both the preadolescent and early adolescent age groups, nominated prosocial participants were less likely than nominated aggressive participants to attribute hostile intentions to others under ambiguous instrumental provocation. For relational provocations, however, the researchers found an age by prosocial group interaction. Early adolescents, but not preadolescents, in the prosocial group attributed less hostile intentions to the provocateur. The researchers suggest that this may indicate that as adolescents grow older, prosocial adolescents are better able to discriminate between hostile and benign intentions in more subtle, indirect forms of aggression.

As previously mentioned, individuals in mid-adolescence place a higher importance on popularity than younger adolescents and adults (LaFontana & Cillessen, 2010), and the value of social status rewards may be at its peak. Thus, during this period, adolescents may be especially sensitive to social cues (e.g., emoticons, social status cues) and popularity in online contexts and face-to-face contexts alike. Mid-adolescents may show more thorough encoding of social cues, focusing on much more than the content of the message. As older individuals have better

regulatory abilities and show better social cue processing, they may also be better able to distinguish between hostile and benign intentions, and therefore attribute less hostile intentions (see D.A. Nelson & Crick, 1999). In contrast, preadolescents may not be able to make the distinction between hostile and benign intentions in ambiguous scenarios, and err on the side of self-protection by attributing hostile intentions to others (Crick & Dodge, 1994; Orobio de Castro et al., 2002). Still, mid-adolescence is a period of vulnerability for risky behavior as the socio-affective and cognitive control systems follow different developmental timetables (Steinberg, 2005; 2008). In line with the curvilinear model of cyber-bullying, activation of the dominant socio-affective system in the presence of strong social status goals may also lead to an increased goal-oriented risky, and perhaps aggressive, behavior.

Chapter 2: Hypotheses

Recent neuroimaging studies have shown tremendous morphological changes in the brain over the course of adolescence. During mid-adolescence, the developing motivational and regulatory systems play a role in risky and reckless behavior, especially in social contexts. There is reason to believe that these systems are part of the underlying developmental mechanisms that contribute to cyberbullying behavior. Based on the review of cyber-bullying literature, the dual systems model approach to adolescent neuropsychological development, and the social information-processing model, are viable frameworks for research examining the development of cyber-bullying behavior. The present research is an exploratory cross-sectional study that, to our knowledge, will be the first to examine the relation between adolescent socio-cognitive development and cyber-bullying. The goals of this study are 1) to replicate the increase in cyber-bullying other studies have found from early- to mid- adolescence, and 2) to examine age

differences in the way emoticons and popularity affect hostile intention attributions in online contexts.

Previous studies on have found a curvilinear cyber-bullying trend that peaks in mid-adolescence, yet no research has examined the possible underlying psychological and developmental mechanisms. The first hypothesis is that cyber-bullying will increase from early- to mid- adolescence, replicating results from previous research and providing partial support for the curvilinear argument. Researchers have shown that although activity in the dopaminergic system peaks in early-adolescence, motivations for rewarding social status goals peak in mid-adolescence. As mentioned earlier, the omnipresence of peers in online contexts may induce a reward-sensitive state, thereby increasing risky and reckless online behaviors (Albert et al., 2013; Chein et al., 2011). As the reward value for social status increases, and immature cognitive abilities are unable to regulate adolescent risk-taking behavior, mid-adolescence may serve as a period of vulnerability to cyber-bullying behaviors. Thus, in this study, we expect an increase in cyber-bullying behavior from early- to mid- adolescence, as well as increased reward-oriented motives for cyber-bullying aimed at gaining affective (e.g. making others laugh), material, and social rewards through cyber-bullying. These are distinct from cyberbullying motivations that aim to reduce aversive emotions to or redress a perceived injustice (Runions, 2013).

The second hypothesis posits that the presence of online social cues will influence hostile intent attributions, and this effect will be greater in mid-adolescence. From early- to mid-adolescence, increasing activation in the reward circuitry to social stimuli and popularity may allow for improved social cue detection and encoding (see Burnett et al., 2011; also see Somerville, 2013). In early-adolescence, inefficient encoding of online social cues may force individuals to rely, for the most part, on the textual content of a message when attributing intent.

Therefore, they may be more likely to perceive a seemingly threatening statement as an attack regardless of the social cues that are present. During mid-adolescence however, there may be an increase in reward circuitry activation to online social cues, such as emoticons, punctuation use, and capital letters, which take the place of social cues commonly used in everyday face-to-face interactions (e.g. facial expressions). Furthermore, the rising importance of social status in mid-adolescence may be met with a greater sensitivity to popularity. These social cues, in turn, help the adolescent interpret the intentions of the author thereby resolving any ambiguities they encounter.

Chapter 3: Methodology

3.1 Participants

This study uses a cross-sectional design with ninety 11-, to 14- year-old students (52.2% males) from a large middle school in Western Canada. The final sample included twenty-five 11-year-olds, thirty 12-year-olds, twenty-two 13-year-olds, and thirteen 14-year-olds. The participating school recruited nine different classrooms to participate in this study. We obtained parental consent from 40.6% of the students. Of the students who returned a consent form, eleven were absent on the day the data was collected.

Two reasons led to the selection of these age groups. First, research has shown that cyber-aggressive behaviour is prevalent among adolescents in early- to mid- adolescence (Li, 2007; Raskauskas & Stoltz, 2007; Wright & Li, 2013). Second, and more importantly, research has shown that cyber-aggressive behaviour increases from early adolescence and peaks in mid-adolescence (Tokunaga, 2011).

3.2 Procedures

3.2.1 Participant Recruitment. Once the Human Research Ethics Board at the University of Victoria granted approval for the current research project, we contacted two middle school principals for permission to conduct the study in their schools. Both principals agreed to participate, however, one school dropped out of the study as major administrative changes were taking place in the school.

The principal from the participating school recruited nine classrooms, with a total of 249 students enrolled in these classrooms, to take part in the study. The researcher distributing consent forms in the classrooms provided the students with more details about what their participation would entail and answered any questions they had. We asked the students to return a signed parental consent form if they wanted to participate in the study. Several teachers sent a consent form to parents in an e-mail requesting consent for their child's participation in the study. Consent provided electronically by a parent via e-mail was accepted. The e-mail was printed out, attached to a consent form, and stored by the researcher.

3.2.2 The Development of the Online Intent Attribution Measure. In an earlier qualitative pilot study, we conducted semi-structured interviews with a sample of twenty-one, 11- to 14- year old students. In the first fourteen interviews, we asked the students three questions about the way they determined the intentions of others online. In the first question, we asked the students to discuss a time when someone was being aggressive online, and how they determined that the intentions in this situation were hostile. The second question asked the students to discuss a time when someone was joking around online, and how they determined that the intent of the sender was to be funny. Finally, the third question asked the students about

a time when they received a message, but the intentions were ambiguous and they were not certain if the message was meant to be funny or aggressive.

In addition to the three questions asking the students to recall various situations where they were required to interpret the intent of the sender, we also asked the students whether the public or private nature of online contexts affects the way adolescents interpreted messages. An additional set of questions asked the students how they would show that they were trying to be mean or joking around online.

The responses provided by the first fourteen participants led to the development of twelve online vignettes where the intentions of the sender were ambiguous. We tested these vignettes with the final seven participants from the qualitative pilot study. For use in the current study, we selected eight vignettes that elicited both hostile and benign intent attributions as they indicated ambiguity. In addition, the scenarios were only selected if the students believed that situations similar to the ones shown in the vignettes could arise at their schools.

3.2.3 Assessment

We administered the questionnaires during class time and the students completed them in one 50-60 minute session. We asked the students to fill out the questionnaire using a pencil or pen, and discouraged them from talking to each other for the duration of the study. The researcher assured participants that their responses were confidential to the extent that was legally possible. Additionally, we informed the students that they did not have to answer any questions that made them feel uncomfortable and that they could stop participating at any time.

3.3 Measures

3.3.1 Online Hostile Intention Attributions, Emotional and Behavioral Reactions.

We constructed an instrument that consisted of eight hypothetical vignettes similar to other instruments used in previous research on social information processing (Crick, 1995; Dodge, 1980; see Appendix A), but applied an online context. In these vignettes, the protagonist receives a message online, in which the intentions of the sender are unclear. For example, an adolescent may read a message that says, "I'm going to post that video of you so everyone can see it" and interpret either hostile or benign intentions. A participant attributing benign intentions may believe that the person who sent the message wanted to post something positive to impress others. In contrast, a participant attributing hostile intentions may assume that the person posting the video may be trying to humiliate them by posting embarrassing content online. To make the vignettes more realistic, we showed participants an image of the message as it would appear on popular social media sites.

The vignettes comprised the *After School Story*, *Posting Video Story*, *Telling Others Story*, *Big Crush Story*, *Shower Story*, *Ugly Face Story*, *Geography Project Story*, and the *Creeps Me Out Story*. In the *After School Story*, the protagonist receives a message from a peer that says "We'll find you after school." The *Posting Video Story* describes a situation where a peer sends a message saying that they will be posting a video of the protagonist online. In the *Telling Others Story*, a peer sends a message that says they will tell everyone else about something that happened during the previous night involving the protagonist. A peer impersonates the protagonist online and confesses their affection for another peer in their contact list in the *Big Crush Story*. The *Shower Story* is similar in that a peer also impersonates the protagonist online, however, in this story, the peer sends a message to others that makes it appear

as if the protagonist does not shower regularly. The *Ugly Face Story* describes a situation in which the protagonist is absent from school and receives a message from a peer that says they heard the reason that the protagonist did not come to school was because they could not get their 'ugly face' out of bed. In the *Geography Project Story*, the protagonist and a peer finished a geography project at a peer's house. When the protagonist returned home, the peer sent them a message that says "thanks for leaving me." Finally, in the *Creeps Me Out Story*, a peer sends a message that says "hi, your weirdness creeps me out" to the protagonist.

