

The Other Side of the Screen: The Impact of Perspective-Taking on Adolescents' Online

Communication

by

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Abstract

In recent decades, adolescents' interactions with peers have increasingly transitioned online. While socially interactive technologies provide multiple avenues for positive communication between peers, adolescents can fall victim to harmful online peer interactions, with such interactions negatively impacting their well-being. Although there is information available about social media use in adolescent populations generally, there is little empirical evidence investigating how adolescents' characteristics are related to their communicative choices on social media. Addressing a gap in the literature, this work examines experimental manipulations of context (e.g., prompts of perspective-taking) and individual differences in socio-cognitive skills as they relate to adolescents' online communicative choices. 12- to 15-year-old participants ($N = 78$) viewed pictures of other adolescents, on a simulated social media app similar to Snapchat, and chose between pre-written aggressive or prosocial comments to send to a recipient under conditions that varied in the degree to which perspective-taking was cued. When perspective-taking was cued, participants chose more prosocial comments to send to a recipient compared to when participants were permitted to choose a comment immediately after viewing another adolescent's picture. Consistent with the literature examining in-person communication, girls made more prosocial choices on the social media app than boys. The results suggest that the individual characteristics of youth (e.g., social media use, mood, affective empathy) are associated with their communicative choices online. Although tentative, findings from this work provide new insights into the ways in which adolescents navigate their complex, and increasingly online, communicative interactions.

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Literature Review Introduction

Over the past few decades, the importance of peer relationships has received a substantial amount of empirical attention from developmental researchers. It has since been well established that positive peer relationships are essential for adolescents' well-being, and, in contrast, that negative peer interactions can have pervasive and detrimental consequences in multiple facets of adolescents' lives (Corsano et al., 2006; Roach, 2018). Adolescence is a transitional stage between childhood and young adulthood, characterized not only by substantial physical and psychosocial developmental changes but also by the emergence of increasingly complex and salient peer relationships (Gray et al., 2012). This literature review aims to outline the nature of peer relationships in adolescence, and more specifically, how individual differences in socio-cognitive skills contribute to adolescents' communicative success within peer relationships and social interactions. This review will discuss the importance of peer relationships for adolescents' well-being, factors commonly associated with peer victimization, and individual differences related to adolescents' communicative behaviour with peers. Moreover, given the prevalence of work demonstrating that peer interactions differ between boys and girls (Rose & Rudolph, 2006), gender will be discussed in relation to adolescents' peer relationships broadly and experiences of peer victimization more specifically. Finally, this review will address some gaps in the literature and discuss future avenues for research. This literature review serves as the background context for this thesis investigating adolescents' online communicative behaviour¹.

¹ Literature reviewed in this thesis includes empirical findings from early (ages 10-13) and middle (ages 14-16) adolescent populations (World Health Organization, n.d.). Samples outside of this range are highlighted.

Peer Relationships in Adolescence

Positive peer relationships serve as a robust protective factor throughout the lifespan, but during adolescence, peer relationships reach paramount importance as youth begin to establish autonomy from parents and spend significantly more time with their peers (Gentry & Campbell, 2002). Adolescents' peer networks begin to expand as they form relationships with peers at school, sports, jobs, and extracurriculars (U.S. Department of Health & Human Services, 2018; Brown & Larson, 2009). As in childhood, adolescents' peer groups seem to be mostly homogenous and characterized by similarity in shared activities, attitudes, appearances, personality, and values (Brown & Larson, 2009). For instance, adolescents tend to form friendships with peers similar in popularity (Dijkstra et al., 2013) and behaviour (Gremmen et al., 2019). Peer groups are also primarily gender congruent, with 90% of adolescents in a recent study reporting same-sex peer relationships (Hartas, 2019). However, peer groups also begin to diversify and increasingly become more gender-mixed with the integration of romantic partners into the peer group (Connolly et al., 2004).

During adolescence, peer relationships become a significant source of influence in adolescents' lives. For instance, in the presence of peers, adolescents were found to make riskier decisions and engage in more risk-taking behaviours than when alone, and this effect was stronger for adolescents than for adults (Gardner & Steinberg, 2005). However, it is important to note that peer influence during adolescence is a reciprocal, rather than a unidirectional process, with all members influencing each other (Brown & Larson, 2009). With the emergence of new types of relationships (e.g., romantic relationships), and increased salience of social status, peer relationships become more complex than in previous stages of development (Brown & Larson, 2009). For example, adolescents who report engaging in sexual activity, compared to those who

do not, are rated as more popular by peers, but are not rated as well-liked by peers. However, adolescents with multiple sexual partners were found to be less popular among peers (Prinstein et al., 2003). Thus, not only must adolescents navigate peer relationships on a dyadic level, but also on a broader peer group level, as individual relations with peers and romantic partners can result in ramifications to one's reputation and social capital.

Decades of research have established that peer relationships are crucial for adolescents' social and emotional development. For instance, psychological well-being has been found to be dependent upon positive relations with peers, such as acceptance and successful integration into the peer group (Corsano et al., 2006). Higher perceived friendship quality among peers has been found to be an advantageous resilience factor for adolescents' psychological well-being. This association was found for adolescents who reported on one close peer relationship, suggesting that positive peer relationships can serve as a protective factor even for adolescents with small social networks (Graber et al., 2016). When adolescents experience loneliness and social rejection, it can have a lasting pernicious impact on adolescents' well-being and development. For example, youth with no reported close peer relationships demonstrated lower levels of prosocial behaviour (e.g., cooperating, assisting with peer problems), academic achievement, and more internalizing symptoms of distress, which was related to higher emotional distress two years later (Wentzel et al., 2004). Thus, failure to establish relationships with peers during this developmental stage can have both immediate and lasting implications for adolescents' well-being.

Gender Differences in Peer Relationships

Given the centrality of peer relationships in adolescence, research has begun to investigate the factors, such as gender², that impact adolescents' interactions with peers. Boys are typically thought to interact with larger peer groups, characterized by shared activities (e.g., sports, videogames), whereas girls typically belong to smaller peer groups characterized by intimacy and emotional connectedness (e.g., self-disclosing; Rose & Rudolph, 2006; Rose & Smith, 2018, McMillan et al., 2018). It has been found that boys' peer groups are less exclusive than girls, often including both friends and acquaintances, which may account for the size difference often found in peer networks among adolescents (Baines & Blatchford, 2009). The individual peers of boys are also more likely to form friendships amongst each other (Rose & Rudolph, 2006).

Adolescents also demonstrate gender differences in their communicative styles with peers. For instance, girls are found to spend more time communicating and self-disclosing with peers than boys, and girls hold more positive beliefs about the benefits of communicating about emotions (Rose & Smith, 2018). Further, throughout childhood and adolescence, girls are reportedly more prosocial than are boys (e.g., more willing to lend money to a peer, including others in peer activities), as rated by self, peers, and teachers (Van der Graaff et al., 2014, 2018, Rose & Rudolph, 2006). For instance, following a social blunder, boys are more likely to tell the truth or use sarcasm, whereas girls typically endorse more prosocial communicative styles (Mewhort-Buist et al., 2020). In response to peer problems, adolescent girls are more likely to demonstrate prosocial behaviour (e.g., supportive encouragement), whereas boys were found to respond using humour (Rose et al., 2016). Girls' peer relationships have also been found to be

² Within this thesis "gender" refers to adolescents' gender identity, rather than biological sex (Canadian Institutes of Health Research, 2020).

more stable than boys and are less likely to deteriorate in middle school samples (Nielson et al., 2020). These findings suggest that boys have more aggressive interaction styles than girls and are more willing to use aggressive and socially risky communicative strategies such as humour and sarcasm with peers (Lazarus et al., 2012; Mewhort-Buist et al., 2020).

Peer Victimization in Adolescence

While positive peer relationships are crucial for adolescents' well-being, negative peer experiences are common in adolescence. Prevalence rates of peer victimization at any age vary considerably between studies, but a consensus throughout the literature estimates that approximately 10-15% of adolescents report experiencing peer victimization (Troop-Gordon, 2017). Peer victimization broadly refers to being the target of intentional acts of aggression carried out by a peer, and can be physical (e.g., pushing, hitting), verbal (e.g., racial slurs, teasing), and/or relational (e.g., social exclusion, gossiping) in nature (Espelage, 2012; Graham & Bellmore, 2007). Peer victimization is differentiated from bullying in that bullying is more severe, repetitive, and involves a power imbalance between the bully and victim (Ybarra et al., 2014). That is, while all instances of bullying are considered a specific form of peer victimization, not all instances of peer victimization reach the definitional threshold for bullying. For purposes of this literature review, peer victimization will be used as an umbrella term to capture all forms of aggression between peers, including minor negative peer interactions to more severe forms such as bullying. Within negative peer interactions, adolescents may assume various roles, such as perpetrator (i.e., carry out victimization), victim (i.e., experience victimization), or bystander (i.e., third party observer to interaction). Bystanders can be both passive or active within negative peer interactions. That is, peers may assist the perpetrator (i.e., do not begin interaction but actively participate), reinforce the perpetrator (e.g., laughing at

victim), defend the victim (e.g., comfort victim, verbally protest), or may remain neutral within the situation (Pouwels et al., 2016).

Given the centrality of peer relationships for adolescents' well-being, it is not surprising that peer victimization is linked to a multitude of negative outcomes for victims, such as anxiety, depression, low self-esteem, and substance use (Siegel et al., 2009; Earnshaw et al., 2017; van Geel et al., 2018). Research has begun to investigate the individual factors that make some youth more vulnerable to experiencing peer victimization while others do not. The most commonly reported factor of peer victimization that emerges throughout the literature is having appearances, interests, or characteristics that deviate from that of the larger peer group (Frisèn et al., 2007; Ybarra et al., 2019). For instance, youth who wear glasses or suffer from acne are often the targets of peer victimization (Horwood et al., 2005; Magin, 2013). Several researchers have also found that adolescents who are overweight or obese report significantly more victimization than their peers (Brixval et al., 2011; van Geel et al., 2014), more traits associated with less social competence (e.g., social anxiety, shyness), and lower levels of self-esteem (Álvarez-García et al., 2020). Moreover, adolescents who experience the physical changes of puberty early (e.g., weight gain, menstruation) are more likely to be victimized by peers (Reynolds & Juvonen, 2011; Troop-Gordon, 2017).

Adolescents who report being within a sexual minority population (i.e. identify as LGBTQIA) are also more often the targets of school violence and peer victimization compared to their heterosexual peers (Olsen et al., 2014). These youth also report more suicidal ideation than their heterosexual peers who report equivalent experiences of peer victimization (see Collier et al., 2013 for a review). Further, adolescents who violate gender norms are more likely to be at risk of peer victimization than their gender-conforming peers (Young & Sweeting, 2004). Youth

also report that adolescents who appear more vulnerable (e.g., shy, quiet, isolated, low self-esteem), and are less likely to fight back are frequently the targets of peer victimization (Ybarra et al., 2019). This is consistent with findings that internalizing disorders such as depression and anxiety predict experiences of peer victimization, in addition to being a consequence of peer victimization (Cook et al., 2010). Research suggests that the unique self-focused communicative styles of adolescents with internalizing symptoms lead to lower peer relationship quality (Schwartz-Mette & Rose, 2009). In addition, youth also reference factors of personality (e.g., excessive talking, gender nonconformity), home environment (e.g., low socioeconomic status), and school success (e.g., unknowledgeable, unpopular) in describing who is frequently targeted during negative interactions with peers (Horowitz et al., 2004). Finally, youth who have experienced victimization in the past tend to be more aggressive and are sometimes found to perpetrate more peer victimization than non-victimized peers (Evans et al., 2019; Dulmus et al., 2006).

Gender Differences in Peer Victimization

Associated factors contributing to experiences of peer victimization seem to be largely similar for both boys and girls, but some gender differences emerge throughout the literature. Concerning the perpetration of peer victimization, boys are found to be more likely than girls to perpetrate and experience physical peer victimization (Beckman et al., 2013; Smith et al., 2019). While some research finds that girls typically perpetrate and experience relational victimization more often than boys (Crick & Grotpeter, 1995), several research studies fail to find any gender differences in rates of perpetration or experiences of relational victimization (Iossi Silva et al., 2013, Loflin & Barry, 2016). Popularity has also been positively linked to the perpetration of peer victimization (de Bruyn et al., 2010), but a recent study suggests this relationship may be

moderated by gender. That is, boys who valued popularity and were highly popular were more likely to victimize peers, whereas girls who valued popularity but were less popular were more likely to engage in peer victimization (Duffy et al., 2017). With respect to peer victimization experiences, some research finds that boys are more likely to experience victimization in general, while other research finds that girls and boys experience similar rates of peer victimization in adolescence (see Smith et al., 2019 for a review). However, some researchers suggest that girls are more likely to experience more negative emotional consequences of peer victimization than boys. For instance, after peer victimization has ceased, girls are more likely to report lasting internal distress compared to boys (Rueger et al., 2011). Although some gender differences do emerge, the literature suggests that boys' and girls' experiences of peer victimization in adolescence are more similar than dissimilar.

