Toward a Conceptual Model of Motive and Self-Control in Cyber-Aggression: Rage, Revenge, Reward, and Recreation

Kevin C. Runions

Abstract Despite widespread public attention to cyber-bullying, online aggression and victimization have received scant conceptual development. This article focuses on how opportunities for aggression are distinct online from those of offline social contexts. The model developed here is informed by a recent aggression typology, which extends the reactive–proactive distinction by distinguishing aggression based on the affective motive (appetitive vs. reactive) and the recruitment of self-control. This typology informs an analysis of psychological processes linked to individual differences that are relevant to adolescents' aggressive activities. Processes implicated include hostile schema activation, anger and fatigue effects on self-control, anger rumination, empathic failure, excitation transfer, and thrill-seeking. With these processes established, the proposed model focuses on how features of online social platforms may afford opportunities for distinct types of aggression by engaging these processes in adolescent users. Features of online settings that present distinct opportunities for activation of these processes are reviewed for each process, including social cue ambiguity, temporal lag, cue permanence, anonymity, the continual perception of audience, and the availability of online gaming and online pornography. For each of the conceptually grounded cyber-aggression-relevant processes, implications for innovative research directions on adolescent cyber-aggression are presented.

K. C. Runions (✉)
Department of Educational Psychology and Leadership Studies,
University of Victoria, PO Box 3010, Victoria,
BC V8W 3N4, Canada
e-mail: krunions@uvic.ca

K. C. Runions
Child Health Promotion Research Centre,
Edith Cowan University, Perth, WA, Australia

Introduction

The broad uptake of new information and communication technologies (ICT) enabling mobile communications and social networking has resulted in dramatic shifts to how young people engage with one another. Social networking and (e.g.) Facebook, Twitter, Google+, and microblogs such as Tumblr, on top of text messaging, provide unprecedented avenues for social interaction. 3G and 4G mobile devices (e.g., smartphones), and text features of mobile cellular telephones, mean that youth have unobtrusive means of being in contact whenever and wherever they like. But with these developments come a similarly widespread concern about unintended consequences of these changes. In the wake of high-profile cyberbullying-linked suicides, such as that of Amanda Todd (Leung and Bascaramurty 2012, Oct. 12), there is great public concern about online acts of aggression and victimization. The idea that young people are no longer sheltered from acts of aggression, even when inside their own homes, is disturbing to parents and policymakers alike, not to mention to the youth who must endure cyberbullying. Cyberbullying is a key unintended consequence of the societal trend to living our social life increasingly online through ICT.

However, despite mounting concern and a corresponding increase in research on cyberbullying, the issue itself remains poorly conceptualized (Dooley et al. 2009; Tokunaga 2010). Despite the use of the term *bullying*, which traditionally implies repeated acts of aggression within a

particular relationship context marked by a power differential (Olweus 1978), many researchers appear interested not in bullying per se but more broadly in aggression and victimization conducted via ICT (Tokunaga 2010). But important areas of research pertinent to the study of aggression have not been explored by cyberbullying research, including the role of distinct motives for aggression, and the role of self-control in the expression of aggression. Consequently, conceptual models have not arisen to account for cyber-aggression broadly construed. Moreover, cyberbullying researchers only sporadically have considered how properties, features, and affordances of ICT might alter or modulate the ways in which aggression arises and is executed online. New conceptual models that reflect the complexity of the phenomenon are required.

This article presents a multidimensional model for considering acts of cyber-aggression that builds on recent work by Runions et al. (2013), who systematically addressed how young people might process social information online differently from face-to-face communication, due to the distinct structural and functional features of ICT. Guided by Crick and Dodge's (1994) social information processing (SIP) model, Runions et al. examined how features of contemporary ICT might operate to influence processing at each SIP step, including cue encoding, cue interpretation, the recruitment of social goals, and the generation, evaluation and execution of responses. For each step, they examined the affordances (i.e., opportunities for action provided within a particular environment; cf., Gibson 1977) for cyber-aggression and -victimization that result from the functions and features of ICT contexts.

The model proposed here extends the Runions et al. (2013) model of cyber-social information processing to consider four distinct types of aggression, based on the motive for aggressing and the self-control brought to bear on the execution of aggression, as discussed in Howard's (2011) quadripartite violence typology (QVT; see Fig. 1). The QVT distinguishes the degree of self-control (automatic vs. controlled) and the affective valence undergirding the act (reactive[1] vs. appetitive). This results in four types of aggression: impulsive–reactive aggression, controlled-reactive aggression, controlled-appetitive aggression, and impulsive–appetitive aggression. For each type of aggression, then, the analysis focuses on how key adolescent individual and developmental differences in
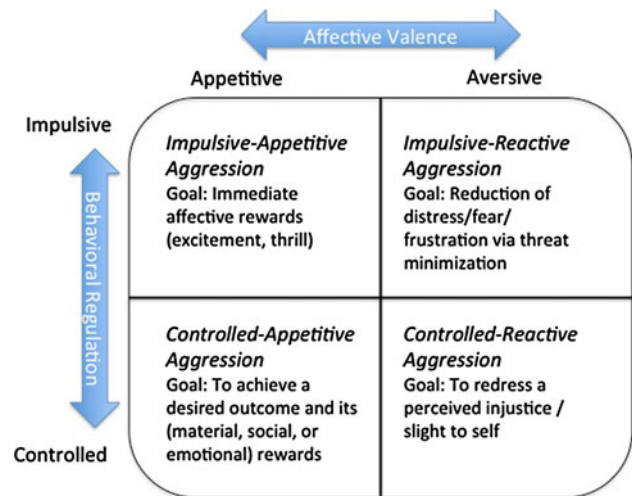

Fig. 1 Howard's (2010) quadripartite violence typology (QVT) distinguishing the impulsivity of aggression from the affective valence of aggression motive

psychological processing are likely to give rise to that type of aggression. Finally, the discussion focuses on how each distinct type of aggression may be influenced by the features, functions, and affordances of ICT-mediated communication (e.g., social networks; see Fig. 2). In sum, the proposed model focuses on how individual differences in social information processing might co-act with structural–functional ICT features to increase or decrease risk conditions for four distinct types of aggression. Finally, new directions for research that can clarify how the online context may promote or afford adolescent cyber-aggression will be presented.

Conceptualizing the Diversity of Aggression

Psychologists have long proposed that aggression may arise via distinct motives and may reflect different functions. The most common of these distinctions is between hostile (cf., reactive, impulsive) and instrumental (cf., proactive, premeditated) aggression (e.g., Barratt and Slaughter 1998; Dodge 1991; Feshbach 1964). Hostile or reactive aggression is thought to arise in reaction to frustration, including in the face of perceived provocation, and especially with the inference that the "agent of frustration" acted on purpose (Hartup 1974, p. 338). Instrumental aggression is thought to be planned behavior aimed at the utilization of aggression to achieve an end goal, and is often described as *cold-blooded*, implying a dominance of reasoned cognition over affect-driven processing. Of course, many acts of aggression fuse both hostile and instrumental components (Feshbach 1964). For example, a young person might respond to a perceived public insult by starting a fight with the provocateur, with an instrumental

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[1] This article retains the widely-used term *reactive* to describe aggression motivated by anger-driven responses to (perceived) provocation, rather than the more general term *aversive*, as the former better captures the specific role of perceived provocation in motivating aggression. The term *appetitive* is adopted rather than *proactive* as the former term captures the role of positively-valenced affective reward, and the latter term conflates the role of self-control and motive.