For each vignette, we experimentally manipulated the social status of the peer who wrote the message (i.e., popular vs. unpopular), the presence of a smiling emoticon (i.e. smiley face vs. none), and the public/private nature of the message (i.e. social media vs. text message) to create eight different versions of each vignette, as shown in Table 1. Using the Latin square technique, we randomized the presentation order for each vignette and condition and counterbalanced the order of presentation across participants resulting in 16 versions of this measure. Following the presentation of each vignette, the participants responded to a question asked the participant to circle the intention of the message sender, to which the options were 'She/He was trying to be mean,' or 'She/He was not trying to be mean.'

3.3.2 Cyber-bullying and Cyber-victimization. We measured cyber-bullying perpetration and victimization using a 24-item Cyber-bullying and Cyber-victimization Questionnaire (Law, Shapka, Hymel, Olson, & Waterhouse, 2012; Law, Shapka, & Olson, 2010; see Appendix B). In the first twelve items, participants self-reported how often they engaged in cyber-bullying on a scale of one (Has never happened) to five (Happens several times a day). A sample item for the cyber-bullying subscale is "how often have you posted, re-posted, or texted an embarrassing photo or video of someone that he or she did not want others to see?" The

cyber-bullying sub-scale had an acceptable internal consistency (α = .82). For each participant, we aggregated the scores on cyber-bullying items into a single cyber-bullying score.

Table 1.

Experimental Conditions for the Online Hostile Intention Attribution Measure

Vignette Condition	Public vs. Private	Emoticon Presence	Popularity
1	Public	Present	Popular
2	Public	Present	Unpopular
3	Public	Absent	Popular
4	Public	Absent	Unpopular
5	Private	Present	Popular
6	Private	Present	Unpopular
7	Private	Absent	Popular
8	Private	Absent	Unpopular

The next twelve items asked participants to report how often they experience various forms of victimization online using a scale of one (Has never happened) to five (Happens several times a day). A sample item for the cyber-victimization is "how often have you received a hurtful message from someone (for example by email, text, or chat)?" The internal consistency for the cyber-victimization subscale was good (α = .93). As we did with the cyber-bullying scores, we aggregated all of the scores on the cyber-victimization items into a single cyber-victimization score for each participant.

3.3.3 Cyber-aggression Motivation. We used a 31-item Cyber-aggression Self-control and Motive Scale (CASCaMS) to examine adolescent approach and avoidance motives for cyber-aggressive behavior (Bak & Runions, 2015; see Appendix C). This scale differentiates between four motivationally distinct forms of cyber-aggressive behaviors on dimensions of motivational valence and self-control. These forms of cyber-aggression include reward, recreation, revenge, and rage. Reward motives are characterized by a desire to gain some kind of a social or material reward, which are often achieved through controlled manipulative behavior. A sample item for the reward subscale includes "if I don't like someone, I use the internet to turn others against them." In comparison, recreation motives are also appetitive and motivate aggressive approach behavior, however, these behaviors are impulsive and motivated by affective rewards associated with joking and teasing. A sample item for the recreation motive subscale is "I like getting a reaction from people online, so I post things that may offend others." Unlike reward and recreation motives, revenge motives for cyber-aggression are reactive, yet controlled. Through careful planning, behaviors driven by revenge motives aim to redress a perceived injustice or a loss of power. A sample item for the revenge motive subscale is "if someone tries to hurt me, I will use my electronic device(s) to get back at them in my own time." Finally, rage motives lead to impulsive reactive aggression aimed at reducing feelings of distress, fear, and frustration. A sample item for the rage motive subscale is "I overreact before I have a chance to think about the consequences when someone says something mean online." The internal consistencies for recreation motives (α = .78), revenge motives (α = .88) and rage motives (α = .94) ranged from good to excellent, whereas the subscale for reward motives demonstrated an internal consistency below the satisfactory level of .70 (α = .63). One item was removed from the subscale but this only marginally improved the internal consistency (α = .65).

We aggregated the scores for each subscale into a single score for Reward, Recreation, Revenge, and Rage.

3.3.4 Missing Data. Overall, 1.69% of the data were missing. We conducted Little's MCAR test separately for each measure and obtained non-significant results. Significant MCAR results provide evidence to suggest that the data is not missing completely at random, so we fail to reject the null hypothesis that the data is missing completely at random. We then used a missing data method called maximum likelihood (ML), which uses all available data to estimate a value for missing data points (Baraldi, & Enders, 2009).

Chapter 4: Results

4.1 Cyber-bullying and Cyber-Victimization

The first goal of the study was to replicate the increasing cyber-bullying trend from early- to mid- adolescence. We used the Cyber-bullying and Cyber-victimization scale to examine the prevalence of cyber-bullying in adolescence. The means and standard deviations for cyber-bullying and cyber-victimization overall and across age groups and are shown in Table 2 and Table 3 respectively.

Table 2

Overall Means and Standard Deviations for Self-Reported Cyber-bullying and Cyber-victimization

Behavior	M	SD
Cyber-bullying	1.55	2.67
Cyber-victimization	4.72	6.75

Table 3

Means and Standard Deviations for Self-Reported Cyber-bullying and Cyber-victimization

	11-Year-Olds (n = 25)		12-Year-Olds (n = 30)		13-Year-Olds (n = 22)		14-Year-Olds (n = 13)	
Behavior	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Cyber-bullying	.74	1.17	.80	1.73	1.54	2.15	4.85	4.51
Cyber-victimization	2.84	2.96	2.90	4.96	5.05	5.11	12.00	11.90

Next, we examined the bivariate correlations between age, cyber-bullying, cyber-victimization, and four motivationally distinct forms of cyber-aggressive behavior shown in Table 4. Gender was not related to self-reported cyber-bullying and cyber-victimization and was therefore excluded from any of the analyses. There is a moderate positive correlation between age and cyber-bullying, $r(88) = .44$, $p < 0.01$, as well as age and cyber-victimization, $r(88) = .40$, $p < 0.01$. Age accounted for 19% of the variance in cyber-bullying scores and 16% of the variance in cyber-victimization scores. For every one year increase in age from 11 to 14, cyber-bullying and cyber-victimization increased by .44 and .40 SDs respectively. Of the four motivationally distinct forms of cyber-aggression, only reward motivations for cyberbullying were positively related with age, $r(88) = .24$, $p < 0.05$, although this correlation was weak.

Table 4

Intercorrelations between Age, Cyber-bullying, Cyber-victimization, and Cyber-aggressive Motivations

Variable	1.	2.	3.	4.	5.	6.	7.
1. Age	–						
2. Cyber-bullying	.44**	–					
3. Cyber-victimization	.40**	.65**	–				
4. Reward	.24*	.74**	.59**	–			
5. Recreation	.11	.69**	.44**	.72**	–		
6. Revenge	.12	.60**	.55**	.57**	.56**	–	
7. Rage	.13	.65**	.57**	.61**	.68**	.89**	–

Note. *$p < .05$, **$p < .01$

Finally, we examined developmental differences in the forms of cyber-aggressive behavior (i.e., reward, recreation, revenge, and rage) among 11- to 14- year-old adolescence using a series of one-way ANOVAs. The assumption of homogeneity of variance was violated for reward and revenge scores as indicated by a significant Levene Statistic. To correct for this assumption violation, we used Brown and Forsythe's (1974) robust *F*-ratios, which can be used to test the long-tailed distributions that are found in the reward and revenge scores. The means and standard deviations for each of the motivationally distinct forms of cyber-aggression are shown in Table 5 and Table 6.

Only the one-way ANOVA for reward motives reached statistical significance, $F(3, 32) = 3.09$, $p < 0.05$. The Tukey Honestly Significant Differences (HSD) test was conducted for follow-up analyses (Howell, 2012). The post-hoc test shows that 14-year-olds engage in significantly more cyber-aggressive behavior motivated by reward than 11-, 12-, and 13- year-olds with Cohen's *d* of .75, .91, and .71 respectively. The younger age groups did not differ significantly from each other. One-way ANOVA's for recreation motives, $F(3, 86) = 1.66$, $p = .18$, revenge motives, $F(3, 50) = 1.90$, $p = .14$, and rage motives, $F(3, 86) = 2.50$, $p = .07$, all demonstrated a non-significant, curvilinear trend that declined from 11- to 13- years of age before sharply rising from 13- to 14- years of age.

Table 5

Overall Means and Standard Deviations for Cyber-aggressive Motives

Behavior	M	SD
Reward	5.44	1.03
Recreation	8.45	2.37
Revenge	8.48	3.63
Rage	18.29	8.15

Table 6

Means and Standard Deviations for Cyber-aggressive Motives by Age

	11-Year-Olds (*n*=25)		12-Year-Olds (*n*=30)		13-Year-Olds (*n*=22)		14-Year-Olds (*n*=13)	
Cyber-Aggressive Motive	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Reward	5.35	0.86	5.21	0.61	5.35	1.04	6.31	1.60
Recreation	8.56	2.33	8.02	2.05	8.18	2.28	9.69	3.07
Revenge	7.96	2.81	8.85	4.21	7.46	3.21	10.31	4.48
Rage	17.60	7.23	18.41	8.70	15.91	7.23	23.38	8.63

4.2 Hostile Intent Attributions

All vignettes provided evidence for some degree of ambiguity as students attributed both hostile and benign intent attributions to each. Nevertheless, of the eight stories, students appeared to be attributing hostile intent more heavily in all stories except the *After School Story* and the *Geography Project Story*, which showed a relatively even split. For example, in the *After School Story* and the *Geography Project Story*, students attributed hostile attributions 56% and 46% of the time, respectively. For all other stories, students attributed hostile intent over 70% of the time. Specifically, students attributed hostile intent in the *Big Crush Story* 74% of the time, in the *Shower Story* 80% of the time, in the *Posting Video Story* 81% of the time, in the *Creeps Me Out Story* 81% of the time, in the *Telling Others Story* 84% of the time, and in the *Ugly Face Story* 92% of the time. This may have produced ceiling effects, which made it difficult to assess the way emoticons and popularity affect intent interpretations.