Peer Interactions and Associated Socio-Cognitive Factors

In recent years, there has been growing recognition of the variability across adolescents' interactions with their peers and the degree to which individual differences in adolescents' socio-cognitive skills may play a role. Socio-cognitive skills refer to the cognitive skills which allow us to perceive, process, and respond appropriately during social interactions with others (Kilford et al., 2016). Adolescents with more developed socio-cognitive skills are more likely to experience social success with peers, which is advantageous for their subsequent well-being (Adams, 1983; Holopainen et al., 2012).

Empathy and Perspective-Taking

Regarding adolescents' relations with peers, the socio-cognitive skill that has received the most empirical attention throughout the literature is empathy. For instance, research finds that self-reported empathy is positively related to relationship quality with peers (Boele et al., 2019).

Empathy is often conceptualized as a multidimensional construct consisting of a cognitive component, understanding others' emotions, and an affective component, experiencing the emotions of others (Vossen et al., 2015). Cognitive empathy and perspective-empathy are often used interchangeably throughout the literature, as both involve cognitive consideration of another's emotions. Further, affective empathy is differentiated from sympathy in that sympathy does not require the experience of emotional congruence, but rather reflects one's own emotional appraisal of a situation (Vossen et al., 2015). While conceptually distinct from empathy, sympathy has also been linked to more self-reported prosocial behaviour within peer relationships (e.g., altruistic helping, going out of one's way to cheer up a peer; Padilla-Walker et al., 2015). In a systematic review of bullying and peer victimization, both cognitive and affective empathy were found to be negatively related to the perpetration of bullying, with the latter showing a particularly strong relation. In contrast, peer victimization was only associated (negatively) with cognitive empathy (van Noorden et al., 2015). Consistent with these findings, other empirical support finds that affective empathy plays a crucial role in predicting lower levels of peer victimization perpetration in adolescence (Zych & Llorent, 2019). Further, adolescent bystanders with higher levels of empathy are more likely to defend their peers (e.g., verbal protests) during negative peer interactions (Longobardi et al., 2020). Empathy has also been shown to influence adolescents' communicative strategies. For instance, while boys are typically found to endorse more aggressive humour styles than girls, empathy mediates this relationship with those higher in empathy endorsing more affiliative and prosocial humour styles (Wu et al., 2016).

Although cognitive empathy is often used interchangeably with perspective-taking, social partners may engage in affective (i.e., inferring the emotions of another) and/or cognitive

perspective-taking (i.e., inferring the thoughts and beliefs of another; Healey & Grossman, 2018). In line with the empathy literature, perspective-taking is positively associated with self-reported prosocial behaviour in adolescence (Tamnes et al., 2018). Further, perspective-taking has been found to be important for communication between peers, as less proficient perspective-taking abilities are associated with less successful peer relationships (Nilsen & Bacso, 2017). Lastly, when the desire for social affiliation is strong, perspective-taking has been found to facilitate social competence, but when one's motivation for social connectedness is low, no advantageous benefits are found (Fujiwara et al., 2018).

Girls typically report higher levels of total, affective, and cognitive empathy than boys (Van der Graaff et al., 2018; Rose & Rudolph, 2006). Chen et al. (2014) have proposed two mechanisms to account for the gender differences frequently found throughout the literature in relation to empathy. First, females have higher oxytocin levels, which facilitates emotional connectedness, while males have higher levels of testosterone, which is linked to higher levels of aggression. Second, traditional gender roles encourage boys to be less emotional, and more assertive, while traits such as caring for others are stereotypically feminine (Koenig, 2018). Boys who hold more stereotypical gender role beliefs have been found to engage in less perspective-taking within peer relationships (Flannery & Smith, 2017). For boys, cognitive empathy was found to be negatively related to the perpetration of physical peer victimization, whereas relational peer victimization was negatively related to cognitive empathy regardless of gender (Dinić et al., 2016). This is consistent with findings that cognitive empathy is a stronger predictor of boys' guilt than girls (Silfver & Helkama, 2007). Further, research has demonstrated that having perspective-taking abilities does not mean that adolescents will necessarily utilize these skills within peer relationships. That is, both boys and girls make significant gains in

perspective-taking abilities during adolescence, yet boys are significantly less likely than girls to employ these skills within the context of peer relationships (Flannery & Smith, 2017), suggesting the reinforcement of socialized gender role stereotypes.

Taken together, the literature suggests that empathy is an important individual difference that influences adolescent's communication and interactions with peers. Higher levels of empathy are generally found to predict more prosocial behaviour; however, some researchers argue that more developed socio-cognitive skills such as empathy allow perpetrators to more effectively manipulate their victims (Graf et al., 2019). However, others have argued that empathy is not inherently good or bad, but that in combination with other critical contextual factors (e.g., personality, situational context, socio-cognitive skills), some individuals may use empathy in harmful rather than socially affiliative ways (Segal, 2019).

Emotion Regulation

Another socio-cognitive skill found to play a role in adolescents' interactions with peers is emotion regulation. Emotion regulation refers to the ability to appropriately monitor, evaluate, and modify emotions through the use of various cognitive strategies (Thompson, 1994). Research has found that self-reported emotion dysregulation makes adolescents more vulnerable to experiencing peer victimization (Fogleman et al., 2019). Among school-aged children, the experience of peer victimization has been found to elicit aversive emotional experiences, and victims often have more difficulty regulating negative emotions of sadness, anger, and contempt (see Adrian et al., 2019). School-age girls with difficulty regulating anger are found to be more at risk of experiencing peer victimization, while boys who inhibit sadness and worry are more likely to experience victimization from peers (Morelen et al., 2016). Further, emotion regulation has been found to play a protective role in mediating the negative consequences for victims of

negative peer interactions. For example, higher self-reported emotion regulation skills mediate the relationship between experiences of peer victimization and symptoms of anxiety (Adrian et al., 2019). While emotion regulation strategies have been found to play an important role for adolescents on the receiving end of harmful peer interactions, less is known about the role of emotion regulation with respect to the perpetration of peer victimization. However, some research finds that early adolescents with higher levels of emotional intelligence (e.g., the ability to perceive, control, and express emotions) are less likely to perpetrate peer victimization as rated by self and peers (Kokkinos & Kipritsi, 2012). Further, while perpetrators of peer victimization do not report difficulties perceiving the emotions of others, they do perceive themselves as having difficulties regulating and expressing their own emotions (Baroncelli & Ciucci, 2014).

Executive Functioning

Executive functions refer to a set of higher-order cognitive skills necessary for purposeful and goal-oriented behaviour (Goldstein et al., 2014). While a myriad of cognitive skills has been ascribed to executive functioning, three central skills have been identified as foundational to the construct of executive functioning including working memory (i.e., the ability to hold information in mind and use it), inhibitory control (e.g., the ability to inhibit dominant responses), and cognitive flexibility (e.g., the ability to appraise and adaptively respond to situations by switching mental sets; Diamond, 2013; Miyake et al., 2000). There is reason to believe that executive functioning impacts adolescents' social functioning, as executive dysfunction is often found in disorders associated with significant social impairment such as attention-deficit hyperactivity disorder (ADHD) and autism spectrum disorder (ASD; Carter Leno et al., 2018). Further, parent-reported ratings of poor executive functioning within ASD

populations have been found to predict the experience of victimization in adolescence (Kloosterman et al., 2014).

Executive functioning has also been found to be related to both perpetration and experiences of peer victimization within typically developing samples. In a sample of preadolescents (10-11), perpetrators of peer victimization performed worse on decision-making tasks, while victims demonstrated slower performance on tasks assessing cognitive flexibility (Medeiros et al., 2016). However, there were no significant group differences on tasks assessing other core executive functioning skills (i.e., working memory and inhibitory control). Targets of physical peer victimization with poorer performance on executive functioning tasks are found to perpetrate physical victimization themselves one year later. However, for adolescents who experienced relational peer victimization, well-developed executive functioning skills were associated with increased perpetration of relational peer victimization (McQuade, 2017). Some gender differences in executive functions as they relate to peer victimization have also been found. For instance, perpetration of peer victimization was associated with poor cognitive flexibility for girls, but not for boys. Further, boys who experience higher levels of peer victimization are found to have less competent executive functioning skills (e.g., self-monitoring, inhibition, flexibility, initiation; Jenkins et al., 2018).

Taken together, the literature suggests that youths' socio-cognitive skills such as empathy, emotion regulation, and executive functioning may play an important role in their interactions with peers.

Online Peer Interactions

In recent decades, adolescents' interactions with peers have increasingly transitioned online with greater access to socially communicative technologies. A recent study found that

60% of adolescents report spending time online with peers on a daily or nearly daily basis, compared to only 24% who report spending time in person with peers (Anderson & Jiang, 2018c). Thirty-eight percent of adolescents also report having online-only peer relationships (Massing-Schaffer et al., 2020). When computer-mediated communication first became popular, adolescents' online and offline social networks were largely separate, and online communication was occurring primarily with strangers in the contexts of chat rooms and online games (Valkenburg & Peter, 2009a). A wealth of research soon followed, establishing a link between time spent online and reduced social connectedness to real-world peers (Kraut et al., 1998; Nie, 2001; Mesch, 2001). However, in recent years with increased accessibility to technology and the emergence of popular social networking sites, the function of how adolescents are using the internet has shifted dramatically in that adolescents are now utilizing the internet primarily for communicative purposes with their already established peers from existing social networks (Gross, 2004; Gomez-Baya et al., 2018). Given the significant role of socially interactive technologies in adolescents' lives, research investigating communication between peers must consider the influence of these technologies.

Future Directions

While the importance of peer relationships for adolescents' well-being has been well documented throughout the literature, research investigating individual differences that relate to adolescents' interactions with peers is in its infancy. Further, there is a paucity of research investigating important individual differences in adolescents' communicative choices within online contexts. Finally, existing research on adolescents' online interactions with peers typically investigates communication within the context of outdated social media platforms such as Facebook, which is used much less frequently than platforms such as Snapchat, YouTube,

WhatsApp, and Instagram (Anderson & Jiang, 2018a; van Driel et al., 2020). Thus, future research should investigate adolescents' online communication and the individual factors, such as gender and socio-cognitive skills, that relate to communication on social media platforms that are more representative of adolescents' social media use in everyday life.

Thesis Introduction

As peer relationships become more salient and influential than in previous stages of childhood, a crucial aspect of adolescents' development is learning to successfully navigate diverse and complex peer relationships within their social world (Brown & Larson, 2009). In the past few decades, adolescents' communicative interactions with peers have increasingly transitioned online, through means of social networking sites and apps, chat rooms, and instant messaging (Subrahmanyam & Greenfield, 2008). While social networking sites have been found to provide multiple avenues for positive communication between peers (see Valkenburg & Peter, 2011a for a review), adolescents can fall victim to harmful online peer interactions with such interactions negatively impacting their mental health and general well-being (see Nixon, 2014 for a review). Given that at least one in five Canadian youth report experiencing negative online peer interactions across a five-year time span (Statistics Canada, 2016), understanding how adolescents navigate socially interactive technologies and online communication is essential. The present work examined the impact of prompting perspective-taking on adolescents' communicative choices on a social media app, and whether such a strategy differentially affects youth depending on their gender. Further, we examined associations between individual characteristics (social media use, mood, empathy, emotion regulation, executive functioning) and adolescents' choices on the social media app.

Features of Online Communication

While existing peer groups largely overlap with online peer groups (Reich et al., 2012), online communication has several unique features that distinguish it from face-to-face communication with peers. First, with increased ownership of cellphones, adolescents are more *accessible*, are connected with their peers around the clock, and have a farther reach to peers in

various geographical locations than is typically possible in face-to-face interactions. Second, online communication has more *anonymity* than face-to-face communication. That is, even if ones' name is attached to online interactions, the visual and auditory social cues that are present in traditional face-to-face communication are typically absent, which may cause youth to be less inhibited online (Suler, 2004). Moreover, communication online is more *permanent* than offline interactions and content can be spread more efficiently and to a broader audience than is possible with face-to-face peer interactions. Communication is also more *controllable* in that adolescents can choose which social cues they wish to convey to peers. Further, adolescents can edit, reflect on, and delete content in efforts to present themselves to peers in a desired way (Yau & Reich, 2018). While these features are thought to be mechanisms by which positive communication between peers is facilitated, they also cultivate an online environment conducive to negative interactions.