Fig. 2 A motive and self-control model of cyber-aggression linking information and communication technology (ICT) properties to processes relevant to a quadripartite violence typology-informed conceptualization of aggression
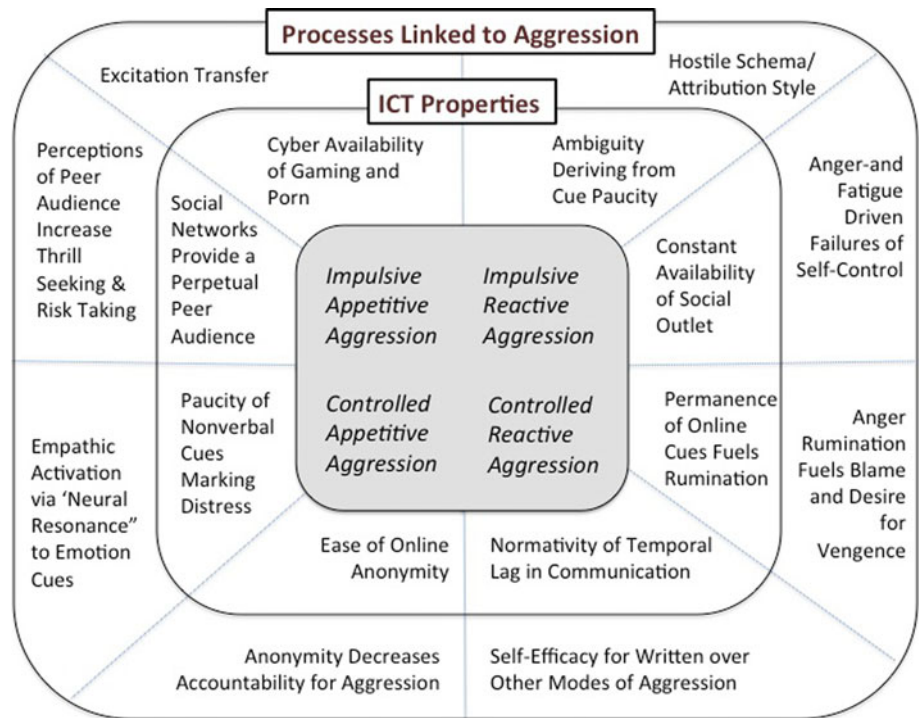
consequence of maintaining their position within the social hierarchy. Moreover, the distinction is not without its critics (e.g., Bushman and Anderson 2001). It has, however, proved fruitful to researchers who have mapped out distinct psychological and social-ecological correlates.

Research examining cyber-aggression for its specific hostile or instrumental components has only recently emerged. Youth who report that they have cyberbullied others are more likely to also acknowledge proactive-aggressive behaviors (Calvete et al. 2010). But Renati et al. (2012) found both reactive and proactive aggression scores to be higher for children who engage in cyberbullying. How cyberbullying is measured may account for variance in findings, as hinted at in recent work by Law et al. (2012). They examined whether adolescent online aggression was driven by proactive or reactive motives, and found that some acts of cyber-aggression were predicted better by reactive motives (e.g., sending aggressive text messages; posting embarrassing photos) and others by proactive motives (e.g., developing a website to attack someone). These data suggest that distinct opportunities for aggressing online may be available that serve distinct motives for aggression.

Runions et al. (2013) provided a starting point for making sense of why different features of ICT media afford opportunities for cyber-aggression in general. But they did not address how distinct motives for aggression may operate differently online than offline, nor what psychological processes might be involved in these motives. They

also did not examine what aspects of the online environment might be implicated in affording those opportunities for differentially motivated aggression. This article aims to extend Runions et al. by addressing these concerns.

Before such an analysis, however, it is important to point out conceptual limitations in the established proactive–reactive distinction that might limit its explanatory power for cyber-aggression and have motivated the use of Howard's (2011) model. In conceptualizing and measuring reactive aggression, there is a potential confound between impulsive, enraged violence, and planned hostile responses also motivated by anger and a desire for vengeance. Similarly, instrumental/proactive aggression conflates impulsive acts of aggression that are motivated by emotions that feel good (e.g., are thrilling) and planned acts of aggression that are motivated by an intention to obtain some sort of reward. A key instrument used to obtain parent and teacher ratings of proactive and reactive aggression (Dodge and Coie 1987) includes items to tap proactive aggression such as "this child uses physical force in order to dominate other kids", which implies the social reward of high status in a group setting, but does not speak to whether the aggression is planned or spontaneous. A sample item to tap reactive aggression, when "this child has been teased or threatened, he or she gets angry easily and strikes back", conflates the immediacy of response with the motive for response. Just as researchers have taken pains to disentangle the form (e.g., physical vs. relational) and function (e.g., reactive vs. proactive) of aggression (e.g., Little et al. 2003), the

conceptual conflation of immediacy and motive indicates the need for a clearer conceptual grounding to support more constructive research.

To address shortcomings in the hostile/instrumental aggression distinction, Howard (2011) has proposed the QVT, which distinguishes two orthogonal dimensions upon which to consider types of aggression (see Fig. 1). The first dimension reflects self-control. Richetin and Richardson (2008) have recently reviewed the literature distinguishing controlled and automatic processing and present a compelling case to consider the relevance of these types of processing for aggression. The QVT incorporates this distinction, noting that some aggression is more controlled, even planned or premeditated, and other acts of aggression and violence arise more spontaneously, with little or no self-control exerted. This distinction also has been made recently by de Castro (2010), who further noted that encouraging reflection after a provocation did not necessarily reduce the aggressiveness of response, but rather increased it in cases where the participants was given time to ruminate on their own emotions. The capacity to recruit self-control does not necessarily mitigate anger and desire for retribution. Instead, it may only serve to delay one's aggressive response. But it would seem problematic to argue that delaying a reaction in order to seek vengeance another day is not also *reactive* or *hostile* aggression.

The second dimension in the QVT reflects affective valence, framed either as appetitive or reactive. Reactive motivated aggression is marked by aversive affect (anger, fear) and aims to reduce that emotion. Appetitive motives deal with positive emotions that serve either to motivate, and/or derive from, transgressive, even violent antisocial acts (Chichinadze et al. 2011; Howard 2011). Appetitive aggression aims to increase positive emotional outcomes that result from aggression.

In distinguishing these two dimensions, the QVT results in four distinct quadrants (see Fig. 1). The impulsive–reactive quadrant corresponds most closely to traditional conceptions of reactive and hostile aggression in the implication of impulsive responsivity in the face of some perceived threat. The controlled-reactive quadrant reflects a controlled response to perceived slights or offenses, with motives of vengeance for a grievance. In the controlled-appetitive quadrant, which maps closely onto traditional instrumental or proactive aggressive, motives center on achieving an extrinsic positive outcome for oneself via deliberative and premeditated means. By contrast, in impulsive–appetitive aggression, the motive for aggressive acts is the immediate or spontaneous enhancement of one's own feelings of excitement or thrill. This quadripartite typology is particularly useful in distinguishing the impulsivity of the response from the motivation for revenge or for some reward, which has been a focus of

critiques of the proactive/reactive dichotomization (e.g., Bushman and Anderson 2001).

Preliminary validation of the QVT model (Bjørnebekk and Howard 2012a, b) via a self-report questionnaire examined its relationship to teacher-rated proactive and reactive aggression, and also to Carver and White's (1994) Behavioral Activation System (BAS)/Behavioral Inhibition System (BIS) scales. This latter scale operationalizes Gray's (1987) distinction between neural systems supporting (a) behavioral activation, which regulates approach behavior in response to rewarding external stimuli, and (b) behavioral inhibition systems, which are implicated in attuning attention to novel cues, potential danger in the environment, and punishment conditions. Bjørnebekk and Howard (2012a), validating a self-report scale based on the QVT with a sample of youth with diagnosed conduct disorder, found support for the four-factor QVT model. They found that controlled-reactive aggression was correlated significantly with teacher-rated reactive, but not proactive, aggression. Controlled-appetitive and impulsive–appetitive (i.e., thrill-seeking) were both correlated significantly with teacher-rated proactive, but not reactive, aggression. Correlations with BAS/BIS also provided support for the QVT model. The fun-seeking subscale of the BAS was correlated positively with all forms of aggression for this conduct disordered sample. BAS reward responsivity, however, was correlated positively only with controlled-appetitive aggression. Although further validation is required, and with diverse samples, these preliminary efforts suggest that, in distinguishing affective motive and the engagement of self-control, the QVT provides an important conceptual distinction for understanding the diverse ways in which aggression arises.

Although the QVT model is new, it appears to provide an important set of distinctions for understanding aggression. This article reviews each of the four types of aggression outlined in the QVT, and examines some key psychological processes that are likely to be involved in problems with that type of aggression during adolescence. Next, the review focuses on features of ICT-communication that might influence youth's online social information processing and thereby increase the risk of that form of cyber-aggression. Following these conceptual developments, implications of the application of the QVT to cyber-aggression for future research and intervention development are considered.

Impulsive–Reactive Aggression

Impulsive–reactive aggression maps most closely to the long-recognized frustration–aggression model (e.g., Dollard et al. 1939). Hostile aggression is thought to arise in reaction to perceived provocation, where a goal is blocked or otherwise a threat to the self is perceived (Berkowitz

1977; Dodge and Coie 1987). Emotionally, anger and rage are potent processes in driving this type of aggression (Hubbard et al. 2002). In the phenomenology of highly aggressive boys' reactive aggression, anger and rage are cited as explanations of their own aggressive responses to hypothetical ambiguous provocations (de Castro et al. 2012). Elicitation of impulsive–reactive aggression amongst youth appears to involve two co-acting processes: the recruitment of hostile schema and the failure of self-control processes. These are reviewed next, with structural and functional features of ICT that afford opportunities for this hostile schema recruitment and self-control failure introduced as well.