Separate logistic regression analyses were conducted for each of the eight vignettes to predict hostile intention attributions in early- and mid- adolescence. The variables age, emoticon (emoticon vs. none), popularity (popular vs. unpopular), as well as the interactions of these variables, were all included in the model as predictors. For each vignette, full and hierarchically nested partial models were contrasted with the constant only model to determine the best model fit. The logistic regression analyses of the best fitting models for each vignette are shown in Tables 7 to 14. The models for the *After School Story*, *Geography Project Story*, and the *Creeps Me Out Story* were all statistically significant when examined against the constant only model. Although the models in the *Big Crush Story* and the *Shower Story* were not statistically significant, it is worth noting that the non-significance of the model was marginal (i.e. $p < 0.10$). Three vignettes (i.e. *Posting Video Story*, *Telling Others Story*, and *Ugly Face Story*) showed no significant effects for the full models. The marginally significant and statistically significant results are discussed in more detail below.

For the *After School Story*, age, emoticon, and the age × emoticon interaction provided the best model fit, and the interaction is shown in Figure 1. This model was statistically significant indicating that the set of predictors reliably distinguished between hostile and benign intentions, $\chi^2(3) = 14.44$, $p < .05$. The Nagelkerke's R^2 of .20 indicates that the variables in this model predict 20% of the variability in hostile intention attributions. Overall, prediction success was 70% (78% for hostile intentions, 60% benign intentions). The Wald statistic for the age × emoticon interaction indicates that emoticons predicted fewer hostile intent attributions, and that this effect was stronger in older participants ($p = .05$). The odds ratio shows that from 11- to 14-years of age, when emoticons are present, the change in the odds of attributing hostile intent is

0.38. As adolescents age, the presence of smiling emoticons decreases the odds of attributing hostile intentions.

Table 7

Logistic Regressions for Hostile Intention Attributions Predicted by Age, Emoticons, and Interactions Between Variables in the After School Story

		95% CI for Odds Ratio		
	b(SE)	Lower	Odds Ratio	Upper
After School Story				
Intercept	- 0.87(3.97)	-	-	-
Age	0.14(0.33)	0.61	1.15	2.19
Emoticon	10.60(5.87)	0.41	4.03×10^4	3.97×10^9
Age × Emoticon	- 0.97(0.48)*	0.15	0.38	0.98

Note. *After School Story*: $R^2 = 0.15$ (Cox & Snell), 0.20 (Nagelkerke). Model χ^2 (3) = 14.44, $p < .01$**

Table 8

Logistic Regressions for Hostile Intention Attributions Predicted by Age, Emoticons, and Interactions Between Variables in the Posting Video Story

		95% CI for Odds Ratio		
	b(SE)	Lower	Odds Ratio	Upper
Posting Video Story				
Intercept	- 1.13(5.30)	-	-	-
Age	0.23(0.43)	0.54	1.26	2.96
Emoticon	8.39(6.87)	0.01	4.40×10^3	3.12×10^9
Age × Emoticon	- 0.72(0.56)	0.16	0.49	1.45

Note. *Posting Video Story*: $R^2 = 0.03$ (Cox & Snell), 0.06 (Nagelkerke). Model χ^2 (3) = 3.16, $p = .37$.

Table 9

Logistic Regressions for Hostile Intention Attributions Predicted by Age, Popularity, and Interactions Between Variables in the Telling Others Story

		95% CI for Odds Ratio		
	b(SE)	Lower	Odds Ratio	Upper
Telling Others Story				
Intercept	1.39(5.73)	-	-	-
Age	0.05(0.47)	0.42	1.06	2.64
Popularity	8.10(7.59)	0.00	3.31×10^3	9.50×10^9
Age × Popularity	- 0.70(0.61)	0.15	0.50	1.64

Note. *Telling Others Story*: $R^2 = 0.05$ (Cox & Snell), 0.08 (Nagelkerke). Model χ^2 (3) = 4.13, $p = .24$.

Table 10

Logistic Regressions for Hostile Intention Attributions Predicted by Age, Emoticons, and Interactions Between Variables in the Big Crush Story

		95% CI for Odds Ratio		
	b(SE)	Lower	Odds Ratio	Upper
Big Crush Story				
Intercept	1.63(3.84)	-	-	-
Age	- 0.06(0.31)	0.51	0.94	1.74
Emoticon	11.70(6.58)	0.30	1.20×10^{5}	4.79×10^{10}
Age × Emoticon	- 0.90(0.52)	0.15	0.41	1.13

Note. *Big Crush Story*: $R^2 = 0.07$ (Cox & Snell), 0.11 (Nagelkerke). Model χ^2 (3) = 6.94, $p = .07$

Table 11

Logistic Regressions for Hostile Intention Attributions Predicted by Age, Emoticons, Popularity, and Interactions Between Variables in the Shower Story

		95% CI for Odds Ratio		
	b(SE)	Lower	Odds Ratio	Upper
Shower Story				
Intercept	- 8.78(5.86)	-	-	-
Age	0.83(0.50)	0.86	2.29	6.09
Emoticon	0.84(0.57)	0.76	2.32	7.09
Popularity	15.20(7.47)*	1.76	3.98×10^{6}	9.01×10^{12}
Age × Popularity	- 1.27(0.62)*	0.08	0.28	0.94

Note. *Shower Story*: $R^2 = 0.09$ (Cox & Snell), 0.13 (Nagelkerke). Model χ^2 (4) = 8.00, $p = .09$

Table 12

Logistic Regressions for Hostile Intention Attributions Predicted by Age, Popularity, and Interactions Between Variables in the Ugly Face Story

		95% CI for Odds Ratio		
	b(SE)	Lower	Odds Ratio	Upper
Ugly Face Story				
Intercept	- 14.07(11.36)	-	-	-
Age	1.42(1.00)	0.59	4.16	29.34
Popularity	13.01(13.12)	0.00	4.47×10^{5}	6.64×10^{16}
Age × Popularity	- 1.15(1.14)	0.03	0.32	2.95

Note. *Ugly Face Story*: $R^2 = 0.04$ (Cox & Snell), 0.10 (Nagelkerke). Model χ^2 (3) = 3.76, $p = .29$

Table 13

Logistic Regressions for Hostile Intention Attributions Predicted by Age, Emoticons, Popularity, and Interactions Between Variables in the Geography Project Story

		95% CI for Odds Ratio		
	b(SE)	Lower	Odds Ratio	Upper
Geography Project Story				
Intercept	4.91(3.04)	-	-	-
Age	- 0.42(0.24)	0.41	0.66	1.06
Emoticon	- 1.71(0.77)*	0.04	0.18	0.83
Popularity	0.13(0.61)	0.35	1.14	3.72
Emoticon × Popularity	2.88(1.02)**	2.44	17.86	130.61

Note. *Geography Project Story*: R^2 = 0.20 (Cox & Snell), 0.27 (Nagelkerke). Model χ^2 (4) = 20.18, $p < .01$**

Table 14

Logistic Regressions for Hostile Intention Attributions Predicted by Age, Emoticons, and Interactions Between Variables in the Creeps Me Out Story

		95% CI for Odds Ratio		
	b(SE)	Lower	Odds Ratio	Upper
Creeps Me Out Story				
Intercept	16.24(6.76)*	-	-	-
Age	- 1.14(0.52)*	0.12	0.32	0.88
Emoticon	- 14.45(8.05)	0.00	0.00	3.76
Age × Emoticon	1.09(0.63)	0.87	2.97	10.17

Note. *Creeps Me Out Story*: R^2 = 0.08 (Cox & Snell), 0.14 (Nagelkerke). Model χ^2 (3) = 7.85, $p < .05$*

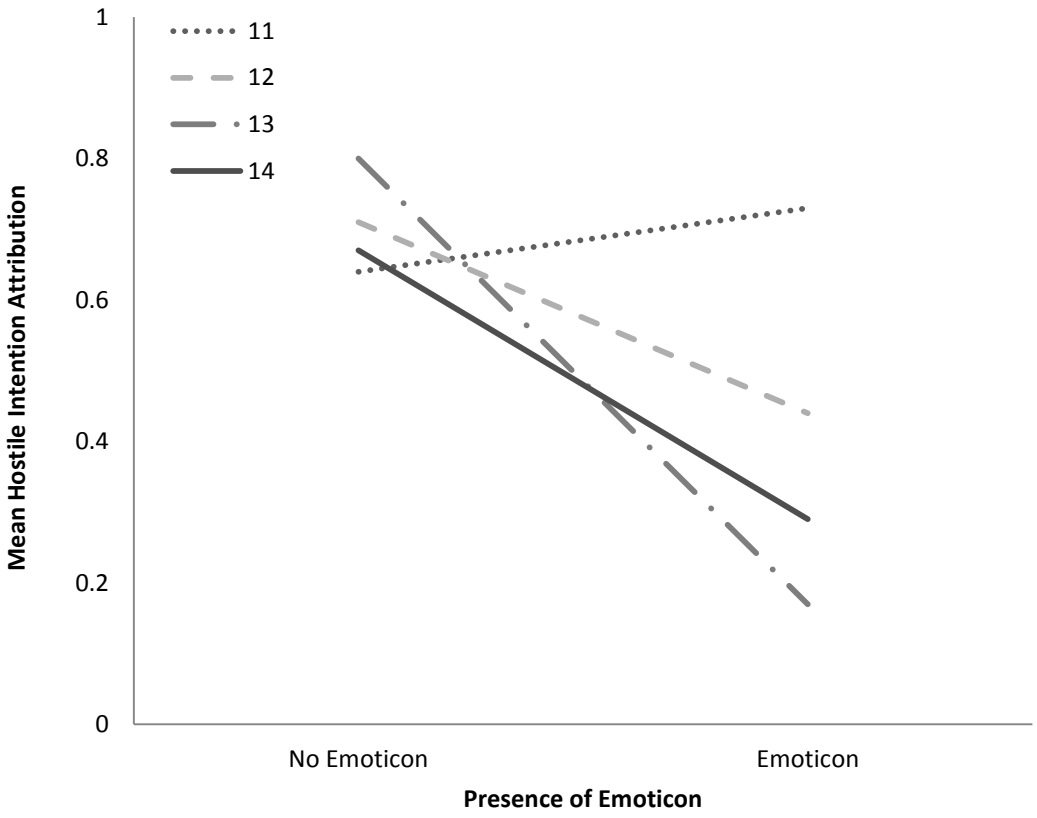

Figure 1. Interaction between the age group and the presence of emoticons in hostile intention attributions found in the *After School Story*.