Benefits of Online Communication

While the media typically highlights the harmful consequences of socially interactive technologies, these communication mediums have been found to have several potential positive benefits for adolescents' peer relationships and well-being. For instance, Valkenburg & Peter (2007a) found that time spent online using instant messaging was positively related to time spent with existing friends and higher quality peer relationships, which subsequently predicted adolescents' well-being. Interestingly, when adolescents utilized the internet for communicating with strangers instead of friends (e.g., chat rooms), these positive benefits for adolescents' well-being did not hold. A Canadian study found that instant messaging enhanced romantic and best friend relationships while visiting chat rooms negatively impacted these relationships (Blais et al., 2008). These findings are consistent with a more recent study that found online

communication enhanced peer relationships and was negatively related to traditional peer victimization within school contexts (Gomez-Baya et al., 2018). Several researchers have found that online communication and social networking sites can facilitate adolescents' self-esteem, even when conversing with an unknown peer (Gross, 2009; Gonzales & Hancock, 2011, Valkenburg et al., 2006). However, other researchers have found a negative relationship between adolescents' self-esteem and the use of socially interactive technologies, particularly for adolescents who report experiencing negative online peer interactions (Vogel et al., 2014; Woods & Scott, 2016). Online communication has also been shown to facilitate adolescents' felt sense of social belonging and self-disclosure, which has positive benefits for adolescent's identity development and well-being (Davis, 2012). For example, adolescents who used instant messaging to communicate emotional distress to their peers reported a significant attenuation of distress (Dolev-Cohen & Barak, 2013). Empirical results seem to be in line with the benefits adolescents report themselves, with 81% of youth reporting they feel more connected to their friends through online communication, and 69% report online communication allows them to interact with a more extensive and diverse peer group (Anderson & Jiang, 2018b). Further, 57% of adolescents have reported making a new friend online, mostly through social networking sites such as Facebook (Anderson, 2015).

Online communication appears to be more beneficial for some youth than others. As mentioned above, adolescents who use socially interactive technologies to engage with existing peers are more likely to reap the benefits of online communication versus youth who interact with strangers online. Consistent with the rich-get-richer hypotheses (Kraut et al., 2002), adolescents with more competent social skills in offline contexts are also more likely to utilize the internet to communicate with peers than those who are less socially skilled (Lee, 2009). This

relationship has been found even in socially disadvantaged groups such as Palestinian youth (Abbas & Mesch, 2018). However, youth with social challenges also report benefiting from online communication. For instance, socially anxious adolescents often report a preference for online communication when it comes to the self-disclosure of intimate topics, which is essential for enhancing social connectedness with peers (Valkenburg & Peter, 2007b). Adolescents higher in loneliness were found to communicate online more frequently than typically developing or socially anxious peers, utilizing the internet more often to compensate for social challenges that hinder traditional peer interactions (Bonetti et al., 2010).

The Internet-enhanced intimate self-disclosure hypothesis has been proposed to account for the positive benefits of online communication for adolescents' well-being. This theory posits that online communication facilitates increased self-disclosure about intimate topics (e.g., secrets, blunders, sex, emotional distress), which enhances the quality of peer relationships, which in turn leads to enhanced well-being given the strong connection between social support and belongingness for adolescents' well-being (Valkenburg & Peter, 2009a; see Literature Review). This hypothesis is consistent with findings that increased self-disclosure has several positive benefits for peer relationships both in online and offline contexts (Davis, 2012; Desjarlais & Joseph, 2017; Valkenburg et al., 2011b). In a recent study, 46% of youth reported using Snapchat to self-disclose their emotions and concerns to peers, while 34% reported using Instagram for purposes of self-disclosure (van Driel et al., 2020). It is important to note that the potential positive benefits of online communication were found within adolescent samples which do not use the internet compulsively, as problematic internet use (e.g., internet use that interferes with daily functioning and/or causes distress) has been consistently linked to poor well-being among adolescents (Erceg et al., 2018).

Risks of Adolescents' Online Communication

Following the death of Amanda Todd in 2012, a Canadian youth who committed suicide after experiencing cybervictimization (Dean, 2012), the world took notice of the potentially tragic risks of online communication for adolescents. Cybervictimization generally refers to intentional acts of aggression committed through means of socially interactive technologies such as cellphones and computers (Brown et al., 2014; Álvarez-García et al., 2017). Some examples of cybervictimization include sending harmful or threatening messages to peers, impersonating a peer online, posting a hurtful comment on a social media profile for peers to see, or sharing explicit photos of peers without their consent. To illustrate some lived experiences of cybervictimization, 42% of adolescents report they have been called an offensive name online, while 32% reported having a rumour spread about them online (Anderson, 2018).

Given the importance of peer relationships for adolescents' well-being, it is not surprising that negative online peer interactions have been connected to a plethora of adverse social, emotional, behavioural, and academic outcomes for youth (Hellfeldt et al., 2020; Marciano et al., 2020; van Geel & Vedder, 2020). Several studies have demonstrated that youth who experience peer victimization in offline contexts also frequently experience cybervictimization from peers (Olweus, 2012; Khong et al., 2019; Cosma et al., 2019), and these dual victims experience the most negative consequences to their well-being (Sumter & Baumgartner, 2017). Thus, cybervictimization appears to be just another avenue in which adolescents experience peer victimization, rather than being a unique experience. Yet, cybervictimization has been found to predict depression, suicide, and social anxiety over and above face-to-face peer victimization (Bonanno & Hymel, 2013; Wigderson & Lynch, 2013; van Geel & Vedder, 2020). In addition to noting several benefits, adolescents also report a darker side of online communication, with 45%

reporting distress due to online “drama”, while 43% report feeling pressured to post socially enhancing content (Anderson & Jiang, 2018b).

Taken together, the literature suggests that online communication and socially interactive technologies can be both advantageous and/or harmful for adolescents’ well-being (see Best et al., 2014 for a review). Socially interactive technologies offer many benefits for users, yet, the context of the interaction, one’s conversational partner, and youths’ individual characteristics are important for adolescents’ online communication with peers and their subsequent well-being. While several potential benefits of online communication have been found, the risk of experiencing cybervictimization also poses a significant threat to adolescents. The literature suggests that youth frequently experience both traditional and cybervictimization simultaneously, though, online victimization has been found to predict negative outcomes regardless of bullying in other contexts. Further, the impact of online victimization may be more harmful to adolescents’ well-being due to its unique features such as the permanency of the interaction, access to wider audiences, and/or victim pool. Both adolescents and teachers rate online victimization as more detrimental to adolescents’ well-being than face-to-face peer victimization (Sticca & Perren, 2013). With 95% of teens reporting owning a cellphone (Anderson & Jiang, 2018a), youth are less able to remove themselves from continual, and at times negative, interactions with peers.

Gender and Online Communication

While both boys and girls use the internet for purposes of communicating with existing peers and romantic partners (Subrahmanyam & Greenfield, 2008), the platforms on which they communicate differ. That is, video games are a key characteristic of boy’s friendships, with boys spending more time online gaming with friends than girls (Lenhart, 2015; Twenge & Martin,

2020). Further, girls have been found to spend more time on social media networks and use smartphones more frequently to communicate with their peers (Twenge & Martin, 2020).

The findings on gender differences and cybervictimization remain mixed. Some researchers have suggested that due to increased time spent online, girls are more at risk of experiencing cybervictimization and often suffer more severe emotional outcomes than boys (Sumter et al., 2015; Frison et al., 2016). However, other research fails to find any differences in boys' and girls' experiences of cybervictimization (Heiman et al., 2018). With respect to perpetration, some studies find that boys are more likely to engage in aggressive online behaviour towards peers (Kiriakidis & Kavoura, 2010; Barlett & Coyne, 2014), while other research has found girls are more likely to engage in cybervictimization due to its relational nature (Connell et al., 2014). Thus, the relationship between gender and adolescents' online communicative behaviour needs to be further elucidated, as there are divergent findings throughout the literature.

Empirical work investigating the role of gender and adolescents' online behaviour often fails to account for the gender of adolescents' conversational partner. Further, within the communication literature, peer interactions are frequently studied within the context of same-sex dyads. While adolescents' peer groups are largely gender congruent, peer groups begin to diversify and increasingly become gender-mixed. Thus, it remains unclear if the gender of participants or the gender of ones' social partner accounts for the previous communicative differences found. Greater understanding of how adolescents communicate within same-sex versus mixed-sex dyads in online contexts could allow for more targeted interventions to facilitate successful and positive social interactions between peers.

Socio-Cognitive Abilities and Online Communication

In recent years, research has begun to investigate the individual characteristics related to adolescents' communicative behaviour online. Given the present investigations' focus on adolescents' socio-cognitive skills, these areas will be reviewed below.

Empathy

A crucial socio-cognitive skill that relates to adolescents' peer relationships is empathy. Generally, in offline and online contexts, youth who victimize others are less empathetic than those who do not (Steffgen et al., 2011; see Zych et al., 2019 for a review). Empathy research frequently differentiates between affective empathy, experiencing others' emotions, and cognitive empathy, understanding others' emotions, and both have been found to play an important role in adolescents' online interactions (Barlińska et al., 2013). Ang and Goh (2010) found that both adolescent boys and girls were more likely to engage in cybervictimization when low on self-reported affective and cognitive empathy, but for boy's cognitive empathy was found to play a more significant role than for girls in predicting prosocial behaviour online. However, other researchers have demonstrated that the combined effect of cognitive empathy and affective empathy mediates the effect found between gender and empathy (Topcu & Erdur-Baker, 2012). Within online contexts, girls self-report higher levels of total, affective and cognitive empathy than boys (Topcu & Erdur-Baker, 2012; Brewer & Kerslake, 2015; Del Rey et al., 2016), which is consistent with girls' communicative styles within in-person peer interactions (Rose & Rudolph, 2006). Recent research has also demonstrated that engaging in online communication may be beneficial for adolescents' cognitive and affective empathy. That is, adolescents who reported using social media more frequently had higher levels of cognitive and affective empathy after a one-year period (Vossen & Valkenburg, 2016). Moreover, researchers have found that

even cyber bystanders (e.g., third party observers to negative online peer interactions) who are higher in empathy are more likely to intervene and engage in prosocial defending behaviour towards a victimized peer (e.g., comforting victim, verbally protesting; Barlińska et al., 2013; 2018; van Noorden et al., 2015).

Emotion Regulation

Emotion regulation, the ability to monitor, evaluate, and modify emotions, is another socio-cognitive skill thought to be related to adolescents' behaviour online (Thompson, 1994). Perpetrators of online peer victimization rate themselves as proficient in perceiving the emotional states of others, but self-report difficulty regulating and using their own emotions (Baroncelli & Ciucci, 2014). Further, lower competence in global emotional intelligence (e.g., the ability to perceive, control, and express emotions) was found to be a significant predictor for the perpetration of cybervictimization, but not face-to-face peer victimization (Baroncelli & Ciucci, 2014). Regarding experiencing online peer victimization, some research suggests that adolescents with emotion regulation difficulties may be at greater risk of being victimized by peers, as these adolescents may display less socially appropriate behaviour within online contexts (Hemphill & Heerde, 2014; Hemphill et al., 2015).

More recent research has begun to investigate the specific emotion regulation strategies employed by youth involved in cybervictimization. Not all emotion regulation strategies are considered equally effective. That is, while some strategies of emotion regulation are considered to be adaptive in nature, such as cognitive reappraisal (i.e., changing the way one thinks about an emotion or emotional situation), others are considered to be maladaptive, such as rumination, avoidance, and expressive suppression (i.e., inhibiting and concealing elicited emotions; McMahon & Naragon-Gainey, 2018). Perpetrators of cybervictimization seem to utilize less

adaptive emotion regulation strategies such as blaming others, rumination, and catastrophizing (den Hamer & Konijn, 2016). With respect to victims, adolescents who report experiencing cybervictimization are more likely to report employing maladaptive emotion regulation strategies such as expressive suppression to regulate their emotions, while non-victimized adolescents are more likely to use adaptive strategies such as cognitive reappraisal (Vranjes et al., 2018). Moreover, cyber victims who report utilizing cognitive reappraisal are less likely to experience the negative emotional consequences often associated with peer victimization (Turliuc et al., 2020). Thus, although the role of emotion regulation in online contexts is a relatively new area of research, empirical support provides evidence that strategies of emotion regulation are important for both the perpetrator and recipient of harmful communicative behaviour online.

Executive Functioning

Executive functions refer to a set of higher-order cognitive skills necessary for purposeful and goal-oriented behaviour (Goldstein et al., 2014). The role of executive functioning has been found to play an important role in adolescents' face-to-face interactions with peers in that adolescents with better executive functioning skills tend to demonstrate more proficiency in their communicative abilities (Nilsen & Bacso, 2017; Turkstra & Byom, 2010). However, little is known about the associations between executive functions and online communication during adolescence. Some preliminary research has demonstrated that weaker executive functioning skills play an important role in adolescents' risk-taking behaviours online (e.g., more likely to disclose personal information; see Carrier et al., for a review). Moreover, engagement in risky online behaviour has been found to be a risk factor for the experience of cybervictimization (Niklová et al., 2019).