Hostile Schema in the Production of Impulsive–Reactive Aggression

Social information processing research has demonstrated that social-cognitive processes underlie proclivities to react with impulsive–reactive aggression. Attributions of hostile intent to other social agents, especially under conditions of situational ambiguity, have long been recognized as a contributor to hostile, reactive aggressive behavior in children and youth (Dodge 1980; Dodge and Coie 1987). In situations where some social harm befalls the participant (or more often, befalls a hypothetical subject), but where the actual intent of the perpetrator of the harm is unclear (i.e., potentially benign (e.g., an unintended accident) or potentially malicious), aggressive children and youth routinely report more hostile attributions of intent than non-aggressive children and youth. Trait-anger (Wingrove and Bond 2005) and a history of violent offending (Smith and Waterman 2003) are both related to cognitive biases suggesting schema activation in the face of hostile stimuli. Such hostile schema appear specific to reactive, not instrumental, types of aggression (e.g., Dodge and Coie 1987).

By adolescence, schema for hostility, and in particular, of others (i.e., one's peers) as hostile and mean in general appear to become active very early in social information processing and influence allocation of attention and subsequent processing (Horsley et al. 2010; Wilkowski et al. 2007). Thus, it seems that, for some youth, particularly with regard to aggression, once a generalized schema is activated, the processing of social information is likely tainted by presumptions of hostility. Such schema can be specific to particular relationships, and are not limited to children and youth with chronic aggression problems (Hubbard et al. 2001; Peets et al. 2011a). Hostility, then, whether generalized to all other social agents or to specific peers, appears to arise very early in processing and in an automatic manner (Zelli et al. 1995, 1996), thereby biasing

subsequent interpretation in social information processing and behavior toward reactive types of aggression.

Ambiguity Online and Hostile Interpretations The ease with which some young people may interpret situations as hostile, and thereby set into motion automated processes leading to impulsive and hostile aggression, may be increased in online communications. A core feature of ICT-mediated communication, as reviewed by Runions et al. (2013), is the paucity of semantic cues due to the reliance on text-only communication. The structural conditions of most online communication notably are limited in the richness and variety of social cues available (Friedman and Currall 2003; Runions et al. 2013). Text-only communication—common to email, text messaging, writing on Facebook walls, and tweeting (i.e., Twitter)—provides neither nonverbal nor paralinguistic cues from which authorial intention can be discerned (Runions et al. 2013; Tokunaga 2010; Ybarra and Mitchell 2004). This paucity of social cues may heighten perceived aggression in email (Friedman and Currall 2003) and other ICT media by creating ambiguity in the intended meaning; this ambiguity may then serve to increase the likelihood of hostile attributions of intent (Runions et al. 2013), thereby initiating aggressogenic processes. The inclusion of emoticons and *e-cronyms* (i.e., online acronyms, e.g. LOL (Laughing Out Loud)), intended to provide clues to the intent of a message may serve, ironically, to increase the risk of interpretations of sarcasm and condescension (Derks et al. 2008a), which may fuel hostile interpretations (Runions et al. 2013) and motivate reactive aggression.

Very few studies have examined the role of hostile schema and information processing on cyber-aggression. It appears common for adolescents, when they are behaving aggressively online, to report that they were reacting to another's provocation (Law et al. 2012). Pornari and Wood (2010) found that hostile attributions of intent predicted cyber-aggression. In one recent study, adolescents who engage in cyber-aggression showed greater recall of false memories to ambiguous events and to insults, suggesting that the activation of hostile schema is involved in cyber-aggression (Vannucci et al. 2012). However, considering hostile schema as a trait leaves unanswered questions as to their role in online social information processing. For individuals who tend to attribute hostile intent, the increase in ambiguity online may heighten the likelihood of hostile interpretation and thereby increase the hostility of response as well. To date, no research has addressed how hostile attribution tendencies might operate differently under the conditions of ambiguity common to ICT communication.

Moreover, considerations of hostile schema as static traits are problematic in failing to account for the relational context of schema activation. Peets et al. (2011a) have shown that, if a peer is disliked personally by a young

adolescent (11–12 years of age), the young person is more likely to attribute hostility in ambiguous scenarios involving that peer. Friends are more likely to be given the benefit of the doubt under conditions of ambiguity, compared to neutral peers and perceived enemies, who receive the most hostile intent attributions and more aggressive response strategies (Peets et al. 2007). Accounting for the relational nature of social schema (Baldwin 1992) is important for nuanced understanding of the origins of acts of aggression.

These elegant demonstrations of the relationship-specificity of hostile schema recruitment have been, to date, unexplored in online communications, where structural ambiguity mirrors the test conditions of these studies. As others have pointed out (e.g., Kowalski and Limber 2007), the capacity for anonymity online can complicate young people's awareness of the identity of the antagonist. But notwithstanding, research on cyber-aggression has not to date accounted for prior relationships in hostile processing online at all. As Runions et al. (2013) have suggested, the structural ambiguity of most text-only messaging, even in light of emoticons and e-cronyms aimed at reducing ambiguity, poses distinct problems for interpretation and consequent behavioral responses, but also distinct possibilities for research. Experimental research manipulating hypothetical ambiguous ICT messages, and manipulating emoticon usage, could be deployed in a framework comparable to Derks et al. (2008a, b) or Sticca and Perren (2012). Anonymity could be varied in a similar within-participants manner. Much research remains to be charted in understanding the role of hostile processing online.

Impulsive–Reactive Aggression and Self-Control

The recruitment of hostile schema does not constitute sufficient cause for impulsive aggression; it is possible to feel angry and hostile and yet to not aggress. As hostile schema are relevant to both controlled and impulsive aggression types, a consideration of self-control is essential to understanding why people vary on the control they bring to bear on their anger. Wilkowski and Robinson (2010) have recently proposed an integrative cognitive model of trait anger and reactive aggression that can help to account for the impulsive-controlled distinction in reactive aggression. In their model, they distinguish automatic and controlled cognitive processing, with the former characterized by spontaneous (i.e., without requiring planning), efficient (i.e., utilizing minimal cognitive resources), and unconscious processing (e.g., Bargh 1994). An automatized hostile processing bias has been observed not only in self-report and other questionnaire studies, but also in implicit-cognitive processing research (Wilkowski and Robinson 2010), including eye-tracking studies that demonstrate high-anger individuals show difficulties in processing data that is

inconsistent with a hostile interpretation (Wilkowski et al. 2007). Individuals who demonstrate problems with anger and reactive forms of aggression appear to be predisposed to hostile interpretations of situational input, as demonstrated by the prevalence of problems with hostile attributions of intent amongst this population. But it is the automatic elicitation of anger, absent recruitment of effortful control processes, which increases the likelihood of impulsive-aggression responses.

This relationship between self-control failure and reactive aggression maps well onto recent reformulations of the Crick and Dodge (1994) SIP model by Fontaine and Dodge (2006), who have argued if a pre-potent response decision meets a primary threshold of acceptability (i.e., does not recruit self-control processes; cf., Runions and Keating 2010), further cognitive processing may be bypassed and the response enacted without further reflection. This model maps well onto the self-described experiences of children and young adolescents with severe problems with aggression, which indicates no evidence for such processing in highly aggressive boys, who instead invoke the motivating power of uncontrollable rage (de Castro et al. 2012).

Under what conditions will impulsive responses bypass response evaluation and decision processes? The General Aggression Model proposes that both individual differences and situational factors will play into the recruitment of self-control of aggression (DeWall et al. 2011). If individuals have poor capacities for self-control in general (i.e., as an individual difference), provocation is likely to result in an aggression response (DeWall et al. 2007). Individual differences in self-control have an important position in understanding proclivicites for aggression and antisocial behavior (cf., Gottfredson and Hirschi 1990); such individual differences appear to be largely stable over adolescence, with change attributable in part to social influences (e.g., peers; Meldrum et al. 2012). Individual adolescents, then, likely show individual differences in their capacities to recruit self-control and avoid impulsive–reactive aggression.

But internal and external contextual factors also are implicated in self-control failure. Researchers of the link between self-control failure and aggression have evoked the strength/resource-depletion model of self-control (Baumeister and Heatherton 1996; Vohs and Heatherton 2000). The resource-depletion model of self-control considers self-control to be a domain-general, limited resource. Individuals are thought to differ in the degree of self-control they can exhibit, but, in using their self-control, they may exhaust their store of self-control, and be unable to exercise further acts requiring self-control. The presence of negative emotions is a key trigger of self-regulation failure, as demonstrated across aggression, binge eating, binge drinking, binge spending, and other risk-taking

behaviors (Heatherton and Wagner 2011) common in adolescence. Inhibition of emotions appears to engage these self-control resources, making further (perceived) provocation, for example, especially likely to result in a failure of self-control (cf., *the last straw*).