The best model fit for the *Big Crush Story* was provided by adding the age, emoticon, and age × emoticon interaction variables, $\chi^2(3) = 6.94$, $p = .07$. Nagelkerke's R^2 is .11, which shows that 11% of the variability in hostile intention attributions is accounted for by the variables in the model. The overall prediction success was 73% (94% for hostile intentions, 13% for benign intentions). The Wald statistic for the age × emoticon interaction was marginally significant ($p < .10$), but also shows that the odds of attributions of hostile intent is 0.41, thus it decreases with age in the presence of emoticons. The interaction effect is shown in Figure 2.

Figure 2. Interaction between age group and the presence of emoticons in hostile intention attributions found in the *Big Crush Story*.

The best model fit for the *Shower Story* was provided by adding the age, emoticon, popularity, and the age × popularity interaction variables, $\chi^2(4) = 8.00$, $p = .09$. Nagelkerke's R^2 is .13, which indicates that the variables account for 13% of the variability in hostile intention attributions. The overall predication success was 80% (100% for hostile intentions, 0% for benign intentions). Although the model was marginally significant ($p < .10$), there was a statistically significant age × popularity interaction as indicated by the Wald statistic ($p < .05$). The interaction effect is shown in Figure 3. The odds ratio is 0.28 and shows that from 11- to 14-years of age, receiving a message from popular peers decreases the odds of attributing hostile intent.

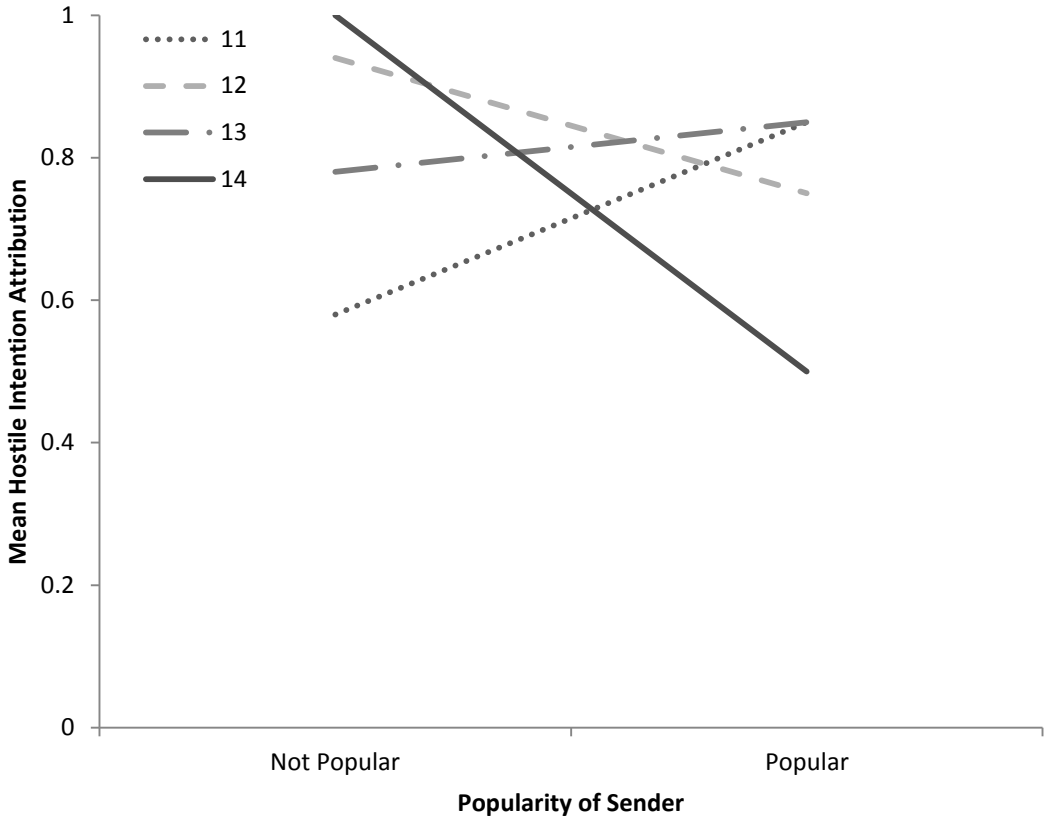

Figure 3. Interaction between age group and the popularity of the sender in hostile intention attributions found in the *Shower Story*.

The best model fit for the *Geography Project Story* was provided by adding the age, emoticon, popularity, and the emoticon × popularity interaction variables, $\chi^2(4) = 20.18$, $p < .01$. Nagelkerke's R^2 is .27, which shows that the variables in the model account for 27% of the variability in hostile intention attributions. The overall prediction success was 66% (61% for hostile intentions, 69% for benign intentions). As shown in Figure 4, the Wald statistic for the emoticon × popularity interaction indicates that adolescents were more likely to attribute benign intentions to unpopular peers when they used smiling emoticons. In contrast, adolescents were

more likely to attribute hostile intentions to popular peers when they used smiling emoticons ($p < 0.01$). The odds ratio is 17.86, which suggests that in the presence of emoticons, popular peers are more likely to be perceived as hostile in this vignette.

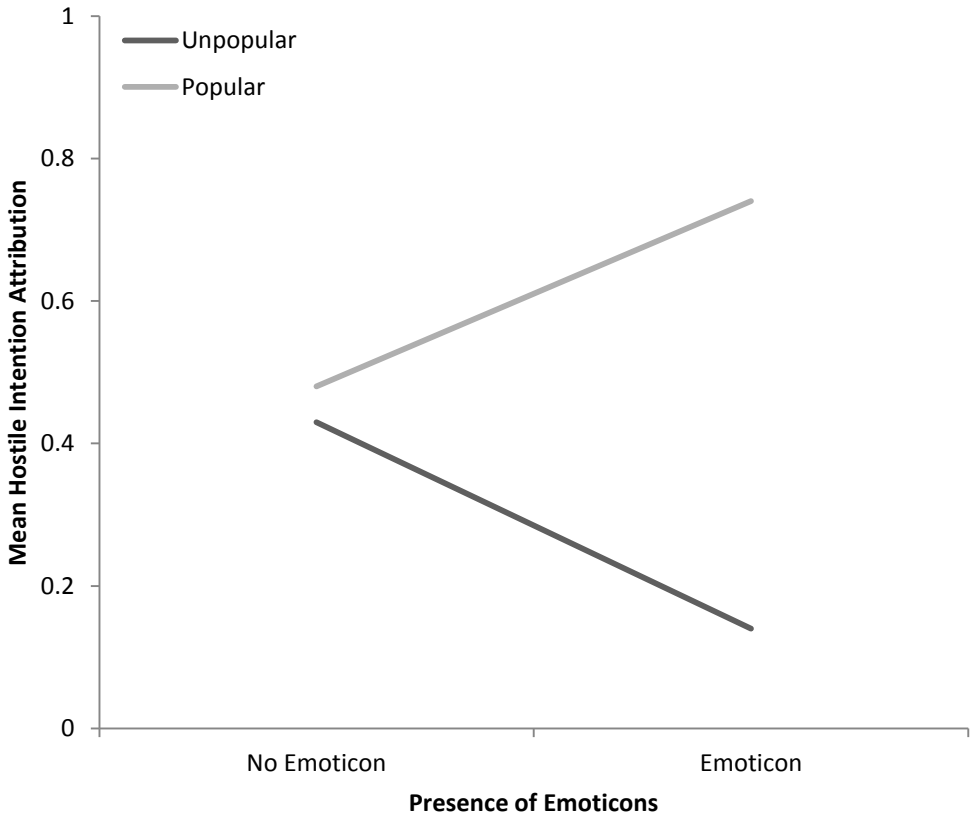

Figure 4. Interaction between the use of emoticons and popularity of the sender in hostile intention attributions found in *Geography Project Story*.

For the *Creeps Me Out Story*, the variables age, emoticon, and age × emoticon interaction, provided the best model fit, $\chi^2(3) = 7.85$, $p < .05$. Nagelkerke's R^2 is .14, which indicates that 14% of the variation in hostile intention attributions can be accounted for by the variables in the model. The overall prediction success was 81.1% (100% for hostile intentions,

0% for benign intentions). As shown in Figure 5, the Wald statistic showed a statistically non-significant effect for the interaction between age and emoticon, but it is important to note that the non-significant effect is marginal ($p < 0.10$). The odds ratio is 2.97, and shows that the odds of attributing hostile intentions to peers increase with age when emoticons are present in the message.