While a paucity of research exists examining the role of executive functions in adolescent's online behaviour, given its role in other aspects of adolescents' socio-communicative behaviour, there is reason to believe that executive functioning may influence adolescent's behaviour within the present study. More specifically, there is reason to believe that adolescents' executive functioning skills are associated with their ability to engage in perspective-taking. For instance, it may be the case that greater working memory abilities allow adolescents to hold in mind important social information while taking a peer's perspective. In fact, working memory has been found to be related to perspective-taking abilities within an adolescent sample (Nilsen & Bacso, 2017). As adolescents' peer groups expand in size, cognitive flexibility may allow adolescents to flexibly shift between various peers' perspectives while navigating increasingly complex group peer interactions. Moreover, greater inhibitory control may allow adolescents to inhibit their own perspective in order to take the perspective of another peer effectively.

Taken together, the literature suggests a relationship between adolescents' online behaviour and their socio-cognitive skills. More specifically, adolescents who engage in and experience cybervictimization are generally found to have less competent socio-cognitive skills than uninvolved peers (Arató et al., 2020). However, the study of individual differences in relation to adolescents' online communication is a relatively new avenue of research. While factors such as empathy have received a considerable amount of empirical attention, much less is known about the role of other socio-cognitive skills such as emotion regulation and executive functioning. Moreover, existing empirical work regarding adolescent's online behaviour in relation to individual differences heavily relies upon self or peer reports of behaviour. Thus, there is a paucity of research examining the role of individual differences within performance-

based first-person tasks. Furthermore, where individual differences have been investigated, the studies focus on more extreme online behaviour, such as cyberbullying, rather than communicative behaviour that falls within more typical exchanges between peers.

Interventions for Online Communication

In efforts to promote more positive interactions between peers, recent work has started to explore the conditions and characteristics that foster more prosocial interactions between youth online. According to the Positive Technology approach (Riva et al., 2012), effective interventions against cybervictimization should aim to facilitate adolescents' affect, engagement, and social connectedness between peers. The present investigations' focus on perspective-taking is warranted by findings of past work that have targeted participants' perspective-taking skills to facilitate more prosocial behaviour between peers. In a recent meta-analysis, researchers found four evidence-based prevention and intervention programs effective in promoting more prosocial behaviour online. First, the FearNot! (Fun with Empathetic Agents Reaching Novel Outcomes in Teaching; Aylett et al., 2015) program displays a virtual school in which the participant takes the perspective of an invisible friend after witnessing a peer being victimized. Participants then take an active role in helping the victim experiment with various emotional problem-solving strategies through instant messaging and then observe the outcomes of the chosen solution. Second, the SMART Talk (Students Managing Anger and Resolution Together; Bosworth et al., 1998) program uses animations and games to teach participants anger management, perspective-taking, and dispute resolution to promote non-violent conflict resolution within negative peer interactions. Third, NoTrap! is a peer and expert-led approach that is implemented both within a school and cyber context to combat both forms of bullying. Finally, KiVa (Salmivalli et al., 2011) is a program with a series of games designed to teach students about victimization, which

affords participants the opportunity to problem-solve in a safe environment. Virtual reality has also shown promising findings in promoting prosocial behaviour by eliciting perspective-taking, with a recent study finding that taking the perspective of a homeless person within a virtual reality context increased the likelihood that participants signed a petition for affordable housing (Herrera et al., 2018).

In a recent study by Van Royen et al. (2017), researchers investigated if reflective messages (i.e., messages prompting participants to consider the consequences of posting online content) can be useful in the promotion of prosocial online communication within an adolescent sample (15-16 years old). In this study, the researchers created a fictitious scenario on Facebook in which a girl posts a public status designed to elicit negative comments about promiscuity. After seeing the status, participants who indicated they were somewhat to very likely to post an aggressive comment on the status were randomly exposed to either a reflective message or a mere time delay. Messages were manipulated to reflect three kinds of messages, including a message indicating the comment would be read by parents, indicating the comment would result in social disapproval from others, or indicating the comment may be harmful for the recipient. Overall, 49% of adolescents indicated the intention to post the comment “slut” on the Facebook status, and researchers found a reduction in the intention to victimize others online in all conditions, but adolescents with low behavioural inhibition had less of a decrease in their intent to post an aggressive comment on the Facebook status.

Taken together, the interventions which appear to be most effective for promoting prosocial behaviour online prompt perspective-taking in various ways. Further, there are preliminary findings for the utility of reflective messages on promoting more prosocial communicative styles on social media (Van Royen et al., 2017). The current study aims to extend

this work by utilizing reflective messages specifically tailored to elicit perspective-taking of another adolescent. It is also not yet known what other important individual differences, such as gender, play a role in the effectiveness of perspective-taking messages and whether these interventions are more useful for certain adolescents. Finally, the existing social media research typically occurs within the context of Facebook, yet, only 10% of adolescents report using Facebook most often, while 35% of adolescents report using Snapchat most often (Anderson & Jiang, 2018a). Within Snapchat, messages and pictures sent can only be viewed for a short period of time before disappearing, and the sender is notified if a recipient saves any content within the app. Thus, there is reason to believe that adolescent's communicative choices on Snapchat may differ from choices made on platforms such as Facebook or Instagram, where interactions are less transient. It may be the case that adolescents are more socially disinhibited due to Snapchat's unique features. Given the potential risks and benefits of social media for adolescents' well-being, understanding the ways in which adolescents navigate popular social media platforms is crucial.

Present Investigation

While previous work has investigated adolescents' communicative styles within the context of cybervictimization, less is known about more common exchanges between peers, that may contain a negative valence, but may not necessarily constitute victimization. The overall purpose of the current study was to investigate how contextual and individual factors are associated with adolescents' communicative choices within social media. More specifically, the first aim of the present study was to address whether prompting perspective-taking (or providing a time delay) would influence adolescents' communicative choices online, and further, whether the gender of a conversational partner independently played a role or interacted with conditions.

The second aim was to examine the latency of adolescents' communicative choices, to explore if adolescents' take more time when making certain communicative decisions online (i.e. when making an aggressive versus a prosocial response), or under certain conditions. The third aim was to address how adolescents' individual differences (i.e., empathy, emotion regulation, executive functioning) relate to their communicative choices online. In order to control for adolescents' familiarity with social media and state mood at the time of the task, participants were asked to report on their social media use and provide a mood rating.

These aims were achieved by designing a simulated social media application similar to Snapchat. Participants viewed profiles of other adolescents and chose between pre-written aggressive or prosocial comments to send to the recipient under conditions that varied in the degree to which perspective-taking was cued prior to choosing a comment (e.g., no time delay, mere time delay, perspective-taking message prompted). We were interested in determining whether a condition that prompted perspective-taking impacted adolescents' communicative choices over no intervention. However, because the provision of a perspective-taking message introduced a time delay, we included a condition where there was a time delay, but no message prompted. To examine adolescents' communicative choices when no interventions were prompted, a condition was included in which no message or time delay was provided for purposes of comparison.

It was predicted that participants in the perspective-taking condition would endorse more prosocial comments relative to the other conditions. Further, it was expected that perspective-taking prompts may be more impactful for boys, as previous research has demonstrated that boys are typically less prosocial in their communicative styles than girls. However, if we found that there was no difference between the perspective-taking condition and a condition that provided a

time delay (with both facilitating more prosocial choices than the no-delay condition), it would suggest that preventing adolescents from responding immediately is conducive to making prosocial communicative choices. While participants' time to respond was included for purposes of exploratory analysis (i.e., no firm hypotheses were made), this measure allowed us to investigate whether the conditions influenced adolescents' speed of responding. With respect to individual differences, it was predicted that adolescents' who had more competent socio-cognitive skills (i.e., affective empathy, cognitive empathy, sympathy, adaptive emotion regulation skills, and executive functioning), would make more prosocial choices on the social media app.

Method

Participants

Adolescents aged 12- to 15-years-old were recruited for participation from a laboratory database and research flyers distributed to local elementary and secondary schools in a medium-sized Canadian city located in Ontario ($N = 78$, $M_{age} = 13.33$, $SD = 0.96$; 39 girls). A small number of participants ($n = 7$) were recruited from a local private school and tested at that location in a quiet room. The sample reflected typical variations that would be expected in this population, including 5 participants with reported mental health diagnoses³ including depression ($n = 2$), anxiety ($n = 4$), and obsessive-compulsive disorder ($n = 1$). Seven participants also reported neurodevelopmental diagnoses⁴ including a learning disorder ($n = 1$, girl), ASD ($n = 1$, boy), Asperger's syndrome ($n = 1$, girl), ADHD ($n = 3$, 2 girls), attention deficit disorder ($n = 2$, boys), developmental coordination disorder ($n = 1$, girl), and a language disorder ($n = 1$, boy).

Demographic information was available for 77 of the 78 participating adolescents in the sample. Almost all participants reportedly spoke English as their first language ($n = 70$, 91%) and used English at home ($n = 67$, 87%). Other languages spoken by participants at home included Tamil, Arabic, Spanish, Hindi, German, and Farsi. The majority of participants had siblings (one sibling: $n = 34$, 44%, two siblings: $n = 23$, 30%, three siblings: $n = 12$, 16%, four siblings: $n = 2$, 3%), while a small number of participants had no siblings ($n = 6$, 8%). The most frequently reported ethnicity was Canadian ($n = 42$, 58%), and the second most frequently reported ethnicity was Chinese ($n = 5$, 7%). Other ethnicities reported by participants included Latin American, Portuguese, Italian, Polish, German, South Asian, Scottish, Nicaraguan,

³ Two participants reported comorbid depression and anxiety diagnoses.

⁴ Two participants reported neurodevelopmental comorbidities.

African, and so forth. Education information was reported for both parents/guardians (153 total) of participating adolescents, with more than half of parents obtaining a level of a university degree or higher ($n = 111$, 73%).

Procedure

Prior to participation, a consent form and demographic questionnaire were completed by parents or guardians, and verbal assent was obtained from each participant. Adolescents were tested individually in a quiet room during one session that lasted approximately 30 minutes. The tasks were administered in a predetermined order, starting with a mood rating scale, followed by a communicative social media task, an empathy and sympathy questionnaire, an emotion regulation questionnaire, a battery of executive functioning tasks, and a social media use questionnaire. As a thank you for participation, adolescents were given a choice between a \$5 gift card or one hour of community service.

Social Media Communication Task

To assess adolescents' communicative choices under varying conditions, a simulated social media app was designed with the goal of recreating Snapchat (Anderson & Jiang, 2018a). The social media app was displayed on a 10.1-inch Samsung Galaxy Tab A (2016) tablet. Participants were told they would be looking at pictures of adolescents their age on a new social media app similar to Snapchat. The stimuli that were of focal interest were those that were manipulated to differ from norms, based on what youth typically get teased about (see Literature Review). More specifically, as youth frequently experience peer victimization due to having interests and appearances that deviate from that of the larger peer group (e.g., violating gender or age norms; Ybarra et al., 2019), we manipulated both the appearance and or/interests of adolescents in each picture to construct 'atypical' trials. How adolescents responded to these

atypical pictures was the main focus in the current study. However, pictures of ‘typical’ adolescents (i.e. no manipulation to characteristics) were included to make the task appear more naturalistic. To create the stimuli, pictures from the internet were edited in Adobe Photoshop by the researchers. There were 24 pictures in total (12 girls; 12 boys). Of the pictures, 18 were intended to reflect atypical adolescents, whereas six were intended to reflect typical adolescents.

Before beginning the social media task, participants completed two sample trials to familiarize them with the app. The first sample (a picture of a cat) was demonstrated for the participant by the experimenter, and the participant was asked to complete the second sample for practice (a picture of a dog). Each sample picture was accompanied by two forced-choice response options. Participants were then told they would be viewing pictures of others their age and were instructed to choose a comment to send to the person in each picture. To minimize the extent to which participants may be influenced by social desirability factors, participants were told the experimenter had work to complete on their computer, and the experimenter proceeded to be seemingly engaged in another task for the duration of the social media task.

Participants were then presented with a series of 24 Snapchat’s (following two practice trials). The trials (i.e., different pictures) were blocked into three sets, that is, participants would see one set of pictures within one condition before seeing another set of pictures in a different condition. There were three conditions under which participants viewed and responded to the trial stimuli (no-delay, delay, perspective-taking), the order of which was completely counterbalanced across participants. Of the eight photos viewed within each of the conditions, which were counterbalanced across participants, but always presented in the same predetermined pseudorandom order, six pictures (three girls) were of atypical adolescents, and two pictures (one girl) were of typical adolescents.

In all conditions, upon clicking on each trial, participants were shown a picture for five seconds. They were then exposed to one of three within-subject conditions before a taskbar appeared at the bottom of the picture that said, ‘Time to reply!’ followed by two forced-choice comment options. Participants then choose a comment option to send to the (fictitious) recipient and hit the reply button. In the *no-delay* condition, participants viewed comment options immediately after the ‘Time to reply!’ taskbar appeared (i.e., there was no delay before seeing response options). In the *delay* condition, participants viewed a loading symbol for a time duration of nine seconds before they viewed response options. Finally, in the *perspective-taking* condition, participants viewed a message (i.e., ‘Put yourself in _____’s shoes. Imagine how _____ will feel receiving comments on their picture), that appeared on the screen for a time duration of nine seconds (i.e., the same length of time as in the delay condition) before viewing response options (Figure 1).