A number of external conditions have been found to limit the recruitment of self-control, with a key factor relevant to aggression being the role of fatigue in depleting self-control (Hagger et al. 2010). During adolescence, sleep patterns undergo substantial changes, both from maturationally driven changes in neural architecture related to sleep and shifts in social norms from childhood to adolescence (Soffer-Dudek et al. 2011). These can result in increased fatigue, later bedtimes and waking times, and longer periods of sleeping on weekends (Soffer-Dudek et al. 2011). Research indicates that, due to these physiological and acculturated changes with adolescence, young people often do not get adequate sleep (Dahl and Lewin 2002), and consequently, by the end of the day, fatigue is a genuine likelihood. Young people who do not go to bed before midnight, independent of the amount of sleep obtained, appear to be particularly at risk for failures of impulse control (Abe et al. 2010), which converges with the research indicating that fatigue is a risk factor for failure of self-control (Hagger et al. 2010).

Moreover, sleep disturbances have been shown to predict subsequent problems in externalizing behaviors (Wong et al. 2009). Irregular sleep patterns (e.g., too little sleep on weekdays and too much sleep on weekends) appear to amplify the influence of exposure to parental conflict on aggression for young adolescents (Lemola et al. 2012). Longitudinal analyses indicate that prior sleep disturbance is predictive of subsequent problems with quick-tempered anger, and with aggression (Umlauf et al. 2011). More subtle processes also may play into the risk of aggression by sleep-challenged young people: poor sleep quality also appears to be linked to poor emotion information processing amongst young adolescents (Soffer-Dudek et al. 2011). These studies all point to the role that sleep disturbance and fatigue play in adolescent capacities to recruit self-control, especially in a context where a hostile schema may be activated. Provocation coupled with situational constraints on self-control, such as fatigue, may compound the risk of self-control failure.

The Internet Never Sleeps: Venting Rage Online Current ICT media permit young people to interact with their social network at the time and place of one's choosing. The constant availability of their social milieu means, for better or worse, that they need never feel truly alone. Unfortunately, young adolescents also report that the prevalence of ICT media in their lives has led to a potential for "non-stop bullying" (Mishna et al. 2009, p. 1224). From an aggressor point of view, the widespread availability and use of smartphones, for example, affords an easy opportunity for aggression whenever and wherever s/he may be. This provides an easy affordance for aggression when anger and rage are experienced. A perpetrator needs only experience anger to set cyber-aggression in motion. Rage-fueled cyber-aggression may be more easily afforded in light of ICT technology that is always available, with the target of one's aggression perceived to be always available as well.

The ubiquity of access to social networks also means that young people are engaging online into the evenings and nights. Getting online is now as simple as turning on one's mobile phone. With mobile ICT, it is easy to engage online into the night, when parental supervision may also be reduced. As an adolescent who does not sleep enough may easily discover, the internet never sleeps, and so, with fatigue-induced limitations on self-control, adolescents may be particularly at-risk of impulsive aggression late at night.

No studies to date have examined the link between cyber-aggression and the time at which aggression took place, but a preliminary hypothesis based on the extant literature would posit that impulsive–reactive cyber-aggression may be most likely to take place when most young people are supposed to be in bed and asleep. Diary or other experience sampling methodologies (e.g., using the youth's mobile device to signal participants at times when the particular event or experience may be happening to collect ecologically-valid data) may be deployed gainfully to examine when and (according to the aggressor) why acts of cyber-aggression happen, as these methods allow researchers access to young people's thoughts and experiences temporally close to the occurrence of the experiences.

Revenge is a Dish Best Served Cold: Controlled-Reactive Aggression

Not all instances of reactive aggression erupt; some simmer. Controlled-reactive aggression (see Fig. 1) is considered vengeful in its motivation, aimed at rectifying a grievance or getting even over a perceived provocation. In this sense, it would appear comparable to aggression driven by a hostile schema discussed above, and to be more likely in individuals with high levels of trait-anger. Its primary difference from impulsive–reactive aggression appears to be the exercise of effortful control processes, and the elicitation of anger rumination, both discussed by Howard (2011) and Wilkowski and Robinson (2010) in their models of reactive/hostile aggression. Controlled-reactive aggression may arise under conditions of perceived unwarranted

harm, threat or insult based on several interconnected processes: recruitment of effortful control, self-assessment of response efficacy, and anger rumination. These are addressed next, with each followed by a consideration of affordances provided by ICT that might create distinct risks for cyber-aggression.

Effortful Control and Self-Efficacy in Controlled-Reactive Aggression

Effortful control reflects the capacity to shift the focus of one's attention and redirect oneself behaviorally when required to do so (Posner and Rothbart 2000), and can serve to suppress anger and impulsive aggression (Rothbart 1989). Meta-analyses support the hypothesis that low levels of effortful control (cf., high levels of impulsivity) are predictive of antisocial behavior problems (Morgan and Lilienfeld 2000). Wilkowski and Robinson posit an important role for effortful control in serving to suppress impulsive–reactive aggression. Wilkowski and Robinson's research (2007, 2008) indicates that individuals who are low in trait anger show greater capacities to recruit effortful control processes in the presence of hostile information. But, they find no differences in recruitment of effortful control in response to non-hostile cues. This, they argue, indicates that people with low levels of trait anger selectively recruit effortful control for the regulation of hostile cognitions.

This dynamic view of the role of effortful control in anger regulation accounts well for differences in high-versus-low trait anger individuals, but is problematic in light of the distinction between controlled and impulsive forms of reactive aggression, both of which are motivated by vindictive anger. Wilkowski and Robinson (2010) note that "high trait anger individuals do not appear to recruit effortful control resources in a manner that would be of use in controlling their hostile thoughts" (p. 24). But, it is still possible that effortful control can be recruited to delay and channel anger-driven responses to a perceived provocation. As suggested by Howard's model (2011), some individuals appear able to exert self-control in response to a provocation enough to avoid immediate aggressive response, and instead delay their response until another opportunity for vengeance arises.

Evaluations of self-efficacy may be relevant in understanding the recruitment of effortful control in response to perceived provocation. Self-efficacy evaluations reflect one aspect of Crick and Dodge's (1994) response evaluation and decision steps of SIP. Young people who are aware of their limitations may recognize that they lack the capacity to retaliate effectively to a perceived provocation in the moment. For example, the only immediate aggressive response to a provocation may be physical aggression, but

if a young person has been unsuccessful in their attempts to deploy physical aggression in the past, this history (e.g., of operant conditioning punishment) may deter a physical response. This is not self-control deriving from any pro-social consideration; effectively it is effortful control nonetheless.

Few studies have assessed self-efficacy for specific functions of aggression, and the conflation of self-control and motive in considering proactive and reactive aggression further complicates interpretation. For example, Peets et al. (2011b), in their study of how such social cognitive processes operate in real relationships with specific peers, found that self-efficacy for aggression was correlated comparably with both proactive and reactive aggression. But in their study, for young adolescents who showed high proactive aggression tendencies at time 1, self-efficacy strongly predicted increased aggression toward a disliked peer. In this case, the use of a proactive aggression measure does not clarify whether the youth's capacities for controlled aggression are implicated, or instead whether the youth's tendency to aggress for some positive affective reward is active. It may be fruitless to attempt to understand self-efficacy without clear conceptualization and measurement of the role of self-control in the enactment of aggression.

The development of self-efficacy for some forms of aggression over others may help to promote effortful control in the face of perceived provocation. This does not mean that anger dissipates due to self-control, only that the young person may have the capacity to inhibit immediate reactions and live to fight another day, and in another way.

Normativity of Temporally Lagged Communication, Self-Efficacy and Self-Control

When replying to a text message or posting something to Facebook (e.g.), an adolescent need not respond immediately, as would be expected in a face-to-face interaction. ICT-communication is marked by the normativity of temporal lags in communication, resulting in staggered discussions, and efforts at wit and quasi-epigrammatic communications. This allows one time to consider one's response and compose an *ideal* reflection of oneself. This may be beneficial for young people who are socially reticent, but it affords distinct opportunities for vengeful aggression as well, by providing the opportunity to craft one's aggressive response.

Unlike real-time physical aggression, vengeful cyber-aggression does not require physical strength or combat skills; unlike real-time verbal aggression, vindictive cyber-aggression does not require a quick wit; unlike relational aggression, spiteful cyber-aggression does not require good standing with a social group who will enact your wishes or spread your rumors. Instead, the cyber-aggressor can sit and plan their response in their own space and their own

good time. Thus, motivated young people can apply themselves to developing self-efficacy for written aggression over physical, verbal or social modes of aggression. To date, however, research examining self-efficacy for cyber-aggression relative to other modes of aggression has not been conducted.