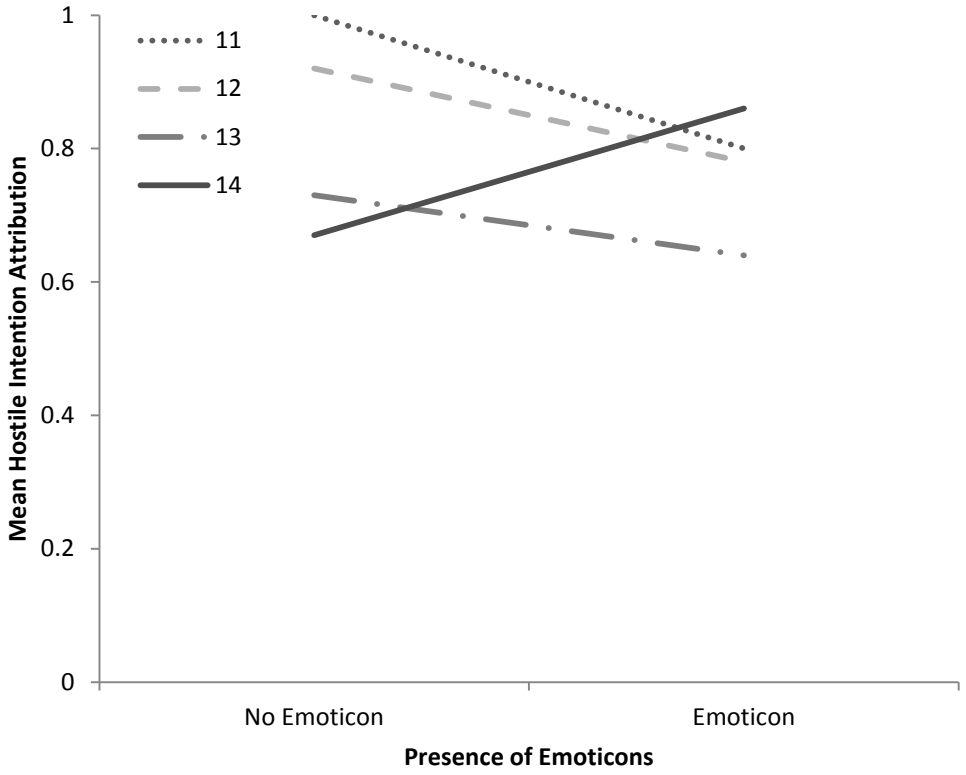

Figure 5. Interaction between age and the use emoticons in hostile intention attributions found in the *Creeps Me Out Story*.

Chapter 5: Discussion

5.1 Cyber-bullying and Cyber-victimization from Early- to Mid- Adolescence

This study is the first to consider the motivations and cognitions underlying cyber-bullying behavior in the context of adolescent development. Specifically, we examined how emoticons and perceived popularity influenced adolescents' intention attributions, and how the effects of these predictors vary across age groups in a cross-sectional sample of 11- to 14- year-olds. Additionally, we investigated the age group differences in adolescents' cyber-aggressive motives, as well as their emotional and behavioral reactions to perceived cyber-bullying.

In line with previous research, we were able to replicate findings that show an increase in cyber-bullying behavior and cyber-victimization from early- to mid- adolescence (Ortega et al., 2009; Jones et al., 2013; Williams & Guerra, 2007). The data was consistent with the developmental model proposed by Tokunaga (2010), however, given the cross-sectional nature of the study design, cohort effects and age-related environmental changes cannot be completely ruled out. Some researchers suggest that the age-related increase in cyber-bullying is a by-product of greater access to technology, which provides adolescents with more opportunities to engage in aggressive behavior (Holfeld & Leadbeater, 2015). However, changes in access to technology does not explain why other studies report a decreasing cyber-bullying trend from mid- to late- adolescence (Dehue, et al., 2008; Ševčíková & Šmahel, 2009; Slonje & Smith, 2008; Ortega et al., 2009). Online communication is just as, or perhaps more, accessible among older adolescents. With the exception of a study by Perren and Gutzwiller-Helfenfinger (2012) examining the effects of age on cyber-bullying through a moral development framework, very little research has investigated why mid-adolescence is a developmentally vulnerable period for

cyber-bullying and cyber-victimization. The results of this study are consistent with a model in which a developmental vulnerability for cyber-bullying increases from early to mid-adolescence.

It is possible that strong social goals compromise the developing regulatory system, which produces more cyber-aggressive behavior. In this study, we found that individuals in mid-adolescence report significantly greater reward motives for cyber-aggression than younger adolescents. These approach motives are characterized by a desire to gain a material or social reward. Our finding is in line with past research that shows a preoccupation with popularity in mid-adolescence. Furthermore, the cognitive control system is still immature in mid-adolescence, thus, the strong social goals may overpower adolescents' regulatory abilities, resulting in more cyber-aggressive behaviors motivated by reward goals. There were no developmental differences in adolescents' revenge and recreation motives. Recreations goals may not be perceived as cyber-aggressive behavior, and may not be motivated by social dominance goals, but rather one-sided affective rewards. In other words, joking online may only be amusing for the individual creating the joke. The insignificant developmental differences for revenge motives suggest that individuals in early- and mid- adolescence engage in controlled revenge at similar rates.

5.2 Developmental Differences in Processing Online Social Cues

In the current study, we aimed to address the research gap in our scientific understanding of cyber-bullying developmental mechanisms through an exploratory examination of the developmental processes that drive cyberbullying behavior. Building on the dual process model, which emphasizes the relationship between adolescent neuro-cognitive development and behavior (see Steinberg, 2005; 2008), we tested the hypothesis that age-related improvements in online social cue processing will influence hostile intent attributions. According to the dual

process model, the socio-affective circuitry becomes highly sensitive to social stimuli in mid-adolescence (Albert et al., 2013; Ernst et al., 2009; Somerville, 2013), which affects social information processing as individuals during this period of development are more likely to attend to, and process, additional social information, such as emoticons (Guyer et al., 2011). A growing sensitivity to social stimuli in face-to-face contexts likely translates to online contexts. Emoticons act as online social cues, which may also provide information about the intentions and motivations of others beyond any information relayed textually.

Our findings show some evidence to suggest that there are developmental differences in the way online social cues are processed and interpreted. Particularly in the *After School* and *Creeps Me Out Stories*, we found a significant interaction between age and the presence of emoticons. What is interesting is that these vignettes produced opposing emoticon effects on hostile intent attributions from early- to mid- adolescence in these vignettes. Specifically, in the *After School Story* where a peer sent a message saying that he will find the protagonist after school, emoticons slightly increased hostile intent attributions in 11-year-olds. With increasing age, however, adolescents were more likely to attribute benign intentions to the sender when the message "we'll find you after school" featured a smiling emoticon. These results suggest that 11-year-olds are more likely to rely on the textual content of the message and pay less attention to online social cues when attributing intentions to the sender. In comparison, individuals in mid-adolescence become increasingly sensitive to the presence of online social cues, and are more likely to process emoticons when attributing intentions to others. Alternatively, conventionalized emoticons may be more familiar to individuals in mid-adolescence who may have more experience interpreting and using them. In turn, familiarity with online social cues may allow older adolescents to recognize emoticons, understand their use with respect to social

conventions, and incorporate the emoticon's socially accepted meaning into their intent attributions. Future studies with individuals in late-adolescence or adulthood could be valuable in determining if individuals in mid-adolescence are indeed hypersensitive to online social cues, or if online social cue processing is related to experience with information and communication technology.

The interaction between age and the presence of positively-valenced emoticons had an opposite effect on hostile intent attributions in the *Creeps Me Out Story*. In this story, a peer's message to the protagonist says "hi, your weirdness creeps me out." The presence of emoticons slightly decreased the likelihood of attributing hostile intentions to the sender for 11- to 13-year olds. However, 14-year-olds were more likely to attribute hostile intentions when the message contained smiling emoticons. Although this finding was still consistent with the second hypothesis as these results show a developmental sensitivity to online social cues in mid-adolescence, the age-related increase in hostile intent attributions for structurally ambiguous messages was unexpected. One possibility for why positively-valenced emoticons produced divergent intent attributions in the vignettes may lie in the way adolescents interpret motives. In the *After School Story*, adolescents may interpret the message "we'll find you after school" as a threat to physical safety, whereas the message "hi, your weirdness creeps me out" in the *Creeps Me Out Story* may be perceived as an insult or social threat. In line with previous studies, individuals in mid-adolescence may have been more sensitive to messages that present a social threat (Davis & Reyna, in press; Sebastian et al, 2010; Sebastian et al., 2011) than a threat to physical safety, especially in the presence of online social stimuli that activate the socio-affective regions of the brain (Guyer et al., 2011; Somerville, 2013). This is consistent with studies showing diverging shifts in anxieties towards physical dangers and social evaluations.

(Westenberg, Drewes, Goedhart, Siebelink, & Treffers, 2004). Specifically, development from late childhood to mid-adolescence was associated with a reduction in anxieties related to physical dangers, and an increase in social evaluation anxieties. Therefore, due to a mid-adolescent sensitivity to social threats, the perceived severity of the provocation in the *Creeps Me Out Story* may have been heightened by the inclusion of online social cues.

5.3 Developmental Differences in Processing Popularity

Popularity may be more prominent in online contexts as individuals have access to more social status cues including information about the number of friends and followers a peer has, the number of positive and negative comments they receive after posting material online, and the number of 'likes' and 'upvotes' they receive after uploading a photo or message. As a result, the existence of these cues online may facilitate the detection of high status and low status peers. In addition to our hypothesis that individuals in mid-adolescence will be more likely to process and interpret emoticons, we also hypothesized that there will be developmental differences in the perceptions of messages written by popular and unpopular peers.

Individuals in mid-adolescence place a greater importance on social status goals than younger adolescents (LaFontana & Cillessen, 2010; Smetana et al., 2006). Thus, it is not surprising that there is more activation in the socio-affective circuitry during interactions with popular peers (Guyer et al., 2011). In our study, we found a significant interaction effect for age and popularity in the *Shower Story*, in which a peer impersonated the protagonist online and made it appear as if the protagonist did not shower. The effect of popularity was most dramatic in mid-adolescence. During this period of development, individuals were most likely to attribute benign intentions to popular peers and most likely to attribute hostile intentions to unpopular peers. The opposite was true for the 11-year-old participants. Although our findings provide

evidence for the developmental sensitivity to popularity in mid-adolescence, the results contradict previous research that shows relational aggression to be increasingly predictive of perceived popularity across a sample of students from grades 5 to 9 (Cillessen & Mayeux, 2004). The inconsistency among studies makes our finding difficult to interpret, a cross-sectional study by Warm (1997) may offer a possible explanation for our results in the *Shower Story*. In this study, the investigator asked 250 students from grades 1, 3, 6, 8, and 11, questions about their teasing behaviors. According to this study, participants across all ages believe that a desire to gain power and cause discomfort motivates teasing behavior, but after the age of 11, participants also reported positive, prosocial motives for teasing. The findings also show a steady increase of goodhearted, playful teasing and a concomitant peak in jokes about appearance and odor in 14-year-olds. Taken altogether, 11-year-olds may be associating aggressive teasing behavior with high-status peers and motivation to gain and maintain dominance. By mid-adolescence, playful teasing increases, especially when it comes to appearance and body odor, which may result in greater attributions of benign intent. At the same time, social status goals are highly rewarding during this period of development, and adolescents become more sensitive to social threats. Thus, individuals in mid-adolescence may perceive low status peers to be in pursuit of power by humiliating and dominating peers. The relationship between popularity and hostile intent attributions requires further research as our findings and interpretations are highly speculative.