The two comment choices displayed with each trial were the same regardless of condition, and always included an aggressive response, which appeared first, and a prosocial response, which appeared second. This approach ensured that aggressive responses were being read within the social media app and that there was consistency across the conditions in presentation. For purposes of this study, prosocial comments were operationalized as comments involving an element of support or friendliness, that is, positive commentary on a typical feature of each picture. Aggressive comments involved an element of criticism, that is, negative commentary on an atypical feature of each picture. The pre-written comments were piloted on an adolescent focus group who provided feedback on the comment choices. Following this pilot, comments were revised to include emotion icons and colloquial text short forms to make the comments more congruent with how adolescents typically speak online. The dependent measures

in the task were 1) the comments chosen, and 2) latency: measured as the time it took for the participant to select a comment choice (i.e. the time elapsed between when comment choices were first presented and when the participant selected a response⁵).

Following participation in the study, participants were informed the recipients of comments (i.e. the adolescents in stimuli) were fictitious individuals whose pictures were taken from the internet.

Questionnaires

Participants completed a paper version of all questionnaires administered (see Table 1 for a list of all descriptive statistics). The mood rating scale was administered first, followed by the empathy and sympathy questionnaire, the emotion regulation questionnaire, and the social media questionnaire.

Control Variables.

Mood Rating Scale. To control for participant's affect at the time of testing, adolescents first completed the Self-Assessment Manikin (SAM; Bradley & Lang, 1994). The SAM is a visual scale that displays faces depicting negative to positive affect across a continuum. While several modified versions of the SAM are available, for purposes of this study, the 9-point SAM emotional valance scale was utilized. Due to its non-verbal nature, the SAM is well established (see Bynion & Feldner, 2017 for a review) and frequently used cross-culturally with both children and adults for research purposes (Greimel et al., 2020; de Tomas et al., 2020; Cannon et al., 2020).

⁵ Across all conditions, participants were permitted as much time as desired to select a response; thus, the latency measure was not conflated by condition. That is, the timing manipulation occurred prior to viewing comment choices.

Social Media Use Questionnaire. To control for participant's familiarity with social media, we assessed adolescents' social media use using a three-item questionnaire developed by the researchers. Participants were first asked how long they spend on social media during a typical day and were asked to respond on a 7-point Likert scale ranging from 1 (*I do not use social media*) to 7 (*5 or more hours per day*). Participants were also asked if they currently own a cell phone. In addition, participants were asked to rate their familiarity with the social media app Snapchat on a 5-point Likert scale ranging from 1 (*very unfamiliar*) to 5 (*very familiar*).

Empathy and Sympathy Questionnaire. Participants were asked to complete the Adolescent Measure of Empathy and Sympathy (AMES; Vossen et al., 2015), a 12-item questionnaire developed for adolescents aged 10- to 15-years-old. The AMES is increasingly being utilized within adolescent and emerging adult populations due to its ability to distinguish between various domains of empathy and sympathy (Bloom & Lambie, 2020; Gönültaş et al., 2019; Van Royen et al., 2017). More specifically, the AMES asks adolescents to report on their affective empathy (e.g., When my friend is sad, I am sad too), cognitive empathy (e.g., I can easily tell how others are feeling), and sympathy (e.g., I feel sorry for a friend who feels sad) using a 5-point Likert scale ranging from 1 (*never*) to 5 (*always*). The subscale scores were scored by averaging responses to the four items within each subscale. The AMES has been shown to be a valid and reliable measure for adolescents, with past work demonstrating an acceptable internal consistency for the affective empathy ($\alpha = .75$), cognitive empathy ($\alpha = .86$), and sympathy ($\alpha = .76$) subscales; the two-week test-retest reliability was moderately sized for each of the three subscales (.56-.69; Vossen et al., 2015). For this sample, the AMES had acceptable internal consistency for the affective empathy subscale ($\alpha = .75$), however, the

cognitive empathy ($\alpha = .68$) and sympathy subscales ($\alpha = .58$) were found to have low internal consistency and, thus, were excluded from analyses.

Emotion Regulation Questionnaire. Participants then completed the self-report Emotion Regulation Questionnaire for Children and Adolescents (ERQ-CA; Gullone & Taffe, 2012), a revised version of the Emotion Regulation Questionnaire developed for adults (ERQ; Gross & John, 2003). The ERQ-CA is a 10-item questionnaire revised for use with children and adolescents aged 10- to 18-years-old to measure two specific strategies of emotion regulation, including cognitive reappraisal (e.g., When I want to feel happier, I think about something different; six items) and expressive suppression (e.g., I keep my feelings to myself; four items), using a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Raw scores for each of the subscales were summed, and scores ranged from 6 to 30 for the cognitive reappraisal subscale and 4 to 20 for the expressive suppression subscale. The ERQ-CA has been found to have sound internal consistency and stability (over 12 months; Gullone & Taffee, 2012) on both the cognitive reappraisal ($\alpha = .83$) and expressive suppression subscales ($\alpha = .75$). In this adolescent sample, the ERQ-CA was found to have sound internal consistency on both the cognitive reappraisal ($\alpha = .79$) and expressive suppression ($\alpha = .81$) subscales.

Executive Functioning Tasks

To assess executive functioning, the inhibitory control task was administered first, followed by the working memory and cognitive flexibility tasks.

Inhibitory Control. To directly assess adolescents' performance-based executive function, the Flanker Inhibitory Control and Attention Test (Ages 12+) from the Cognition (CB) Battery of the NIH Toolbox for the Assessment of Neurological and Behavioural Function (NIH-TB) was used. In this task, participants view a series of five arrows either pointing in the same

(congruent trial) or opposite direction (incongruent trial) of the middle arrow and are asked to indicate the direction of the middle arrow as quickly as possible. For purposes of this study, the Computed Score from performance on the Flanker task was used, which is a two-vector scoring method of accuracy and reaction time (each scored 0-5). More specifically, if a participant's accuracy score (number of correct responses multiplied by 0.125) on all trials is less than or equal to 80% (out of 40 trials), then the participant's accuracy score equals their computed score. For participants whose performance exceeds 80% accuracy, their accuracy on all trials and median reaction time on incongruent trials are combined to calculate a computed score (Slotkin et al., 2012). The CB of the NIH-TB has been normed, validated, and is reported to be psychometrically sound (Mungas et al., 2013). Moreover, the Flanker task has been shown to demonstrate excellent developmental sensitivity ($r = .83$), test-retest reliability ($ICC = 0.92$), and adequate convergent and discriminant validity (Zelazo et al., 2013). This task was administered on the NIH Toolbox iPad app, displayed on a 10.2-inch retina 7th generation iPad (2019).

Working Memory Task. To measure working memory, participants then completed the digit span task from the Wechsler Intelligence Scale for Children, 5th edition (WISC-V; Wechsler, 2014). In factor-analytic studies, span tasks have been found to load onto factors of working memory (Miyake et al., 2000), in addition to having adequate psychometric properties (see Conway et al., 2005 for a review). In this task, participants were read a series of digits aloud and were asked to recite them back first in the same order and then in reverse order. Each list of digits (both forward and backward) contained nine items with two trials per item (for a total of 18 trials). One point was awarded for each correctly recited trial, and the task was discontinued after two consecutive scores of zero on the same item. Each item increased with difficulty as the

strings of digits become longer. For purposes of analysis, only the raw score from the backwards digit span task was used as a measure of working memory, with scores ranging from 0-18.

Cognitive Flexibility Task. To measure cognitive flexibility, participants completed the Trail Making Test Part A and B (TMT; Army Individual Test Battery, 1944). The TMT is frequently utilized in research settings and for purposes of neuropsychological assessment (Tatar & Cansız, 2020; Beddoes et al., 2020; Sartori et al., 2020). In Part A, participants are asked to connect a series of 25 circles, with a number ranging from 1-25 written in each circle. In Part B, participants are asked to connect a series of 25 circles, each containing either a number ranging from 1-13 or a letter from A-L. The participant's task is to connect the circles in ascending order, alternating between circles with numbers and circles with letters (e.g., 1-A-2-B-3-C-4-D). Participants are instructed to complete both tasks as quickly as possible without lifting their writing instrument from the page. If participants made an error, the experimenter corrected the error immediately and moved the pen back to the last correct circle. The TMT is scored in seconds by the amount of time it took each participant to complete each part of the task. While Part A of the TMT is typically thought to measure attention and psychomotor speed, Part B is typically regarded as a measure of executive function (Kortte et al., 2002). Therefore, an overall measure of inhibition that accounted for psychomotor speed on task performance was calculated by regressing Part B of the task on Part A and saving the unstandardized residuals

Results

Preliminary Analyses

Social Media Use Reported by Adolescents

The majority of adolescents reported owning a cellphone ($n = 57, 74\%$), and being somewhat or very familiar with the social media app Snapchat ($n = 44, 56\%$). While some adolescents reported that they do not use social media ($n = 18, 23\%$), the majority of adolescents were daily users of social media (less than 30 minutes: $n = 11, 14\%$, 30 minutes-1 hour: $n = 19, 24\%$, 1-2 hours: $n = 11, 14\%$, 2-3 hours: $n = 7, 9\%$, 3-4 hours: $n = 9, 12\%$, 5 or more hours: $n = 3, 4\%$).

Missing Data

All of the data were analyzed for missing values. The AMES was found to have six missing values (0.64% of the data), and the ERQ-CA was found to have nine missing values (1.15% of the data). Little's Missing Completely at Random test was not significant, indicating that the values were missing completely at random for both the AMES ($\chi^2 = 46.95, df = 33, p = .055$), and the ERQ-CA ($\chi^2 = 48.65, df = 54, p = .680$) questionnaires. The missing values were imputed using single stochastic regression imputation, and the Cronbach's alpha for each subscale was calculated using the imputed values for each of the questionnaires.

Outlier Analyses

The data was analyzed for univariate outliers ($\pm 3SD$), and any detected outliers were Winsorized. On performance-based tasks, two outliers were detected (i.e., NIH-TB Flanker Task and Trail Making Test Part A). For the atypical trials on the social media task, average latency variables were computed for each of the three conditions, separated across response type (i.e., aggressive and prosocial; six variables computed). Further, six additional latency variables

were computed for the atypical trials. Of the 12 latency variables computed, six were found to have univariate outliers (11 outliers total). The data was also analyzed for multivariate outliers, but none were detected.

Composite Variables

Prior to conducting the main analyses, two new variables were calculated. First, it was found that all three questions in the social media questionnaire were significantly correlated with each other (see Table 2). Thus, a social media composite score was created by summing the z-scores of the variables, wherein a higher score reflected greater familiarity with social media. Second, an executive function composite was created by summing the z-scores of the digit span backwards and the Flanker task, which were significantly correlated with each other. As the unstandardized residual of the Trails task was not significantly correlated with the other executive functioning measures ($p > .698$), it was dropped from further analyses.

Order Effects

To examine order effects across all possible condition counterbalances (six total), a repeated-measures analysis of variance (ANOVA) was conducted with participants' choices for each condition entered as the within-subjects factor and condition entered as the between-subjects factor. The ANOVA revealed a main effect of choices, $F(2, 144) = 3.63$, $MSE = 0.01$, $p = .029$, $\eta_p^2 = .05$, which was qualified by a significant two-way interaction between participants choices and condition order, $F(10, 144) = 3.21$, $MSE = 0.01$, $p = .001$, $\eta_p^2 = .18$. To follow-up this interaction, independent t-tests were conducted between all possible order combinations. Only one comparison yielded significant results. That is, participants who experienced the no delay condition first (order: no delay, delay, perspective-taking) made significantly more prosocial choices than those who received this condition last (order: perspective-taking, delay, no delay),

$t(24) = 2.09, SE = .07, p = .047, d = .82$. However, in another comparison in which the no delay condition was presented first (order: no delay, perspective-taking, delay) compared to last (order: delay, perspective-taking, no delay), this pattern did not hold, and thus, this order effect was not interpreted as meaningful, $p = .243$. No other order comparisons emerged as statistically significant, $ps > .059$.

To further test if there were order effects based on participants' initial exposure to the task, three independent t-tests were conducted between adolescents, grouped by the first condition they received. No statistically significant differences emerged within any of the t-tests, suggesting that participants' choices were not influenced by the first condition they were exposed to in the social media task, $ps > .067$.

Comments Chosen

To address the first research question, a 2 (participant gender) x 3 (condition) x 2 (stimuli gender) mixed ANOVA was conducted, where all variables except participant gender were within-subjects. The dependent measure was the proportion of prosocial choices made in the social media app on the atypical trials (Figure 2)⁶.