Hostile Rumination Processes

As just reviewed, in the context of anger provocation, some people will be able to deploy effortful control capacities to avoid impulsive–reactive aggression. For some people, this would correspond to a dissipation of anger, but for others, anger will linger, and the desire for vengeance will remain. Wilkowski and Robinson (2010) emphasize the importance of rumination as a key cognitive process in trait anger and reactive aggressive. Rumination refers to a tendency to revisit, rehearse, dwell and brood on negative experiences and/or adverse emotions (Nolen-Hoeksema 1991). Rumination processes have been shown to predict aggressive reactions to perceived slights and provocation (Collins and Bell 1997). Different people appear to show tendencies to ruminate on different emotions, with anger rumination being related to problems with aggression, and sadness rumination predicting problems with depressed mood (Peled and Moretti 2010). Importantly, anger rumination predicts overt aggression (i.e., physical and verbal; Anestis et al. 2009) and relational aggression (i.e., the manipulation of social networks to cause harm) over and above the significant prediction by trait anger itself (Peled and Moretti 2010). These ruminative processes may help account for which youth can, and which cannot, use self-control to avoid aggression altogether.

Given that anger rumination appears to amplify anger and vengefulness (Bushman 2002), it is likely to inform any re-appraisal that might arise from the recruitment of effortful control processes. In distinguishing impulsive and controlled types of reactive aggression, Wilkowski and Robinson's (2010) integrative cognitive model may be expanded to consider how rumination processes may moderate the influence of effortful control on behavior. For individuals who do not ruminate on their anger, effortful control may serve as Wilkowski and Robinson have proposed: to suppress anger and aggression. But for individuals who are prone to anger rumination, effortful control may serve instead to alter the type of aggression elicited, shifting it from a spontaneous attack to controlled-reactive aggression.

Permanence of Digital Data and Anger Rumination A core feature of the online media by which young people now communicate is the permanence of digital data. Acts of aggression can be publically posted, saved, copied and pasted, and redistributed ad infinitum with no degradation of the information, and no alteration due to memory effects or re-telling (Hinduja and Patchin 2008; Runions et al. 2013). Research on reappraisal of provocative stimuli indicates that the act of revisiting offensive material may increase instances of "thoughtful aggression" if no mitigating information is provided (Barlett and Anderson 2011, p. 1565). The structural permanence of online social cues may provide fuel for anger-rumination, as young people are able to revisit and confirm their interpretation of provocation (Runions et al. 2013). This may increase the likelihood of controlled-reactive aggressive responses. Of course, if exonerating information becomes available either online or off, the desire for vengeance may decrease, and aggressive responses become less likely (Barlett and Anderson 2011). But in the absence of such revisions, data permanence seems likely to afford increased opportunities for hostile rumination, augmenting the risk of cyber-aggression.

Close examination via qualitative and daily diary methodologies could provide insight into how young people engage with anger-provoking stimuli online to fuel rumination, or, alternately, how they disregard certain stimuli to avoid ruminating on perceived slights. Such research would provide rich, ecologically-valid data on how young people are able to recruit control in the face of anger-provoking stimuli, and how youth make sense of their capacities for control and the means to which they put such control. Experimental research using eye-tracking methodologies (e.g., Horsley et al. 2010; Wilkowski et al. 2007) also could tap into how the allocation of attention over a shorter period of time is related to vengeful social goals. Individual differences in rumination should be observable in real time as attention returns to the offending online stimulus; examining the association of these individual differences to the social responses that young people nominate may provide us with a clearer understanding of the role of anger rumination in controlled-reactive cyber-aggression.

Controlled-Appetitive Aggression

The types of aggression described above are seen as motivated by reaction to aversive emotions such as anger and a concomitant desire for vengeance. In contrast, appetitive types of aggression are thought to be motivated by the positive reward, including positive affect, arising either directly with the act of aggression, or indirectly through material or social rewards achieved and desires attained consequent to the aggression. Proactive aggression has been conceptually and empirically linked to expectations of positive affect deriving from aggression. Youth with predominantly proactive-aggression problems are more likely to anticipate that aggression would lead to

more positive feelings for themselves, compared to youth with reactive problems or with no aggression problems (Dodge et al. 1997). Researchers have observed that some children and youth expect positive affective consequences from the harassment of others or other transgressive behaviors. Kindergarten-aged children, for example, predict that they would feel happy in situations in which they were dishonest so long as they are not caught in their transgression (Barden et al. 1980). By adolescence, youth with clinical levels of behavior problems are more likely to expect to feel positive after having succeeded in an instrumental antisocial behavior (e.g., stealing a desired jacket; Arsenio et al. 2004). For some youth, the pull of positive affective responses may continue to motivate antisocial behavior and aggression.

Instrumental/proactive aggression has been defined variously as involving self-serving, reward-motivated, contingency-learned positive incentives consequent on aggression, and deliberate, planful behavior aimed at achieving those rewards. At the core, definitions aim to distinguish it from hostile/reactive aggression (e.g., "Behaviors such as coercion, dominance, bullying, and instrumental aggression seem to occur without immediate provocation or instigation"; Dodge and Coie 1987, p. 1147). Dodge and Coie (1987) further argued that the "anticipated outcome is what 'pulls' the behavior" (ibid). Also central to most contemporary definitions of instrumental/proactive aggression is its planned nature. Thoughtful (Anderson and Bushman 2002) or instrumental (Berkowitz 1993) aggression involves deliberative processing and intent to harm (as a proximal cause) to achieve another goal (as a distal cause), including, evidently, the goal of positive affect.

These definitional themes correspond well to the controlled-appetitive type of aggression as conceived in Howard's QVT (2011). As a planned behavior aimed at achieving self-reward (i.e., positive desired material reward or rewarding affective states), controlled-appetitive aggression would appear to require particularly strong beliefs about the appropriateness of aggression to achieve one's goals. It also appears to be based on a particular incapacity to empathize with those who may be harmed in the process. These aspects of controlled-appetitive aggression are explored next, followed by sections examining how online communication could amplify these tendencies.

Controlled-Appetitive Aggression as a Planned Behavior

Insofar as this type of aggression reflects self-regulated actions, the Theory of Planned Behavior (TPB) may productively inform the study of controlled-appetitive aggression (Richetin et al. 2011). This theory aims to account for why intentions do or do not result in actualized behaviors, and emphasizes the role of (a) attitudes toward the behavior;

(b) subjective norms, or the perceived acceptability of the action in a particular context or setting; and (c) perceived behavioral control, or self-efficacy, for the behavior (Ajzen 1991). In late childhood and early adolescence, aggressive children, compared to nonaggressive peers, hold attitudes minimizing concern about the potential harm of aggression (Boldizar et al. 1989). Proactive aggression, in particular, is linked to beliefs justifying aggression (e.g., Andreu et al. 2010). However, at least by adolescence, both reactive and proactive aggression are associated significantly with attitudes affirming the acceptability of aggression (Bailey and Ostrov 2008), suggesting that attitudes toward aggression, on their own, may not differentiate adequately appetitive and reactive types of aggression.

As discussed in the section on controlled-reactive aggression, self-efficacy appears to be particularly important for controlled types of aggression (Richetin et al. 2011). For example, aggressive non-victimized young adolescents report greater self-efficacy for physically aggressive responses than do victimized or non-victimized, non-aggressive youth (Bettencourt and Farrell 2013). There is also evidence that social norms may influence intentions to engage in verbal, if not physical, aggression (Roberto et al. 2003). But self-efficacy for aggression also interacts with collective social norms about aggression (Barchia and Bussey 2011), indicating the need to consider these aspects of planned behavior together. It is with regard to these two aspects of the Theory of Planned Behavior—perceived behavioral control and social norms—that ICT-media seem likely to provide opportunities for cyber-aggression that differ from traditional, offline aggression.

Planned Behavior and Anonymity   In considering the affordances provided by ICT for aggression, researchers have observed the potential for anonymous aggression afforded by the many ICT platforms (Ang and Goh 2010; Moore et al. 2012). Kowalski and Limber (2007) found that half of the cyber-victimized youth in their study did not know the identity of their antagonist. Young adolescents identify anonymity as a key aspect that makes cyberbullying more serious than traditional forms of bullying (Mishna et al. 2009). These findings speak to the prevalence and perceived impact on the part of cyber-victims, but do not address how the anonymity afforded by ICT increased the willingness to cyber-aggress.