Although it is not central to the study, we found an interesting interaction between the presence of online social cues and popularity in the *Geography Project Story*. There was little difference in intent attributions for both popular and unpopular peers when no online social cues were present in the message. However, when online social cues in the form of positively-valenced emoticons were included, adolescents were more likely to attribute hostile intentions to

popular peers, and also more likely to attribute benign intentions to unpopular peers. This is in line with previous research, which shows that when high status individuals engage in teasing behavior, others are more likely attribute hostile intentions (see Keltner, Capps, Kring, Young, & Heerey, 2001). The positively-valenced emoticon following the message "thanks for leaving me" may have strongly indicated to the adolescents that the message was a joke or tease. However, differential interpretations of teases from high and low status individuals may have contributed to the observed interaction. Another possible explanation for the findings can be taken from the dual process model. Messages from popular peers elicit greater activation of the socio-affective system (Guyer, McClure-Tone, Shiffrin, Pine, & Nelson, 2009). A stronger activation of this system may result in differential processing of online social cues. Teasing by popular peers may present a greater social threat for adolescents, which in turn, can lead to more interpretations of hostile intentions.

Chapter 6: Limitations and Future Directions

An important limitation of this study is the small sample size. We analyzed the data using logistic regressions, which use maximum likelihood coefficients and require larger sample sizes than linear regressions. Additionally, R.P. Burns and R. Burns (2008) recommend a minimum of 50 cases per predictor. As our models included age, popularity, and emoticons, as predictors, as well as 2-way and 3-way interactions between the independent variables, we would require a sample size of 350 participants for a complete analysis consistent with the recommendations. Insufficient power for our analysis may account for our inability to obtain consistent results across vignettes and may have produced spurious results.

Variations in participants' definitions of popularity may be another limitation of our study. In each of the vignettes, participants read messages from hypothetical popular and

unpopular peers. However, a potential threat to internal validity is the possibility that the definition of popularity differed across participants and age groups. Some participants may have applied definitions consistent with sociometric popularity, which describes well-liked peers. Researchers who have examined popularity from this perspective found that sociometrically popular individuals are less likely to start fights, are cooperative, kind, honest, and trustworthy (Lease, Musgrove, & Axelrod, 2002; Parkhurst & Hopmeyer, 1998). Other participants may have applied definitions consistent with perceived popularity. According to this definition, popular peers are socially dominant individuals who have larger peer networks, and admirable characteristics including leadership and confidence (Cillessen & Rose, 2005; Parkhurst & Hopmeyer, 1998). The probability of attributing hostile intent to popular peers would likely change depending on which definition of popularity the adolescent applies in each vignette. Future research should disentangle the relationship between popularity and hostile intent attributions by examining both definitions of popularity in cyber-aggression research. Furthermore, we argued earlier that popularity cues may be more prominent in online settings. Eye-tracking technology can be used to examine how adolescents process popularity cues, such as 'likes' or number of friends, when attributing intentions to others.

The present study used a cross-sectional sample to examine developmental differences among age groups. Additional research should include longitudinal samples in order to examine how social information processing abilities develop in adolescence. Furthermore, longitudinal research can help disentangle the causational relationship between social information processing and cyber-aggressive behaviors and motivations. In addition to longitudinal sample, research examining the curvilinear cyber-bullying trend that peaks in mid-adolescence would benefit from

an additional sample with individuals in late adolescence. Due to the current sample, we were only able to examine the hypothesized increasing trend from early- to mid-adolescence.

Chapter 7: Conclusion

This study used a developmental perspective to examine the relations between adolescent social cognitions and cyber-bullying behavior from early- to mid- adolescence. We found an increasing cyber-bullying trend from ages 11 to 14, which is consistent with findings from previous research. The results also showed some support for developmental differences in the way early- and mid-adolescents process online social cues and messages written by popular and unpopular peers. Specifically, we found that in a vignette where ambiguous messages can be perceived as threats to physical safety, positively-valenced emoticons serve as online social cues that soften the message across age groups, and that this effect was stronger among individuals in mid-adolescence. Another vignette, where ambiguous messages can be perceived as a social threat, however, showed that positively-valenced emoticons reduce the likelihood that individuals in the younger age groups will attribute hostile intentions to peers, but increase hostile intent attributions in older age groups. We suspect that a sensitivity to social threats, but not threats to physical safety, in mid-adolescence contribute to differences in the way online social cues are perceived.

With respect to popularity, the results show that 11-year-olds are more likely to attribute hostile intent to popular peers, whereas 14-year-olds are more likely to attribute hostile intent to unpopular peers. This may be related to the steady increase of positive prosocial teasing from early- to mid- adolescence, along with an increasing awareness of positive or prosocial motivations for teasing. At the same time, the importance of dominance goals in mid-

adolescence may lead 14-year-olds to perceive unpopular peers as motivated by the pursuit of power, and interpret the tease as a social threat.

In line with the dual process model, we did find some evidence consistent with the idea that strong social goals in mid-adolescence may overpower the cognitive control system to produce cyber-bullying behavior. Individuals in mid-adolescence were more likely to engage in cyber-bullying motivated by material or social rewards. Despite our small sample size, and limitations with regards to popularity definitions and sample size, we believe our study provides a good foundation for further research examining the developmental processes that underlie cyber-bullying behavior.

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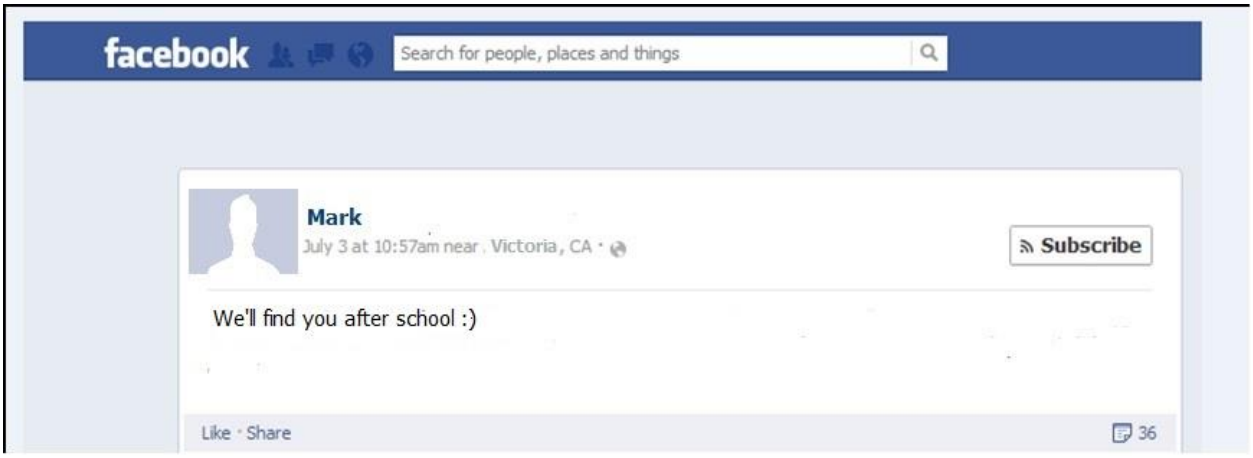
Appendices

Appendix A: Online Hostile Intent Attribution Measure

After School Story (From Boy Version; Condition 1: Emoticon Present, Popular Peer, Public)

Tim is a boy in middle school, just like you. When Tim reads through the messages on his social media sites, he finds one from Mark, a popular boy in his school. The message was on his profile where everyone can see.



1. **Do you think Mark was trying to be mean? (Circle 1 or 2)**
   1 He was trying to be mean
   2 He was not trying to be mean

2. **How would you feel if you were Tim? Write down the emotion that you would feel most**

   _____

3. **How much would you feel this way? Circle the one that is most correct.**

1	2	3
Not very much	Somewhat	Very much

4. **Would you to write an angry message back to Mark? (Circle one)**

1	2	3	4
Very not likely	Not likely	Likely	Very likely

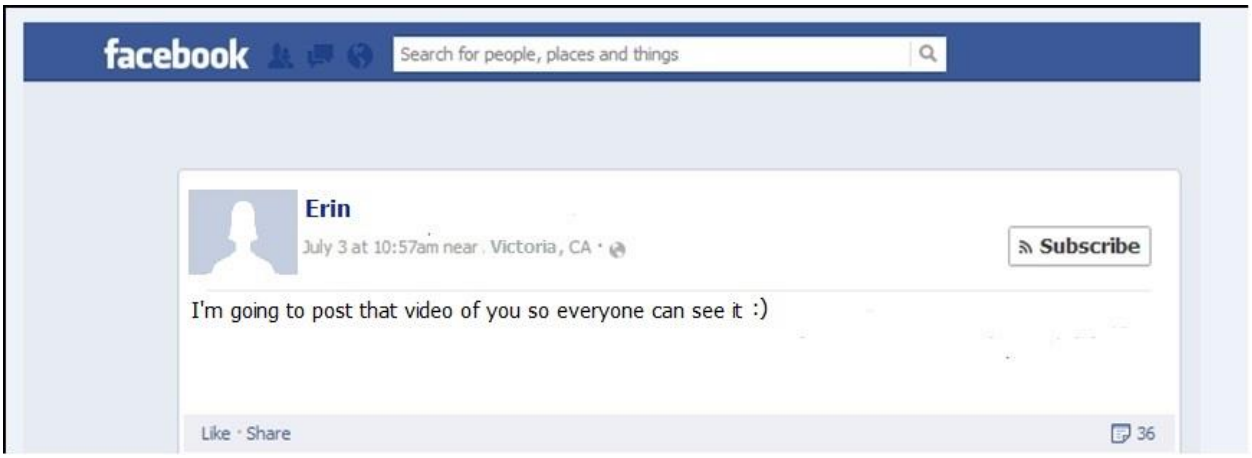
5. **What would you do if you were Tim?**

_____

_____

Posting Video Story (From Girl Version; Condition 2: Emoticon Present, Unpopular Peer, Public)

Gina is a girl in middle school just like you. When Gina is walking home, an unpopular girl from her school named Erin posts this message on Gina's profile where everyone can see.