The Box's test of equality of covariance matrices revealed a violation, $F(21, 21244.12) = 6.59, p < .001$. However, given that Box's test is extremely sensitive to departures of normality, and the sample sizes between groups were equal, no statistical correction was performed for this violation (Tabachnick & Fidell, 2007).

⁶ To first assess whether stimuli type, namely, whether an atypical or typical trial affected adolescents' responses, this variable was added to the ANOVA. A main effect of stimuli type emerged, such that participants were more prosocial in their choices when commenting on a typical adolescents' picture ($M = .93, SE = .01$) compared to an atypical adolescents' picture ($M = .88, SE = .02$). This finding suggests the way in which we manipulated our stimuli based on the victimization literature was appropriate for the social media task, $F(1, 76) = 9.64, MSE = 0.08, p = .003, \eta_p^2 = .11$. Stimuli type did not interact with any other variables, $ps > .183$.

Several main effects emerged. First, there was a main effect of participant gender, with girls ($M = .94$, $SE = .03$) making significantly more prosocial choices than boys ($M = .82$, $SE = .03$) on the social media app, $F(1, 76) = 12.49$, $MSE = 0.14$, $p = .001$, $\eta_p^2 = .14$. A main effect of condition also emerged, $F(2, 152) = 3.23$, $MSE = 0.02$, $p = .042$, $\eta_p^2 = .04$, and a follow-up planned comparisons paired samples t-test revealed that participants made significantly more prosocial choices in the perspective-taking condition ($M = .90$, $SE = .02$) compared to the no-delay condition ($M = .86$, $SE = .02$), $t(77) = 2.43$, $SE = .02$, $p = .017$, $d = .28^7$. A marginally significant difference also emerged, $t(77) = 1.90$, $SE = .02$, $p = .062$, $d = .22$, with participants trending towards making more prosocial choices in the perspective-taking condition compared to the delay condition ($M = .87$, $SE = .02$). No significant difference was found between the no-delay and delay conditions, $p = .804$. No main effect of stimuli gender was found, nor did any two-way interactions emerge.

Thus, consistent with our first hypotheses, results suggest that participants are making more prosocial choices after viewing a perspective-taking message, compared to when adolescents were allowed to immediately send a comment to a recipient. Moreover, consistent with the literature and our hypotheses, girls made significantly more prosocial choices on the social media app than boys. However, our hypothesis that perspective-taking prompts would be more impactful for boys was not supported.

Latency in Making a Choice

Average response times for prosocial versus aggressive choices were calculated across conditions and were analyzed for univariate outliers, which were Winsorized (4 outliers total).

⁷ This analysis was performed with all neurodevelopmental disorders removed ($n = 7$). The patterns of results remained the same, but the main effect of condition was attenuated and emerged as only marginally significant ($p = .056$).

Note that the data points that went into each average response time were quite different across the response types because participants generally made more prosocial choices on the social media app. More specifically, all participants chose at least one prosocial comment or more across trials ($n = 78$), while 41 participants (53%) chose one or more aggressive comments. A paired sample t-test was conducted and revealed that of those participants who made at least one choice of both prosocial and aggressive comments ($n = 41$), the response time was significantly longer when making an aggressive choice ($M = 6882.35ms$, $SE = 836.88$), then when making a prosocial choice ($M = 4494.03ms$, $SE = 300.87$), $t(40) = 3.22$, $SE = 741.72$, $p = .003$, $d = .50$. This suggests that when adolescents chose an aggressive comment, it was typically not done so in rapid fashion. Instead, the results suggest there was time taken before these choices were made, relative to prosocial choices.

To ensure our interpretations of the timing data were not conflated by response choice, the timing data was analyzed separately for prosocial and aggressive responses.

Latency of Prosocial Choices

To address the second research question, a 2 (participant gender) x 3 (condition) mixed ANOVA was conducted, where participant gender was between-subjects. The dependent measure was average response times for prosocial choices for atypical stimuli⁸ (Figure 3).

To address the main research questions, the aforementioned ANOVA was conducted using only the atypical trials. The Box's test of equality of covariance matrices revealed a violation, $F(6, 41848.76) = 3.91$, $p = .001$, such that the observed covariance matrices of the

⁸ To first assess whether stimuli type, namely, whether an atypical or typical trial affected adolescent's time to choose a comment, this variable was added to the ANOVA. A significant main effect of stimuli type emerged, $F(1, 70) = 7.99$, $MSE = 1884190.54$, $p = .006$, $\eta_p^2 = .10$, with participants spending significantly less time when making prosocial choices on atypical trials across all conditions ($M = 3962.21ms$, $SE = 192.06$), compared to typical pictures of adolescents ($M = 4336.21ms$, $SE = 191.74$). The stimuli type variable did not interact with any other variables, $ps > .175$.

dependent variable is not equal across groups. Given that Box's test is extremely sensitive to departures of normality, and the sample sizes between groups are equal, no statistical correction was performed for this violation (Tabachnick & Fidell, 2007).

A main effect of condition emerged, $F(2, 152) = 3.90$, $MSE = 1382663.71$, $p = .022$, $\eta_p^2 = .05$. However, this effect was qualified by a significant two-way interaction between condition and participant gender, $F(2, 152) = 8.13$, $MSE = 1382663.71$, $p < .001$, $\eta_p^2 = .10$. Follow-up planned comparisons independent t-tests were conducted for each condition, however, Levene's Test for Equality of Variances ($p = .010$) indicated unequal variance, thus equal variances were not assumed (the adjusted degrees of freedom are reported). The t-tests revealed that within the delay condition, girls ($M = 3400.80ms$, $SE = 210.95$) took significantly less time to choose a prosocial response than boys ($M = 4870.02ms$, $SE = 337.29$), $t(63.78) = 3.69$, $SE = 397.83$, $p < .001$, $d = 0.83$. No significant differences were found in the no delay ($p = .075$), or perspective taking conditions ($p = .920$).

To further explore the interaction, paired-samples t-tests were run to compare the conditions separately for each gender. The t-test revealed that boys took significantly more time when making a prosocial comment in the delay condition ($M = 4870.02ms$, $SE = 337.29$) compared to both the no-delay condition ($M = 4106.55ms$, $SE = 323.09$), $t(38) = 2.60$, $SE = 293.94$, $p = .013$, $d = .42$, and perspective-taking condition ($M = 4178.65ms$, $SE = 293.89$), $t(38) = 2.60$, $SE = 265.92$, $p = .013$, $d = .42$. There was no significant difference in response time between the no-delay condition and perspective taking condition for boys, $p = .797$. For girls, the t-test revealed that girls took significantly more time when making a prosocial choice in the perspective-taking condition ($M = 4225.79ms$, $SE = 367.03$) compared to both the no-delay ($M = 3327.56ms$, $SE = 284.95$), $t(38) = 4.48$, $SE = 200.65$, $p < .001$, $d = .72$, and delay conditions ($M =$

3400.80ms, $SE = 210.95$), $t(38) = 2.79$, $SE = 296.05$, $p = .008$, $d = .45$. There was no significant difference in response time between the no-delay and delay conditions, $p = .771$ ⁹.

Thus, within the delay condition, the time it took participants to respond when making prosocial choices was impacted by gender. That is, when a time delay was introduced, girls took significantly less time than boys to make a prosocial choice in the social media app. When conditions were compared separately for each gender, the results revealed that boys took longer to make a prosocial choice within the delay condition compared to the other two conditions. Moreover, girls took longer to make a prosocial choice within the perspective-taking condition compared to the other two conditions. However, results should be interpreted with caution due to multiple comparisons made. If applying a Bonferroni correction to these results ($\alpha = .008$), only some of these effects remain significant.

Aggressive Choices

As noted above, participants generally responded prosocially. Given the lower number of aggressive choices made by adolescents, an ANOVA on the latency data for aggressive responses that included all cells could not be run. Thus, a repeated-measures ANOVA was conducted with only condition entered as a within-subjects variable, which allowed for us to compare across conditions for 41 participants who made an aggressive comment in each of the conditions. No significant main effect of condition emerged for the timing of aggressive choices, $p = .087$ ¹⁰.

Individual Differences in Participant Choices

The third goal of this study was to examine whether participants' individual characteristics were associated with their choices on the social media app, as well as whether

⁹ The pattern of results remained the same when all neurodevelopmental disorders were excluded from analyses.

¹⁰ The pattern of results remained the same when all neurodevelopmental disorders were excluded from analyses.

gender moderated these associations. Prior to conducting the individual difference regression analyses¹¹, all individual difference measures were mean-centred, and interaction terms were calculated for each of the individual difference measures (mean-centred) and participant gender. A hierarchical multiple regression was run with the dependent measure of the proportion of prosocial choices collapsed across conditions. Age, gender, social media use, and mood were entered as Step 1, the individual difference measures of interest (i.e., affective empathy, expressive suppression, cognitive reappraisal, executive functioning) were added as Step 2, and the interaction terms (i.e., individual difference measures and participant gender) were added as Step 3. The results of the regression analysis are reported in Table 3. The standardized residuals from the regression analysis were examined for outliers, but none were detected

At Step 1, the overall model was significant, and significantly improved the model in predicting prosocial choices. With respect to the predictors, age was not significant, but participant gender, social media use, and mood significantly predicted the proportion of times participants made a prosocial choice on the social media app. Thus, there is a main effect of gender, whereby girls made more prosocial choices on the social media app compared to boys. There was also a main effect of social media use, whereby adolescents who use social media more made fewer prosocial choices on the social media app. Further, there was a main effect of mood whereby adolescents with more positive mood ratings tended to make more prosocial choices.

At Step 2, the overall model was significant, and significantly improved the model in predicting prosocial choices. A main effect of affective empathy was found, whereby adolescents

¹¹ An a priori power analysis was conducted using G*Power with alpha set at .05 and power set at .80. A minimum sample size of 109 is required in order to detect a medium effect size in the hierarchical multiple regression analyses (with 8 predictors; Cohen, 1992).

with higher self-reported affective empathy made more prosocial choices on the social media app. With respect to the other predictors, expressive suppression, cognitive reappraisal, and executive functioning were not significant.

At Step 3, the overall model was significant, but there was not a significant improvement in the model when the interaction terms were added¹².

Overall, the results suggest that certain individual characteristics were associated with adolescents' choices on the social media app. With respect to gender, girls made more prosocial choices on the app. With respect to participants' mood, when participants entered the task reporting a higher affect, they were more likely to make prosocial choices. Adolescents who reported greater social media were less likely to make prosocial choices. When these factors were controlled for, it was found that affective empathy was associated with participants' making more prosocial choices on the social media app. There were no significant associations found between adolescents' executive functioning, emotion regulation, and their communicative choices during the social media task.

¹² The pattern of results remained the same when all neurodevelopmental disorders were excluded from analyses.

Discussion

This study examined the impact of prompting perspective-taking messages on adolescents' communicative behaviour within a first-person social media task. This study also examined the latency of adolescents' choices within the social media app to investigate if participants took longer to consider their communicative decisions within certain conditions. Further, the role of individual characteristics was examined in relation to adolescents' communicative decisions online. Several interesting findings emerged that contribute to the growing body of literature as it relates to adolescent's online communication, individual differences, and intervention strategies designed to facilitate more prosocial behaviour on social media platforms.

Social Media Communicative Choices

Consistent with our predictions, after viewing a perspective-taking message encouraging consideration of another adolescent's feelings, participants chose more prosocial comments to send to a recipient, compared to the no-delay condition. Reflecting on these findings, it seems that encouraging adolescents to consider their conversational partner's emotional state facilitates greater prosocial choices. It may be the case that through the perspective-taking process, adolescents are more likely to experience emotional congruence (i.e., affective empathy) with a recipient and may act more compassionately towards them as a result. Empirical work has found that training empathy promotes adolescents' affective, but not cognitive empathy, and facilitates less cybervictimization within online contexts (Schultze-Krumbholz et al., 2016). An alternative, but not mutually exclusive, explanation for our findings is that the social cues present in face-to-face communication are often absent within online contexts. The lack of emotional feedback in online communication may cause adolescents to be more disinhibited in online communication

with peers. However, taking another adolescent's perspective may compensate for the lack of emotional cues within online contexts, and perspective-taking prompts may elicit feelings of compassion towards another adolescent once their feelings are cognitively considered.