Psychological researchers have long been aware of the power of anonymity to disinhibit aggression. As Zimbardo noted in 1969, "If others can't identify you or single you out, they can't evaluate, criticize, judge or punish you" (p. 255). Meta-analyses support the notion that an absence of accountability provided by anonymity predicts increased antisocial behaviors (Postmes and Spears 1998). Anonymity, easily achieved online (e.g., via message boards,

Twitter, or Tumblr), may bolster the aggressor's sense of self-efficacy via their beliefs in being able to aggress successfully without retaliation. Moreover, the capacity to remain anonymous behind a computer or tablet screen may augment perceived behavioral control by weakening the influence of social norms on self-control (Derks et al. 2008b), making aggression that incorporates appraisals of social norms more likely.

Shifts in Online Social Norms As noted above, the theory of planned behavior suggests that intentions are more likely to arise and to be actualized as behaviors when those behaviors are perceived to be normative. There is reason to believe that online communications are marked by a different set of social norms than traditional modes of communication (Bryant and Marmo 2012; Runions et al. 2013). McLeod et al. (1997, p. 714) have argued that norms around politeness are attenuated by the paucity of social cues, and ICT-communicators are consequently less likely to "make positive responses to each other, refrain from blunt criticisms of each other [or] to listen attentively to each other". Young and Whitty (2012, p. 3) have argued that what is considered taboo in a face-to-face setting may not be taboo in cyberspace, where the altered contingencies of each online setting mean that issues of moral permissibility "must stem from a moral system born of those spaces". If online social norms are demonstrably different, or are perceived to be different, and more hostile, than offline communication, then cyber-aggression should be easier to engage in, as per predictions of the Theory of Planned Behavior.

Controlled-Appetitive Aggression and Empathic Failure

In emphasizing the role of attitudes toward the behavior, the Theory of Planned Behavior may point researchers toward a key determinant of attitudes to aggression for many people: empathy. Empathy is typically defined as a capacity for comprehending and sharing in another's emotional state (e.g., Cohen and Strayer 1996; Hoffman 2000), and can be considered as both a trait (a tendency that varies between individuals) and a state (a response elicited in particular situations). Trait empathy is related to the likelihood of engaging in aggression (e.g. Cohen and Strayer 1996): more empathic people tend to share more deeply in the suffering of others and are thereby less likely to aggress (Hoffman 2000). Moreover, young adolescents who hold beliefs supporting fighting show less empathic perspective taking and concern for others (Farrell et al. 2012). Instrumental/proactive aggression, in particular, is linked with a lack of remorse and empathy (Cornell et al. 1996), suggesting an absence of a key inhibitor of

aggression. One's attitude toward aggression, then, influenced by one's capacity to feel empathy for the victim, likely serves as an important constraint on translating appetitive aggressive desires into actual aggression.

People with greater trait empathy are thought to experience greater guilt when they do engage in aggression (Silfver and Helkama 2007). Guilt arises with one's recognition that one has violated salient and personally meaningful moral and/or social norms (Kugler and Jones 1992), and generally arises from automatic evaluations (Haidt 2003). Guilt is morally self-informative (Clore et al. 1994): It serves to inform one that s/he is doing or has done something wrong (Haidt 2003), that is, something that violates one's own moral sensibilities. This information can then feed into social information processing and influence social goals, response evaluation, and response decisions.

Empathic responses are thought to arise through two distinct processes: (a) experience sharing, a vicarious affective sharing of someone else's emotions (aka., *affective empathy*), and (b) mentalizing, or the cognitive appreciation and/or understanding of someone else's situation (aka., *cognitive empathy*; Walter 2012; Zaki and Ochsner 2012). Empathic responses appear to derive from the action of one or the other of these pathways, and, in many cases, from their co-recruitment, although co-recruitment appears not to be necessary to the experience of empathy (Walter 2012; Zaki and Ochsner 2012). These two processes are reviewed next.

Affective empathy involves a process of *neural resonance*. Neural resonance refers to the activation of brain regions responsible for processing our own activities in response to observations of the activities of others (Keysers et al. 2010). As Keysers et al. (2010, p. 417) note, "our perception of other individuals involves neurons and brain areas that were thought to be reserved for the control of our own actions and the experience of our own emotions". This *neural mirroring* process appears to permit an affective simulation of others' emotional experiences (e.g., Adolphs et al. 2003; Singer et al. 2004; Walter 2012). These processes may relate to violence inhibition mechanism models (Blair 1995, 2005). Blair proposed that this neurally-based mechanism is activated in the context of distress cues emitted by others, and likely recruits neural resonance. This inhibition mechanism may account for findings such as those of Camras (1977), who observed that displays of sad or fearful facial expressions resulted in termination of aggression in children.

The second component process in empathy is the capacity to "adopt the psychological point of view of others" (Davis 1983, pp. 113–114), which is an important factor in inhibiting aggression (Richardson et al. 1994). Such capacities for perspective-taking are implicated in aggression regulation, especially under conditions of a

perceived provocation (Richardson et al. 1994). Leith and Baumeister (1998) have shown that guilt-prone individuals appear to have superior perspective-taking capacities, suggesting that cognitive processes may recruit emotional responses crucial to the inhibition of aggression. Normative declines in aggression over childhood into adolescence (Broidy et al. 2003) may map onto developing capacities for perspective-taking, which show an increasing developmental trajectory over childhood through adolescence (Martin et al. 2008). Cognitive paths to empathy, built upon increasingly sophisticated perspective taking, appear to be important inhibitors of aggression for young people.

Thus, empathy appears to involve the activation of at least one of two processes. Neural resonance may evoke empathy via exposure to others' emotional displays, and/or perspective-taking capacities may arise from conscious reflection on another person's experiences. It is likely that both are active in everyday instances of empathy. The flexible activation of both systems permit complex social cognitive processing, for example, the processing of conflicting information from different modalities (e.g., when nonverbal emotion cue information conflicts with the semantic content of a sentence; Zaki et al. 2010). This neural flexibility between the two systems likely accounts for the importance of situational–contextual cues in triggering empathic responses, even for individuals high in trait empathy.

Reduced Empathy Activation Online   Cyberbullying perpetrators appear to show less remorse than youth involved in face-to-face bullying (Slonje et al. 2012). As a participant in Mishna et al. (2009) observed "the person who's doing [cyber-aggression] doesn't feel guilty because they're not saying it to their face" (p. 1224). Why would the guilt normally associated with aggression be minimized online?

Social developmental experimental research has shown that face-to-face emotional cues appear to inhibit aggression (Camras 1977; Lemerise et al. 2005). In face-to-face settings, the multidimensional nature of empathy provides multiple pathways for eliciting empathy. With distinct processes of cognitively-driven mentalizing and affectively-driven experience sharing (Brass et al. 2009), face-to-face interactions afford multiple modalities of social information (non-verbal, paralinguistic, and semantic) that can operate together to activate multiple neural systems that support empathic responding.

The ICT-context, with its characteristic paucity of social cues, both non-verbal and paralinguistic, may limit the opportunities for the neural pathways supporting vicarious responses to become activated, and thereby limit opportunities for empathy. Specifically, in this setting, the absence of social cues may limit neural processes of neural resonance (Zaki and Ochsner 2012), impeding affective

empathy, and thereby facilitating aggression. With online cues so limited in the emotional information that they can convey, the emotional costs associated with cyber-aggression may become minimized (Slonje and Smith 2008). These costs may be best conceptualized as emotional influences on social information processing (de Castro 2010) promoting empathy. Without social cues such as emotional expression or emotional intonation, it may be more difficult to induce guilt in cyber-aggressors. In eliminating one of the two means of activating empathy, and forcing the adolescent to rely on the semantic processing systems alone, important mechanisms for impeding aggression are inactive in ICT contexts.

Moreover, this constriction of opportunities for neural resonance may amplify the risk of aggression amongst young people who have problems with disruptive behavior. Such youth show low levels of both trait and state empathy under normal circumstances, and a particular difficulty in showing empathy for negative emotions (e.g., sadness and anger; de Wied et al. 2010). Research indicates that cyber-aggressors show low levels of remorse and guilt (Perren and Gutzwiller-Helfenfinger 2012), and as with other aggressors, cyber-aggressors show less empathy than less-aggressive peers and than victimized youth (Steffgen et al. 2011). But neither study speaks to how affective or cognitive components of empathy might be engaged differentially in online communication. The one study to date that has examined the role of cognitive and affective empathy (Ang and Goh 2010) looked at empathy as a trait, and found small but significant co-acting, gender-moderated effects of both on overall cyber-aggression, but again this does not speak to how the online setting in particular could modulate empathic responding. Hints to the role of trait empathy for online behavior are provided by a study of video game virtual violence conducted by Hartmann et al. (2010). They found that young adults with higher levels of trait empathy report greater guilt when they engage in unjust virtual violence (Hartmann et al. 2010). But again this study does not speak to a differential recruitment of empathy-related mechanisms in cyber- versus face-to-face aggression. Research is needed that directly examines cognitive perspective-taking and affective-sharing components of empathy as inhibitors of face-to-face aggression versus cyber-aggression.