1. **Do you think Erin was trying to be mean? (Circle 1 or 2)**
   1 She was trying to be mean
   2 She was not trying to be mean

2. **How would you feel if you were Gina? Write down the emotion that you would feel most**

   _____

3. **How much would you feel this way? Circle the one that is most correct.**

   1 2 3

   Not very much Somewhat Very much

4. **Would you write an angry message back to Erin? (Circle one)**

   1 2 3 4

   Very not likely Not likely Likely Very likely

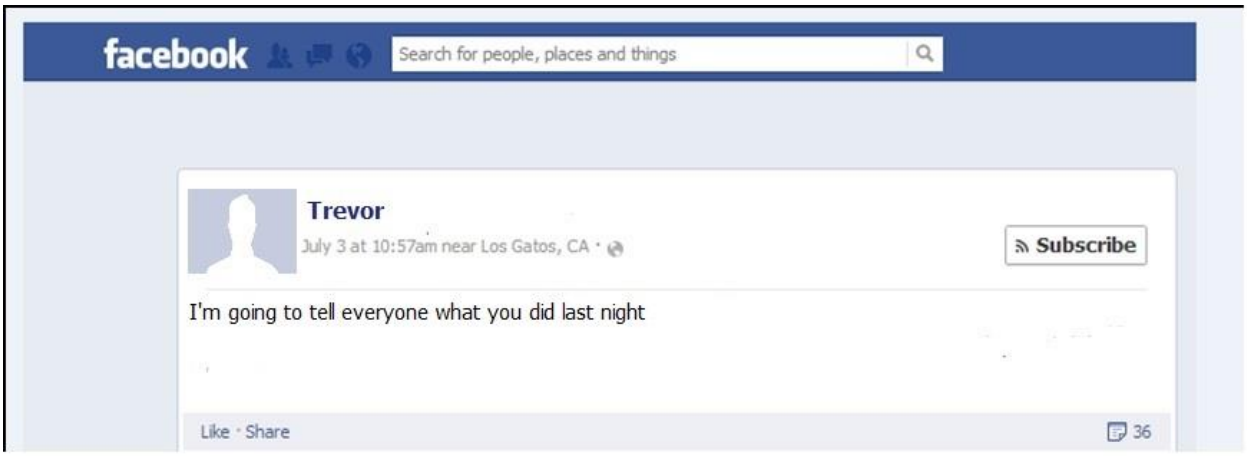
5. **What would you do if you were Gina?**

_____

_____

Telling Others Story (From Boy Version; Condition 3: Emoticon Absent, Popular Peer, Public)

Ian is a boy in middle school, just like you. While he was online, Trevor, a popular boy from his school posted a message on Ian's profile where everyone can see.



1. **Do you think Trevor was trying to be mean? (Circle 1 or 2)**
   1 He was trying to be mean
   2 He was not trying to be mean

2. **How would you feel if you were Ian? Write down the emotion that you would feel most**

   _____

3. **How much would you feel this way? Circle the one that is most correct.**

   1 2 3

   Not very much Somewhat Very much

4. **Would you to write an angry message back to Trevor? (Circle one)**

   1 2 3 4

   Very not likely Not likely Likely Very likely

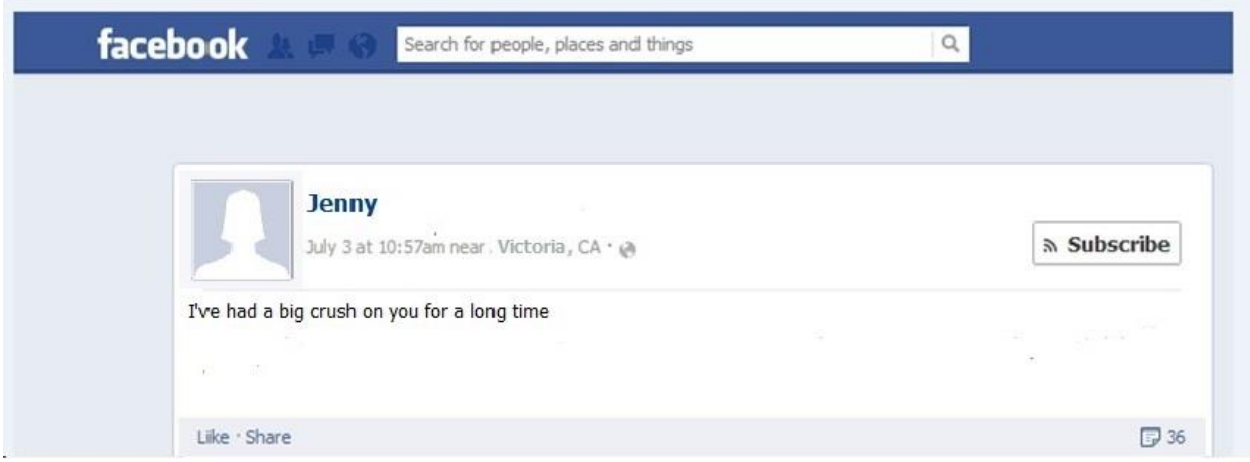
5. **What would you do if you were Ian?**

_____

_____

Big Crush Story (From Girl Version; Condition 4: Emoticon Absent, Unpopular Peer, Public)

Jenny and an unpopular girl named Emily go to the same middle school. Jenny forgot to log off from her social media account at the library, so Emily pretended to be Jenny online and posted a message on a boy's profile where everyone can see.



1. **Do you think Emily was trying to be mean? (Circle 1 or 2)**
   1 She was trying to be mean
   2 She was not trying to be mean

2. **How would you feel if you were Jenny? Write down the emotion that you would feel most**

   _____

3. **How much would you feel this way? Circle the one that is most correct.**

   1 2 3

   Not very much Somewhat Very much

4. **Would you write an angry message back to Emily? (Circle one)**

   1 2 3 4

   Very not likely Not likely Likely Very likely

5. **What would you do if you were Jenny?**

_____

_____

Shower Story (From Boy Version; Condition 5: Emoticon Present, Popular Peer, Private)

Peter and a popular boy named Josh are in middle school, just like you. Peter left his phone on his desk when he went to the washroom. Josh took Peter's phone and texted a message to one of Peter's contacts.

1. **Do you think Josh was trying to be mean? (Circle 1 or 2)**
   1 He was trying to be mean
   2 He was not trying to be mean

2. **How would you feel if you were Peter? Write down the emotion that you would feel most**

   _____

3. **How much would you feel this way? Circle the one that is most correct.**

1	2	3
Not very much	Somewhat	Very much

4. **Would you to write an angry message back to Josh? (Circle one)**

1	2	3	4
Not very likely	Not likely	Likely	Very likely

5. **What would you do if you were Peter?**

_____

_____

Ugly Face Story (From Girl Version; Condition 6: Emoticon Present, Unpopular Peer, Private)

Ella and an unpopular girl named Tina go to the same middle school. One night Tina sent Ella a text message.

1. **Do you think Tina was trying to be mean? (Circle 1 or 2)**
   1 She was trying to be mean
   2 She was not trying to be mean

2. **How would you feel if you were Ella? Write down the emotion that you would feel most**
   _____

3. **How much would you feel this way? Circle the one that is most correct.**

1	2	3
Not very much	Somewhat	Very much

4. **Would you write an angry message back to Tina? (Circle one)**

1	2	3	4
Very not likely	Not likely	Likely	Very likely

5. **What would you do if you were Ella?**

_____

_____

Geography Project Story (From Boy Version; Condition 7: Emoticon Absent, Popular Peer, Private)

James and a popular boy named Ethan were classmates. They both finished a geography project at Ethan's house. When James got home, he got a text message from Ethan.

1. **Do you think Ethan was trying to be mean? (Circle 1 or 2)**
   1 He was trying to be mean
   2 He was not trying to be mean

2. **How would you feel if you were James? Write down the emotion that you would feel most**
   _____

3. **How much would you feel this way? Circle the one that is most correct.**

1	2	3
Not very much	Somewhat	Very much

4. **Would you to write an angry message back to Ethan? (Circle one)**

1	2	3	4
Very not likely	Not likely	Likely	Very likely

5. **What would you do if you were James?**

_____

_____

Creeps Me Out Story (From Girl Version; Condition 8: Emoticon Absent, Unpopular Peer, Private)

Lilly is watching TV when she hears her phone buzz. She receives a text from Tara, an unpopular girl from her middle school.