Past work has found that social media users report regrets after posting content fuelled by intense emotional states and impulsivity (e.g., not thinking through consequences; Wang et al., 2011), which suggests that delaying responses may change communicative behaviour. Indeed, Van Royen and colleagues (2017) found both reflective messages and a mere time delay to be advantageous in promoting prosocial behaviour online. This suggests that merely slowing down adolescents' time to respond may cause them to adopt less impulsive communicative styles and more carefully consider their online behaviour. Contrasting this work, in the present study, a marginally significant difference emerged with participants trending towards making more prosocial choices in the perspective-taking condition, relative to the delay condition. While it is important to note that this latter finding did not reach significance, it suggests that perspective-taking messages elicit more prosocial communication beyond merely creating a time delay before participants can respond. There are differences between the current study and work by Van Royen and colleagues (2017), which may account for the somewhat divergent findings. First, the reflective messages used within the current study were specifically designed to prompt perspective-taking of another adolescent's feelings, rather than passively reminding participants that a comment may be harmful to a recipient. Second, the current study aimed to investigate adolescents' communicative styles within more common exchanges between peers (e.g., contexts with minor negative valence), rather than in contexts designed to convey promiscuity. Third, in the study by Van Royen et al. (2017), only participants who indicated an intention to post a hurtful comment were exposed to the interventions. These youth likely differed in important

ways (e.g., individual characteristics) from those who endorsed more prosocial communicative strategies. In sum, prompting participants to think about the perspective of the recipient within a Snapchat-like task seems to elicit more prosocial communicative choices, and this finding does not seem to be only related to preventing youth from immediately responding.

Gender and Communicative Choices

Gender was also found to be an important factor in influencing adolescents' choices on the social media app. A main effect of gender emerged, with girls endorsing more prosocial choices to send to recipients compared to boys. Past work has found mixed results with respect to the communicative styles of boys and girls in online contexts. For instance, some research has found that boys are more likely to perpetrate cybervictimization, while other work finds that girls are more likely to perpetrate cybervictimization due to its relational nature. Further, several studies fail to find any gender differences in the communicative styles of boys and girls concerning the perpetration of cybervictimization (see Ang & Goh for a review, 2010). The current findings provide some clarity demonstrating that girls make more prosocial choices within social media.

The current study examined the gender of both interlocutors, although no differences emerged in regard to recipients' gender (i.e., whether the photo was of a girl or a boy). This finding suggests that adolescents interact similarly within same-sex and mixed-sex dyads during interactions on social media. Contrary to our prediction that participants' gender may interact with the conditions, girls' propensity for prosocial choices (relative to boys) was found across the conditions. This pattern, within an online task, is consistent with traditional face-to-face communication literature, which finds that girls are typically more prosocial than boys and endorse less socially risky communicative strategies (see Rose & Rudolph, 2006 for a review;

Mewhort-Buist et al., 2020). This is likely due to socialized gender stereotypes that encourage girls to adopt socially affiliative communicative strategies (e.g., empathetic, sensitive, cooperative), while boys are encouraged to be dominant and assertive. Research has found that these prescriptive gender roles emerge in childhood and continue into adulthood (Koenig, 2018).

Latency of Communicative Choices

We were interested in exploring whether the different conditions affected the length of time participants took to consider their communicative decisions. Two interesting findings emerged within the latency data. First, it was found that participants took longer when making an aggressive choice on the social media app, compared to a prosocial choice. Thus, we did not find evidence that adolescents made aggressive choices in a rapid way, which would have suggested that alternative prosocial options were not considered. Rather, those choices were made with more consideration time than prosocial choices. Though, it is important to note that this finding was from a subsample of the participating adolescents, as many participants exclusively made prosocial choices.

Second, there was a difference in the amount of time that boys and girls took when making their prosocial choices, though this differed across conditions. More specifically, in the time delay condition, girls took less time than boys when making a prosocial choice on the social media app. When the conditions were examined separately for each gender, boys took significantly longer when making a prosocial choice in the time delay condition, relative to the other two conditions. For girls, the perspective-taking condition slowed down their responses, as they took longer when making a prosocial choice in this condition compared to in the no delay and time delay conditions. Taken together, the findings suggest that the delay condition may be operating differently for boys and girls. However, it is difficult to know how to interpret this

finding, given that longer response times could be interpreted in various ways. For instance, the longer response by boys within the delay condition could mean this prompt cues them to increase their consideration prior to responding. Though, it could also mean that for girls, it made them more rapidly make a prosocial choice. In general, this finding opens up room for future work. For instance, it opens up the question as to whether perspective-taking prompts lead to slowed responses by girls generally, or whether it is specific to the type of task (e.g., communicative choices, prosocial responding). Further, although it was not examined for purposes of this thesis, it would be useful to explore whether such differences in response latencies between girls and boys are mediated by factors that have been shown to differ across genders (e.g., empathy; Van der Graaff et al., 2018).

Individual Difference Associated with Adolescents' Communicative Choices

The third goal of the current study was to examine whether adolescents' characteristics were associated with their communicative choices online. The main aim was to investigate socio-cognitive skills; however, we also looked at adolescents' use of social media, as well as their mood to examine if such factors were important for adolescents' choices on the social media app.

Interestingly, those youth who reported greater familiarity with social media (i.e., social media use, familiarity with Snapchat, and owning a cellphone), chose fewer prosocial comments on the social media task. Past work has shown that increased time spent online increases adolescents' risk of experiencing cybervictimization (Athanasidou et al., 2018), perhaps because these youth engage in more risk-taking behaviours online, such as chatting with strangers and posting personal information (O'Dea & Campbell, 2012). Thus, it is likely that adolescents who are more familiar with social media are more frequently exposed to negative interactions within online contexts. Moreover, some adolescents who experience cybervictimization also frequently

perpetrate cybervictimization (e.g., victim-perpetrators; Ybarra & Mitchell, 2004). Adolescents identified as online victim-perpetrators are more likely to report being heavy users of the internet compared to adolescents who self-report as exclusively belonging to either group (Ybarra & Mitchell, 2004). Relating this past work back to the current study, it may be the case that these adolescents become more desensitized to the culture of negative communicative interactions on social media, and as a result, adopt these critical communicative styles themselves. Future work could more systematically examine this by looking at relations between exposure to social media, experiences of cybervictimization, and interpretations of various communication styles conveyed online.

Adolescents' who reported lower moods at the onset of the task made fewer prosocial comments on the social media task. This finding is interesting as past work within an undergraduate sample found that induced mood can influence self-reported communicative strategies endorsed, such that participants who experienced a lower mood induction endorsed less socially risky communicative strategies (Forgas, 1999). In our work, we found that lower mood was related to communicative choices that were risky, namely, socially aggressive comments. It is difficult to know whether these differential findings are due to the format of the task or if mood impacts communicative decisions differentially within adolescent populations. Regardless, while there are known associations between mood and aspects of various social functioning for online peer victimization (Olenik-Shemesh et al., 2012; Bonanno & Hymel, 2013), the present findings fill a gap in the research examining the role of mood on the communicative behaviour of adolescents online. This being said, because we did not ask participants to report on their trait mood, it is difficult to know whether these findings relate to more state-specific mood versus more general characteristics of the participants. Future work

could look at either mood inductions prior to an online communication task, or measure both state and trait mood to determine which is a better predictor.

Addressing the central aim, we examined whether socio-cognitive factors such as affective empathy, emotion regulation, and executive functioning were associated with adolescents' communicative choices on the social media app. When youths' social media use and mood were controlled for, we found that self-reported affective empathy was associated with more prosocial choices on the social media app. Such findings are consistent with past work, which finds that adolescents who report higher levels of empathy and sympathy often demonstrate more prosocial behaviour within peer relationships (Boele et al., 2019; Padilla-Walker et al., 2015). In the present investigation, adolescents with greater affective empathy skills likely experienced greater emotional congruence with the recipients in the social media task. Previous studies have found that adolescents higher in empathy are more impacted by the emotional states of others. For instance, adolescents higher in empathy, sometimes report experiencing empathetic distress due to emotional contagion of another's distress (Smith & Rose, 2011). It may be the case that this process of affective perspective-taking facilitated consideration of the potentially harmful emotional impact of negative comments for recipients, which resulted in participants' making more prosocial choices on the social media app. This finding extends previous work in several ways. First, this study examined the role of affective empathy on adolescents' communication within a performance-based social media task, rather than asking adolescents to self-report on their communicative behaviour online (Vossen & Valkenburg, 2016; Topcu & Erdur-Baker, 2012). In addition, filling a gap in the literature, the present study examined the role of affective empathy for online behaviour using a task that is similar to one of the most popular social media platforms among adolescents, Snapchat. Lastly,

whereas past work has found associations between affective empathy and more extreme negatively valenced online behaviour (e.g., cyberbullying; Ang & Goh, 2010; Schultze-Krumbholz et al., 2016), in the present work, we see associations between affective empathy within more common conversational exchanges between peers. While the role of cognitive empathy could not be examined in this study, due to low reliability in the current sample, future work should examine the impact of cognitive empathy on adolescents' online communication within a first-person social media task, particularly on social media platforms that are popular among youth currently (i.e., Snapchat, WhatsApp, TikTok). The implications of this finding suggest that promoting adolescents' affective empathy (e.g., through empathy training) could lead to more prosocial communicative exchanges among peers on social media.

Contrary to our predictions, emotion regulation was not found to be related to adolescents' choices on the social media app. We had predicted that adolescents with adaptive emotion regulation abilities would make more prosocial choices, as previous work as found that maladaptive strategies of emotion regulation are related to less prosocial behaviours (i.e. more peer victimization) within peer interactions (McMahon & Naragon-Gainey, 2018). However, this past work has studied emotion regulation within the context of cyberbullying (i.e., in contexts which may elicit strong emotions). It could be the case that because our manipulation included only a minorly negative valence, expressive suppression did not play a role between more typical exchanges between peers on the social media app. That is, the context within the current study may not have elicited strong emotions which necessitated the employment of adolescents' emotion regulation skills.

Lastly, the role of executive functioning was examined in relation to adolescents' choices on the social media app. We had predicted that those adolescents with better executive

functioning skills would make more prosocial choices, but this prediction was not supported. Past work has suggested that more aggressive online behaviour may be due to poor executive functioning (Ohan & Johnston, 2007). However, this past work allowed participants to spontaneously generate messages to others. It may be the case that providing adolescents with pre-generated options to choose from limited the degree to which executive functioning was associated with communicative behaviour. Further, in the current study, participants took longer to make aggressive choices. Thus, it does not seem that such communicative choices resulted from impulsivity or disinhibition. Future work could explore the role of executive functioning, within a more ecologically valid social media task, that allows adolescents to spontaneously generate comments to send to recipients.

Overall, the results suggest that individual factors of gender, social media use, mood, and affective empathy were associated with adolescents' choices on the social media app. These findings have important implications for both research and practice. For instance, one important consideration for research studies is that researchers investigating adolescents' online communication should attend to the individual characteristics of adolescents. Indeed, social media experiences have been found to differ from adolescent to adolescent (Beyens et al., 2020). Further, our findings add to the growing body of literature investigating the individual and contextual factors conducive to positive peer interactions, as well as contributing to a more general understanding of the ways in which adolescents navigate their online world. Further, the results open up avenues for future exploration as to what interventions may be effective in changing adolescents' online behaviour to allow for more targeted prevention and/or intervention programs.

Limitations

Although this research presents novel contributions regarding how contextual and individual factors are associated with adolescents' communicative choices within social media, there are limitations of the present study to mention.

A central limitation to the present thesis was the use of pre-written forced-choice and unidirectional comments within the social media app. While this methodology allowed for the examination of adolescents' communication on social media in a controlled fashion, it did not allow for reciprocity within the communicative exchange, which is not how authentic social media interactions take place. That is, social media users are not provided with communicative options to send to a recipient, but rather generate their own comments. Thus, in the current study, we weren't able to examine the more spontaneous, adolescent-driven communicative responses. Further, although response options were informed by a focus group, the options provided to adolescents may not have reflected adolescents' natural style of communication. In this thesis, regression was used to examine the relations between adolescents' individual differences and communicative choices. However, future work should examine whether condition moderated such associations. More specifically, multilinear modelling would allow for exploration as to whether there is a greater change across conditions for youth with certain characteristics. For instance, it may be the case that prompting perspective-taking is more impactful for youth who would otherwise make more aggressive choices (e.g., those with lower moods and/or affective empathy). Another limitation is a lack of ethnic and parental education diversity among participating adolescents, which limits the generalizability of the present findings. Further, the current study was underpowered to detect effect sizes that were small, thus, some important

individual differences may not have emerged as significant and we cannot confidently interpret the null findings.

Conclusion

Recent work points to the importance of within-person characteristics for understanding adolescents' well-being in relation to their social media use (Beyens et al., 2020). Speaking to this consideration, the present study investigated what contextual and individual factors are related to adolescents' socio-communicative behaviour within a simulated Snapchat app. It was found that adolescents made more prosocial choices after viewing perspective-taking messages, providing evidence for the utility of perspective-taking messages in promoting more prosocial behaviour between adolescents. Girls and adolescents with more competent socio-cognitive skills tended to make more prosocial choices on the social media app. More specifically, adolescents with higher self-reported affective empathy were found to make more prosocial comments within the social media app within certain conditions. Further, other important individual differences that emerged in relation to adolescents' choices on the social media app included participants' mood, and social media use. The findings from this research inform our understanding of the ways in which adolescents navigate their complex, and increasingly online, communicative interactions.