"That was a Real Kick and Good for Laughs and Lashings of the Old Ultraviolent": Impulsive–Appetitive Aggression

Excitement and thrill are primary self-reported motives amongst convicted criminal offenders (Gudjonsson and

Sigurdsson 2007; Ohlsson and Ireland 2011) and youth offenders (Putnins 2010). Violent offenders more likely than non-violent offenders to report the elicitation of positive affect as a key motive for their offenses (Ohlsson and Ireland 2011). In light of these findings, Howard (2011) proposed the impulsive–appetitive aggression type, for whom aggression is motivated by immediate attendant exhilaration and thrill of violence and transgression. As with Alex in Stanley Kubrick's (1971) film *Clockwork Orange*, quoted above, the primary motivation for aggression in some cases may be the "laughs" aggression affords the aggressor. Developmental research has indicated that for adolescents with delinquent behavior problems, proactive aggression tendencies predict positive outcome expectancies, including feeling good about oneself and peer respect; this holds for all sorts of aggressive situations, including for reactive situations that bore no clear instrumental gain (Smithmyer et al. 2000). Validation of the QVT via a self-report instrument of conduct-disordered youths indicated that thrill-seeking aggression reflected a clear and distinct factor that differentiated these youth from a non-aggressive control group (Bjørnebekk and Howard 2012a, b). For some youth, the immediate thrill may be a sufficient motive for aggression, with no other reward, rage, or desire for revenge required.

A small body of literature helps somewhat in clarifying the psychological development of this type of aggression. In a sample of preschool children, Arsenio et al. (2000) found that, as might be expected, children who initiate fights are more likely to display angry affect in general. But, less intuitively, children who initiate fights were more likely to display expressions of *happiness* during aggressive interactions with peers (Arsenio and Lover 1997; Arsenio et al. 2000). However, aside from the work on youth offenders previously cited, the extant research has not examined whether pleasure, excitement and happiness derived from the acts of aggression are motivating factors in later childhood and/or adolescent aggression. Some children and youth with aggression problems do cite the likelihood of positive affect as a motivator for aggression and other antisocial, transgressive behaviors (Arsenio et al. 2004; Barden et al. 1980; Dodge et al. 1997). However, these studies have conflated the instrumental reward value of gains accrued from aggression with immediate, positive affective drivers of aggression. The QVT model may provide a better theoretical framework for understanding the relationship between aggression and positive affect by disaggregating aggression motivated by an immediate, intrinsic, positive-affect pay off and genuinely instrumental aggression that involves a planful effort to use aggression as a means to achieve some (likely extrinsic) goal.

Sensation Seeking and Aggression: Developmental and Individual Differences

In the past few years, the role of sensation seeking in a range of antisocial risk behaviors, especially during adolescence, has become clear. Sensation seeking may be defined as a tendency to engage in novel and thrilling, stimulating, and rewarding activities, and is related to the evaluation of high-risk options as strongly rewarding (Zuckerman 1979). Numerous studies have linked individual differences in sensation seeking to a range of risk taking behaviors, including illegal substance use, risky sexual activity, minor theft and vandalism, and risky driving behaviors (e.g., Arnett 1996; Crawford et al. 2003; Dunlop and Romer 2010; Rolison and Scherman 2002; Zuckerman 1994). Sensation seeking in children and adolescents is related to problems with anger, and poor anger control (del Barrio et al. 2004), suggesting that sensation seeking could be a contributor to frustrative/reactive aggression, but other research on children's aggression has found that sensation seeking is predictive of proactive aggression, but not reactive aggression (Xu et al. 2009). Unfortunately, no comparable studies have looked at sensation seeking and motives for aggression in adolescents.

Viewed through the lens of the QVT, it may be that a conception of youth who are "wild, sensation-seeking risk takers [being] prone to aggression" (Watson et al. 2004, p. 418) mistakenly conflates wildness—arguably better captured by measures of effortful control, and impulsivity—with sensation seeking, which is a fundamentally appetitive motivational construct. In particular, sensation seeking appears to motivate risk taking by selectively focusing attention to future positive affect that adolescents believe will follow the risk activity, although immediate rewards may be even more motivating (Steinberg 2008). But sensation seeking need not involve impulsivity, reflecting instead the strong operation of the behavioral activation system (BAS), which is neurally and developmentally distinct from systems involved in impulsive behaviors reflecting poor inhibition and self-control (Steinberg et al. 2008). The QVT, in distinguishing control from affective valence, accounts better for this distinction than other models of aggression.

Puberty-linked neurotransmitter-based changes are thought to increase sensitivity to rewards, and sensitivity to social information, in adolescence (Albert and Steinberg 2011). These normative developmental changes may support increases in peer influence commonly observed in adolescence. Shifts in sensitivity to social information and social reward in adolescence are important to understanding the nature of adolescent risk taking. Across a range of risk-related activities, from dangerous driving to sexual activity to the commission of crime, the presence of peers

appears to increase adolescent risk taking (see Steinberg 2008). In an elegant experimental paradigm, Gardner and Steinberg (2005) tested adolescents in a video-game driving simulation, designed to test risk-taking behaviors. When alone, teens showed no more risky driving behaviors than did adults. But when a couple of friends of the participants were allowed to sit in on the session, adolescent participants engaged in 50 % more risk taking. Follow-up fMRI research indicated that the presence of peers was related to the activation of socio-emotional brain regions not engaged when youth were tested alone (Chein et al. 2011). The tendency to take greater risks while in the presence of peers is a function of individual differences in surgency (Segalowitz et al. 2012), a construct blending sensation seeking, positive state affect, and behavioral activation system influences (Rothbart et al. 1994). For many adolescents, it would seem that, where there are peers, there is an incentive for risk taking.

Developmentally, sensation seeking and impulsivity appear to follow distinct trajectories, with sensation seeking increasing in the early adolescent years and then stabilizing or declining toward adulthood (Steinberg et al. 2008). Impulsivity, on the other hand, shows a linear decline from 10 years of age (Steinberg et al. 2008). In early adolescence, then, the drive for immediate reward, especially in the form of peer approval, may become particularly strong, without the mitigating influence of fully developed systems for the inhibition of impulsivity. This may be a recipe for rash, impulsive decision-making, including decisions to aggress.

A focus on reward—including social status rewards—may drive sensation seekers in some contexts to aggress deliberately. It is also possible that deliberative, controlled-appetitive aggression also may be influenced by social reward. Maslowsky et al. (2011) recently found the relationship of sensation seeking to risk behaviors to be mediated partially by cost–benefit analyses that weigh the benefits as greater than the costs. Such cost–benefit analysis also may play into controlled-appetitive aggression. But it appears most likely that sensation seeking interacts with adolescents' still-developing capacities for inhibitory control to potentiate impulsive–appetitive aggression in social contexts. Low levels of effortful control (i.e., poor behavioral inhibition) moderate and potentiate the link between sensation seeking and proactive aggression but not reactive aggression (Xu et al. 2009), which suggests that proactive aggression may not be entirely about deliberative, carefully planned aggressive acts. In distinguishing control processes from the appetitiveness of motives, the QVT may help to clarify the manner in which sensation seeking, as a pull to rewards, can co-act with impulsivity or self-control to result in spontaneous or controlled antisocial acts and aggression.

All the Social Network's a Stage: Perpetual Audience and Appetitive Aggression A key aspect of the new ICT media is the social networking capacities they provide. With the large-scale adoption of Facebook, Twitter, and microblog sites such as Tumblr, young people have an easy forum from which to share their views and opinions. When posting on such media, one is aware of an audience as an abstract, but cannot be certain of the exact composition of that audience. Given that peer influence, and even the presence of peers, contributes to risk taking and to delinquent (Monahan et al. 2009) and aggressive (Modecki 2009) behavior, social networks may present a distinct social contextual risk for aggression. Runions et al. (2013) have pointed to this ambiguity around audience as a potential contributor to cyber-aggression in affording a perception of a constant audience of peers. The perception of perpetual audience may prime the risk-taking, sensation seeking processes reviewed by Steinberg (2008) and his colleagues (Chein et al. 2011). Experimental studies, modeled on those of Steinberg's colleagues, which manipulate the actual or perceived audience, may help to disambiguate the role of audience on cyber-aggression. As this analysis has indicated, the perception of audience alone may trigger neural pathways sensitive to social cues. This could be examined by manipulating the perceived audience in an experimental fashion via an analog study, in which the participant believes that they are engaging in a live online scenario with their network of friends (e.g., Facebook) or followers (e.g., twitter) observing their responses. Alternately, studying hypothetical situations, and varying the hypothetical context from private (e.g., text messaging) to public (e.g., Facebook wall), appears to be adequate to detect differences in processing and response styles (see Sticca and Perren 2012).