1. **Do you think Tara was trying to be mean? (Circle 1 or 2)**
   1 She was trying to be mean
   2 She was not trying to be mean

2. **How would you feel if you were Lilly? Write down the emotion that you would feel most**
   _____

3. **How much would you feel this way? Circle the one that is most correct.**

1	2	3
Not very much	Somewhat	Very much

4. **Would you write an angry message back to Tara? (Circle one)**

1	2	3	4
Very not likely	Not likely	Likely	Very likely

5. **What would you do if you were Lilly?**

_____

_____

Appendix B: Cyber-bullying and Cyber-victimization Questionnaire

The following questions are interested in your experiences with cyberbullying. Think about your experience of using mobile phones and devices that connect to the Internet and respond to the following statements. **Remember to only check ONE answer for each question.**

How often have you:	**Has never happened**	**Has happened rarely**	**Happens every month**	**Happens every week**	**Happens several times a week**
1. Posted or re-posted something embarrassing or mean about another person online?	1	2	3	4	5
2. Sent or forwarded a hurtful message electronically to someone (for example by email, text, on Facebook, etc.)?	1	2	3	4	5
3. Posted, re-posted, or texted an embarrassing photo or video of someone that he or she did not want others to see?	1	2	3	4	5
4. Posted or texted a hurtful comment about an online photo or video of somebody else (for example, made fun of how they look)?	1	2	3	4	5
5. Posted or sent messages to purposely exclude a certain person or group of people?	1	2	3	4	5
6. Posted or re-posted something private about another person that he or she did not want others to know?	1	2	3	4	5
7. Used email or text messaging to spread rumours or gossip about someone?	1	2	3	4	5
8. Texted or made hurtful comments about somebody's race or ethnicity?	1	2	3	4	5
9. Texted or made hurtful comments about somebody's perceived sexual orientation?	1	2	3	4	5
10. Texted or made hurtful comments about somebody's perceived sexual behaviours (for example, called somebody a slut or a pervert)?	1	2	3	4	5
11. Said something sexual to somebody else online to embarrass them?	1	2	3	4	5
12. Sent sexual content (photos or jokes) to somebody else online to embarrass them or to be mean?	1	2	3	4	5

The following questions are interested in your experiences about being cyberbullied or harassed through mobile phones or Internet. Think about your experience in using mobile phones and other devices that connect to the Internet and respond to the following statements. **Remember to only check ONE answer for each question.**

How often have you:	**Has never happened**	**Has happened rarely**	**Happens every month**	**Happens every week**	**Happens several times a week**
1. Had something embarrassing or mean posted or re-posted about you?	1	2	3	4	5
2. Received a hurtful message from someone (for example by email, text, or chat)?	1	2	3	4	5
3. Had an embarrassing photo or video of you posted or re-posted that you didn't want others to see?	1	2	3	4	5
4. Had hurtful comments made about a photo or video of you?	1	2	3	4	5
5. Been purposely excluded online?	1	2	3	4	5
6. Had something personal posted or re-posted about you that you didn't want others to know?	1	2	3	4	5
7. Had gossip or rumours spread about you?	1	2	3	4	5
8. Received hurtful comments or messages about your race or ethnicity?	1	2	3	4	5
9. Received hurtful comments or messages about your perceived sexual orientation?	1	2	3	4	5
10. Received hurtful comments about your perceived sexual behaviours (for example, been called a slut or a pervert)?	1	2	3	4	5
11. Received a sexual message from somebody who was trying to be mean to you or to embarrass you?	1	2	3	4	5
12. Had sexual content (photos or jokes) sent to you from somebody who was trying to be mean to you or embarrass you?	1	2	3	4	5

Appendix C: Cyber-Aggression Self-Control and Motive Scale (CASCaMS)

The following questions are interested in your online experiences, including texting on your phone or experiences on social media. Think about your experience in using mobile phones and other devices that connect to the Internet and respond to the following statements. **Remember to only circle ONE answer for each question.**

1.	If I see a mean message about me online, it bothers me more and more when I think about it, and I try to get even	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me
2.	If someone tries to cyberbully me, I quickly lash back with something online	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me
3.	If someone does something to hurt me, I would get back at them in my own time by using my electronic device(s)	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me
4.	Sometimes I'll team up with my friends to bring someone down online	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me
5.	If I don't like someone, I use the internet to turn others against them	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me
6.	If someone says something online to hurt me, I post something back right away to get back at them	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me
7.	I have at times used the internet to make someone look like bad	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me
8.	If I see a picture of a funny looking person I don't know online, I post comments without thinking too much about how they would feel	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me
9.	If someone tries to hurt me, I will go online to immediately get back at them	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me
10	I like getting a reaction from people online, so I post things that may offend others	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me

11.	I pretend to be someone else online to ruin somebody else's friendships	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me
12.	I overreact before I have a chance to think about the consequences when someone says something mean online	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me
13.	If I see a message online that gets me angry, I react too quickly and then regret the way I responded	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me
14.	Sometimes I can be mean to people online to get what I want	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me
15.	If someone makes me angry online I quickly post mean texts and messages online	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me
16.	Joking online is so much fun that I don't worry about whether someone might be bothered by what I say	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me
17.	If someone makes fun of me on the internet, I get frustrated and respond angrily online right away	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me
18.	I repeatedly annoy people online because I think it's funny	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me
19.	When I don't like a person, I use the internet to make them feel like they do not belong in my group	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me
20.	I get back at people who make fun of me on the internet because their posts hurt more the more I think about them	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me
21.	I get carried away having fun online and others think I'm being a cyberbully or a troll	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me
22	If I'm having fun and joking online, I don't care if someone's feelings get hurt	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me

23.	If I need to get revenge on someone, I would rather strike back online where I can plan out how to do it	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me
24.	I like using my electronic device(s) to plan my revenge when I feel angry at someone	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me
25.	If someone tries to hurt me, I will use my electronic device(s) to get back at them in my own time	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me
26.	I make fun of people I don't know on the internet without thinking about whether they will see it or not	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me
27.	I go online to get back at someone as soon as they post a hurtful message about me	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me
28.	If somebody criticizes me online or in a text, I often react aggressively without thinking of the consequences	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me
29.	If I get teased or threatened, I get angry easily and strike back online right away	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me
30.	I respond very quickly to a message or post that is disrespectful to me	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me
31.	I hastily respond to something written online and regret it later	1 Very Unlike Me	2 Somewhat Unlike Me	3 Somewhat Like Me	4 Very Like Me

Appendix D: Parental Consent Form

Parental Consent Form

Young People's Social Interactions on the Internet

Your child is invited to participate in a study that is being led by Dr. Kevin Runions who is an Adjunct Professor in the department of Educational Psychology and Leadership Studies at the University of Victoria. This form provides important information regarding your child's involvement in the study.

Purpose and Goals
This project will examine how young people interact on line. Specifically, we would like to learn about the factors that affect the way children understand messages online and react to them.

Importance of the Research
In addition to advancing our scientific knowledge of online behavior in adolescence, our study will help researchers, parents, teachers, counsellors and other professionals working with children understand how online communication affects youth, and how to best help them use it safely.

Participant Selection
Your child is being invited to participate in this study because they are in grade 6 or 8, and children in these age groups tend to be very active online and display high levels of cyber-aggressive behaviour. We want to understand why previous scientific findings show these trends.

What you and your child will be asked to do
If you agree to have your child participate in our study:

- The study will only involve a single, 1-hour session in May, which will take place in your child's classroom.
- All of the participants in each classroom will be completing the questionnaire at the same time as their peers.
- The questionnaire will consist of hypothetical stories involving online interactions. Participants will be asked about the intentions of the person who sent the message, and how they would react to the message.
- The questionnaires will also ask participants about their online experiences, behavior, parent relationships, and family relationships.

Anonymity
Your child's data will be completely anonymous. This means that your child's name will not appear on any of the data files and will never be mentioned when we report our findings. We do not examine children's individual data as our research aims to find and understand general trends in online behaviour among all participants, or subgroups of participants based on grade and gender.

Confidentiality
Any information that you or your child provide will not be shared with anyone else. All of the data will be protected as your names will not appear on any of the data files, and will be stored in locked filing cabinets in our secure research facility. All electronic documents will be password protected on secure computers and hard drives that will be kept in our research facility.

Inconvenience
Completing the questionnaire in one, 1-hour session may pose a minor inconvenience for some students. Our priority is to avoid being a disruption for the classroom, and will be working with the teachers to find a time that is most convenient for them and their students.

Risks
Some children may find it difficult and uncomfortable to think about cyber-aggressive behaviour and situations. This is may be especially true for children who have experienced cyber-bullying in the past. In order to minimize the risks, we will tell the children that they could stop participating at any point, and that they could choose not to answer any of the questions.

Benefits for you and your child
In general, we find that children often enjoy participating in research. By providing consent, you and your child will help contribute to research aimed at improving our understanding of cyber-aggression and cyber-bullying, and the way we address this issue. Participants who have a chance to reflect on their experiences, may improve the way they communicate online in the future.

Compensation
As a token of appreciation, your child will be entered into a raffle to win one of 8, $25 gift cards to Chapters.

Voluntary Participation
It is important to us that you know your participation is completely voluntary. If you choose to allow your child to participate, you and your child will be able to withdraw from the study at any time. If you would like to withdraw from the study after participating, please contact our research team and we will remove your data. Removing your data will not affect compensation for your help.

Sharing the Findings
We will provide a report of our findings to your child's school and school board. Our report will not include your child's name and will summarize the general trends among children in these age groups. In addition, we will present our findings at academic conferences and publish our study in academic journals. The results of this study may also be shared on T.V. and the radio, or in newspapers and magazines.

Disposal of the Data
All of the data will be deleted after 7 years.

Contacts
If you have any further questions about the study, you may contact Dr. Runions by e-mail (kevin.runions@telethonkids.org.au) or Michal Bak by phone (778-677-4180) or by e-mail (mbak@uvic.ca). You can also check the ethical approval of this study, or bring up any concerns by

contacting the Human Research Ethics Office at the University of Victoria (250-472-4545 or ethics@uvic.ca).

Your signature below indicates that you understand the above conditions regarding your child's participation in this study, that you have had the opportunity to have your questions answered by the researchers, and that you consent to have your child participate in this research project. Please take the time to ensure that your child understands the information on this form.

Name of Participant	*Parent Signature*	*Date*