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Appendix

Figure 1

Conditions in the Social Media Communication Task

No Delay Condition



Delay Condition

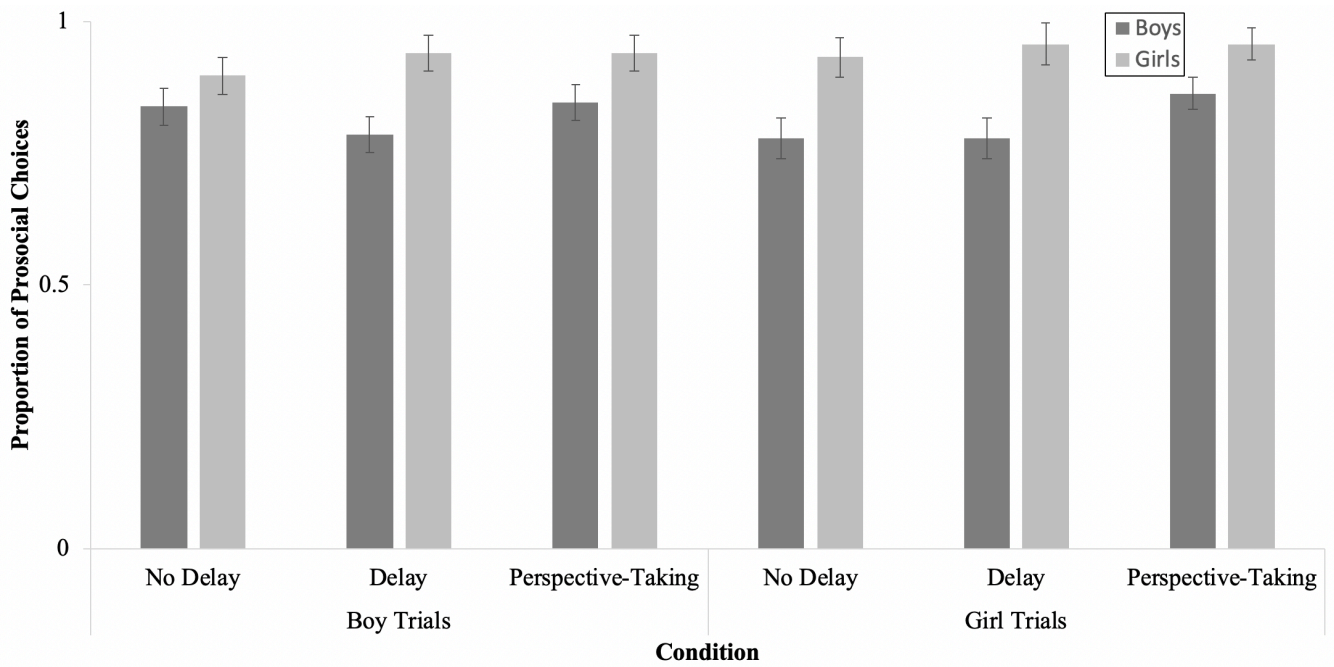


Perspective-Taking Condition



Figure 2

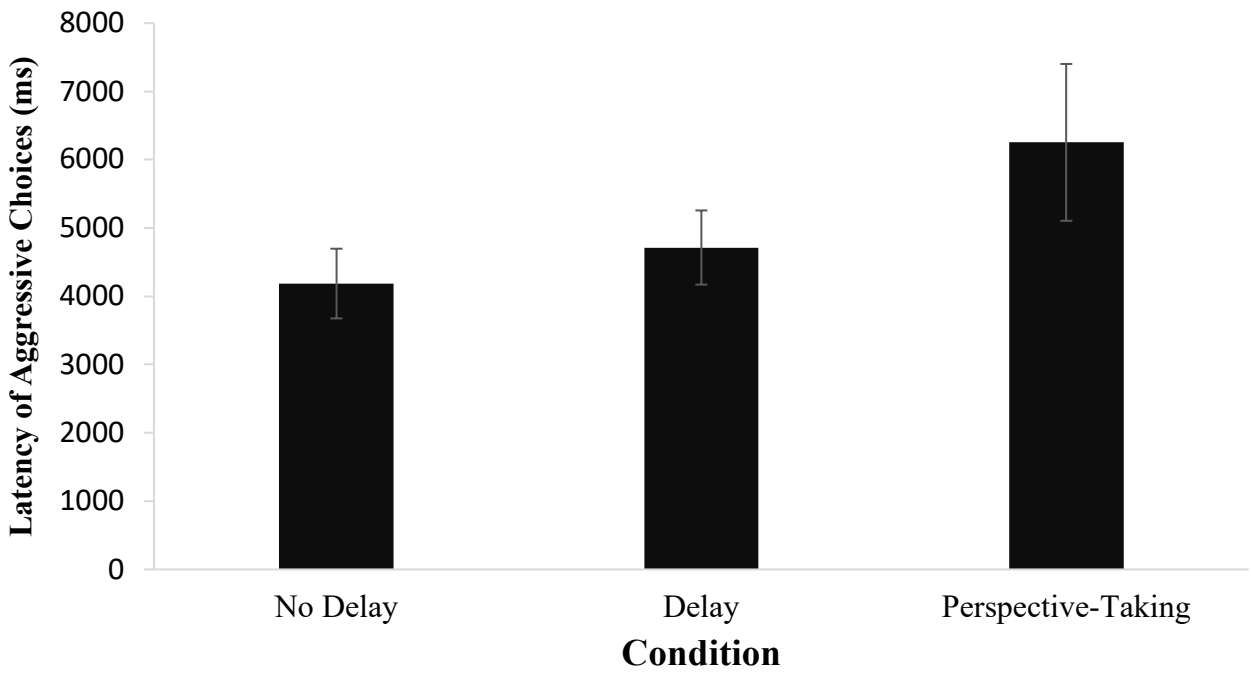
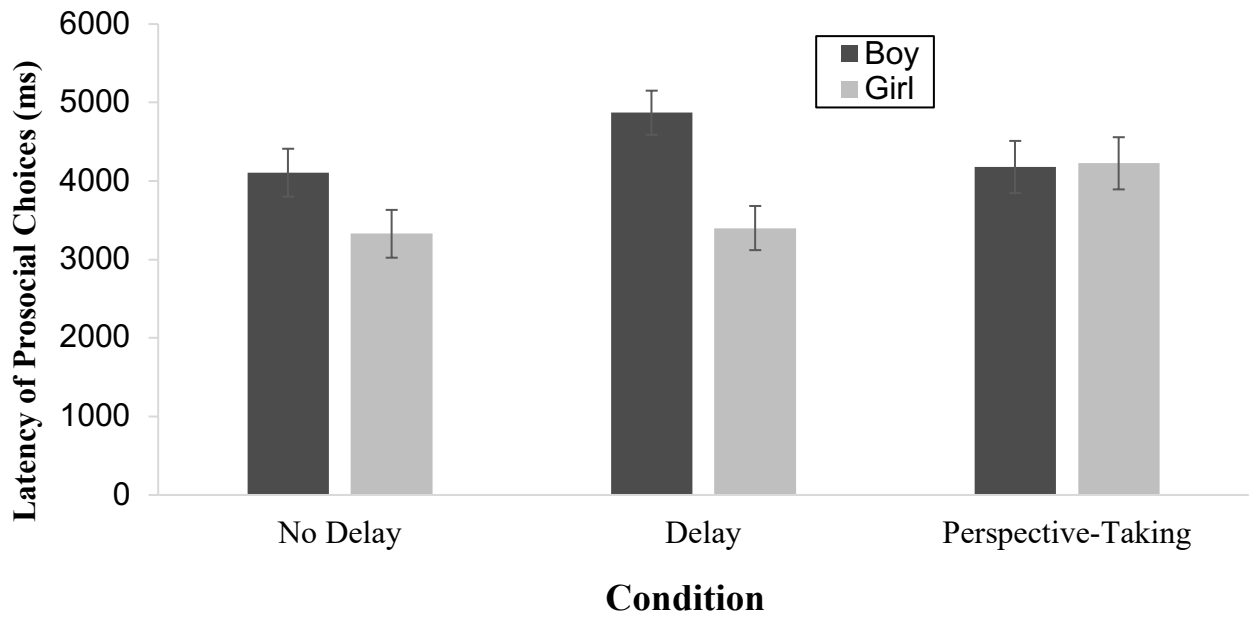
Adolescents' Proportion of Prosocial Choices on the Social Media App



Note. While only a main effect of condition and participant gender were found for atypical trials, stimuli gender is included to fully represent the data. Error bars represent standard errors.

Figure 3

Adolescents' Latency on the Social Media App by Response Type



Note. Error bars represent standard errors.

Table 1*Descriptive Statistics for Questionnaires and Performance Based Measures*

Measure	Girls				Boys			
	<i>n</i>	<i>M</i>	<i>SD</i>	Range	<i>n</i>	<i>M</i>	<i>SD</i>	Range
Mood	39	6.72	1.15	4–9	39	7.08	0.93	5–9
Affective Empathy	39	3.48	0.79	1.5–5	39	2.79	0.64	1.5–5
ERQ-CA								
Cognitive Reappraisal	39	21.18	4.26	13–29	39	20.46	3.97	12–27
Expressive Suppression	39	11.46	3.27	5–19	39	11.03	3.34	4–18
Social Media Use								
Time Spent	39	2.31	1.69	0–6	39	2.13	1.91	0–6
Familiarity	39	3.41	1.43	1–5	39	3.20	1.64	1–5
Own Cellphone	39	0.74	0.44	0–1	38	0.74	0.45	0–1
NIH Flanker Task	39	8.13	0.82	6.07-9.83	39	8.49	0.59	7.17-10
Digit Span (Bkw)	39	9.08	1.87	4-13	39	9.38	2.23	4-14

Note. Given that gender was a key variable of interest, descriptives for each gender are provided.

Table 2*Bivariate Correlations for Study Variables and Choices on the Social Media App*

Variable	1	2	3	4	5	6	7	8	9	10
1. Mood	–									
2. Affective Empathy	-.05	–								
3. Cognitive Reappraisal	.16	.13	–							
4. Expressive Suppression	-.27*	.11	-.23*	–						
5. NIH Flanker Task	-.13	.11	.13	.12	–					
6. Digit Span (Bwd)	-.02	-.06	-.14	.04	.23*	–				
7. SM – Time Spent	.12	-.02	.02	-.05	-.01	-.02	–			
8. SM – Familiarity	-.13	-.18	-.02	-.05	-.01	.03	.33**	–		
9. SM – Own Cellphone	-.12	.02	.13	.07	.03	-.19	.45**	.25*	–	
10. Choices ^a	.16	.41**	.24*	-.08	-.23*	-.06	-.12	-.28*	-.09	–

^aRepresents average choices made on the social media app, collapsed across condition.

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

Table 3*Hierarchical Regression Results for Individual Differences*

Variable	B	95% CI for B		SE B	β	R^2	ΔR^2
		LL	UL				
Step 1						.27	.27***
Constant	.15	-0.44	0.74	.30			
Age	.03***	-0.01	0.07	.02	.17		
Gender	.14**	0.08	0.21	.03	.44		
Social media use	-.02*	-0.04	-0.01	.01	-.29		
Mood	.04	0.01	0.07	.02	.25		
Step 2						.36	.09**
Constant	.33	-0.27	0.93	.30			
Age	.02	-0.02	0.06	.02	.13		
Gender	.09*	0.02	0.17	.04	.28		
Social media use	-.02*	-0.04	-0.00	.01	-.27		
Mood	.03	-0.00	0.06	.02	.18		
Affective empathy	.05*	0.00	0.10	.02	.24		
Cognitive reappraisal	.01	-0.00	0.02	.00	.17		
Expressive suppression	-.00	-0.01	0.01	.01	-.03		
Executive functioning	-.02	-0.04	0.01	.01	-.15		
Step 3						.36	.02
Constant	.38	-0.25	1.01	.32			
Age	.02	-0.02	0.06	.02	.12		
Gender	.09*	0.01	0.17	.04	.27		
Social media use	-.02*	-0.04	-0.00	.01	-.27		
Mood	.03	-0.01	0.06	.02	.17		
Affective empathy	.08*	0.01	0.16	.04	.40		
Cognitive reappraisal	.00	-0.01	0.01	.01	.05		
Expressive suppression	-.00	-0.02	0.01	.01	-.03		
Executive functioning	-.02	-0.05	0.01	.02	-.20		
Affective empathy x gender	-.06	-0.16	0.04	.05	-.21		
Cognitive reappraisal x gender	.01	-0.01	0.03	.01	.15		
Expressive suppression x gender	.00	-0.02	0.02	.01	.03		
Executive functioning x gender	.01	-0.03	0.06	.02	.09		

Note. CI = Confidence interval; LL = lower limit; UL = upper limit

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