Arousal- and Excitation-Transfer in Impulsive–Appetitive Aggression

Bandura (1991) argued that any source of arousal could aggravate problems with aggression, and consequent research on excitation-transfer indicated that aggressive responses may derive from other forms of arousal and excitation. Physiologic arousal resulting from sources other than anger have been shown in experimental studies to increase the intensity of pain delivered to a research confederate (Zillmann 1971). Violent video games have been shown to predict aggressive cognition and affect, decreases in empathic response, and increases in arousal (Anderson et al. 2010). There is some evidence that physiologic arousal may mediate the link between violent gaming and aggression (Englehart et al. 2011). Similarly, prior viewing of pornography appears to facilitate aggressive responses via arousal mechanisms (Donnerstein et al. 1975; Zillmann

1971). A meta-analysis of the research that followed these early studies indicates that the more graphic the pornography, the greater the aggression engendered (Allen et al. 1995). More frequent viewing of pornography also is associated with higher rates of binge drinking and sexual risk behaviors (Carroll et al. 2008). Pornography use and violent gaming may be expressions of problematic sensation seeking, and, as such, linked to appetitive types of aggression.

Online Gaming and Pornography and Cyber-Aggression: Excitation Transfer It seems reasonable to propose that excitation-transfer from other online activities could predispose youth to greater aggression online. Online gaming and viewing of cyber-pornography are two online activities that hold the potential to increase physiologic arousal and thereby influence aggressiveness online. Recent studies indicate that almost all college-aged males report viewing online pornography as teenagers (93 %; Sabina et al. 2008). Young men who frequently view online pornography are more susceptible to peer influence (Lam and Chan 2007). Viewing pornographic material online is linked to sexually aggressive behaviors (Ybarra et al. 2011), and to proclivities toward sexual harassment (Lam and Chan 2007). Excitation-transfer processes may drive the connection between pornography use and aggression.

Online gaming provides another potential arousal mechanism that could increase cyber-aggression. Online gaming has been examined recently for its influence on taboo violation and guilt responses. Whitty et al. (2011) recently have noted that some adult game users have difficulties separating the moral and emotional responses to taboo online activities in MMORPGs (massively multiplayer online role-playing games; e.g., World of Warcraft). Although cyberspace holds the potential for diverse moral norms (Young and Whitty 2012), research indicates that virtual violence does produce guilt responses, particularly in the more trait-empathetic players (Hartmann et al. 2010). Yet, the experience of guilt online appears not to limit youth's enjoyment of those violent games (Weaver and Lewis 2012). Studies have linked online gaming and pornography viewing to aggression in general (e.g., Ko et al. 2009), and meta-analyses indicate that violent video games do increase arousal (Anderson and Bushman 2001). It is unclear, at this point, whether violent gaming holds different implications for online and offline aggression. But given the ease with which young people may transition from such online activities to social media, in which opportunities for appetitive aggression are present, further research seems warranted.

To date, however, no research on the role of arousal in enabling a spillover of online virtual violence to online actual aggression has been conducted. One concern to be considered in the conduct of such research, however, is the possibility of conflation via third-variable accounts. For example, the influence of sensation seeking and appetitive processes may account for any link between pornography use or gaming and aggression. Research that looks at the links between surgency/sensation seeking, online pornography and/or violent gaming usage (including how graphic the imagery is), and various expressions of cyber-aggression, including sexual harassment, is needed.

But It Was Just a Joke: Thrill-Seeking, Appetitive Aggression, and Intent to Harm

Many young people seek to excuse their cyber-aggression by claiming they were just joking. Pornari and Wood (2010) have argued that, because young people already associate online technologies with entertaining activities, aggressive acts may be conducted without awareness of the severity of the act. We also may need to be aware that the intent to harm is not necessary to inflict harm on others: appetitive, thrill-seeking aggression may arise simply from an insensitive, thoughtless comment that *seemed funny* (i.e., to the aggressor) at the time. Shapka (2011) has noted that most aggressive online messaging is not intended to harm, but only considered as *kidding around* by the aggressor. Needless to say, not all such so-called jokes are taken as such by the target (e.g., Kowalski et al. 2008; Malti et al. 2010). But in a context that may be marked by an absence of cues to trigger empathic responses, and shifts in social norms online toward a more abrasive, less polite style of interaction, the likelihood of genuinely unintended aggression arises. In failing to take others' perspective online, young people may genuinely believe that their jokes are within the bounds of acceptable interaction online, and the thrill of adding a (self-regarded) hilarious comment may be strong. A failure to foresee the consequences of one's behaviors does not mitigate responsibility for one's actions, but from a research (and legal) perspective, unintended aggression is not the same as intended harm, or bullying.

Obviously this is speculative, but the role of thrill-seeking in appetitively motivated acts leaves open the possibility that unintended aggression does account for some incidents that get referred to as *cyberbullying*. It may be that the adolescent cyber-aggresssors in Raskauskas and Stoltz's (2007) study were not being disingenuous in noting that cyberbullies do it "for fun" (p. 570), and not for malice. If so, then we may be using the term *cyberbullying* to refer to incidents that lack (a) a clear power differential, (b) a repeated nature, *and* (c) an intent to harm, thereby failing to fit *any* of the criteria for distinguishing bullying from other acts of aggression proposed by Olweus (1978) and commonly cited by bullying researchers. Research that looks at aggression as driven by a range of motives and does not

presume hostile intent may provide us with a clearer picture of youth's attempts at humor online, and how they dovetail with aggression and perceived victimization.

Conclusions

This article aims to spur new directions in cyber-aggression research by providing a conceptual model for considering how appetitive and reactive affective processes in adolescence can motivate acts of aggression and how adolescent capacities for self-control may alter the expression of aggression. This conceptual model builds on recent conceptual development in adolescent on-line social cognition (Runions et al. 2013) that considered how ICT-media might modulate social information processing. The new model presented here is aimed at researchers, but it is important to note that understanding how these individual and technological processes co-act is important for effective intervention. If you do not understand why aggression arises, why and how it can be channeled, and how technologies may afford their own opportunities for enacting aggression, it seems unlikely that you will be effective in preventing youth cyber-aggression. Acts of aggression motivated by revenge are fundamentally different from acts motivated by expectations of positive rewards, and different again from acts motivated by the thrill of aggression itself. Distinguishing aversive/reactive from appetitive aggression permits a clearer understanding of the different ways that anger and blame can motivate retributive aggression, whether that revenge is sought immediately and automatically or is delayed to allow the aggressor the last laugh. But first, research is needed that tests these distinctions and their relevance to cyber-aggression.

In differentiating cyber-aggressive acts that arise spontaneously via automatic processes from those that are self-controlled behaviors, this model focuses on how different aspects of the newest generation of online communication tools may influence psychological processes involved in the production of aggressive cyber-activity. Although the focus has been on social networks, some (but not all) of the concerns encapsulated in Fig. 2 are relevant to test-messaging and email communications, which remain common avenues for cyber-aggression. Across these ICT modes, aggression may derive from hostile schema recruitment in the absence of self-control and re-evaluation of the perceived provocation, or it may arise as a thrill at transgression in the context of perceived social audiences, and attendant neural reward processes. Alternatively, aggression may derive from careful consideration of how best to enact revenge, or from a calculated plan to achieve a desired material or social goal. Research that probes and tests some of the technological

affordances of online social contexts, and that listens to young people's own voices and their own accounts of their own motives for aggression, is needed.

These distinctions between aversive/reactive and appetitive motives, and between controlled versus automatic processes, also hold differential implications for the likelihood of cyber-aggression. By building on the framework for considering the role of the ICT medium on adolescents' processing of social information (Runions et al. 2013), and integrating Howard's (2011) ideas about motive and self-control, this article aims to spur research that better addresses the diversity of youth aggression. But it is by no means an exhaustive review of all the potential individual differences, developmental differences, or online processes that may be implicated in each type of cyber-aggression. The ideas presented here are offered as working hypotheses for future research, and as a potential spur for further conceptual development on aggression and how it manifests itself online and off. Effective intervention will only arise with a clear, theoretically-informed and empirically-tested understanding of the processes underlying different motives and types of cyber-aggression.

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Author Biography

Kevin C. Runions is an Assistant Professor in Educational Psychology and Leadership Studies at the University of Victoria, British Columbia, and an Adjunct Lecturer with the Child Health Promotion Research Centre, Edith Cowan University, Perth, Australia. He received his doctorate in Human Development and Education from the Ontario Institute for Studies in Education/University of Toronto. His major research interests include social cognitive development and aggression, cyber-aggression, and the role of teacher–student relationships in peer dynamics and social development.