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The Role of Communication Technology in Adolescent Relationships and Identity Development

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Abstract
Background The popularity of communication technologies such as text messaging, e-mail, instant messaging, and social networking sites has grown exponentially, especially among adolescents. At the scale of growth along with the pressures and normative use of communication technology, psychological effects of these technologies need to be further assessed.
Objective The purpose of this study was to determine if technology usage and preference for using communication technology in social situations are related to adolescent development in regard to peer relationships, identity development, and psychological adjustment.
Methods Participants ($N = 268$; 69 % female; 81.9 % White) from three public high schools were surveyed in their classroom.
Results Time spent using communication technology was associated with less relationship avoidance, but greater internalizing symptom severity, identity distress, existential anxiety, and peer aggression. Preference for using technology for interpersonal communication was associated with greater peer aggression, relationship anxiety, and existential anxiety. Those with a preoccupied attachment style (high in relationship anxiety, but low in relationship avoidance) reported the most time using communication technology. Communication technology usage was not related to identity exploration, commitment, or status, but it did predict psychological symptom severity over and above the identity and relationship variables.
Conclusions Communication technology usage was found to be related to identity and relationship problems, and was linked to greater maladjustment, even after controlling for identity and relationship difficulties.

Keywords Communication technology · Adolescent adjustment · Identity distress

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Introduction

Text messaging, e-mail, instant messaging, and social networking sites are changing the way people interact with each other. The popularity of these communication technologies among adolescents in particular has grown exponentially, with little accompanying research to understand their influences on adolescent development (Baker and White 2010). With the massive expansion of available technology and technology use, the question arises as to how this popularity of communication technology could influence identity development, interpersonal relationships and psychological adjustment for adolescents.

According to the United States Census Bureau (2014), from 1984 to 2012, households in the United States with a computer have risen from 8.2 to 78.9 %. Households with internet access have risen from 18.0 % in 1997 to 74.8 % in 2012. With the amount of households having computer and internet access continuously on the rise, so has the degree of adolescent exposure to internet and virtual based media. Ninety-three percent of teenagers between the ages of 12–17 have a computer in their household according to a nationally representative survey of 802 teens and their parents by the Pew Research Center (Madden et al. 2013). Seventy-eight percent of teens have a cell phone, 47 % of which are smart phones. With technology use and various ways to access communication technology growing, it is important to understand its potential effects on the formation of an identity in adolescents.

Establishing a firm sense of identity is a crucial task of adolescence according to Erikson (1968). It is a time of exploring the roles, goals, and values that give one's life direction and purpose. Marcia (1966) operationalized Erikson's original concept of identity formation by defining it in regard to two processes, identity exploration and identity commitment. Identity exploration often occurs in response to a crisis of meaning and purpose while identity commitments are postponed as various possibilities are considered. Identity commitment refers to the adoption of select roles, goals, and values, often after an extensive period of exploration, in domains such as occupation, religion, morality, and relationships. Individuals, who are not able to resolve this crisis and establish commitments, frequently feel distress and symptoms of anxiety and depression (Berman and Weems 2012; Berman et al. 2009; Weems et al. 2004).

Newer theoretical models (e.g., Crocetti et al. 2008; Luyckx et al. 2006, 2008; Meeus et al. 2010) have further refined and expanded on these two identity constructs to identify specific types of exploration (e.g., in depth, in breadth, ruminative) and commitment (e.g., commitment making, identification with commitments, reconsideration of commitments), however, these refinements are not central to this study. More central to this study are the concepts of identity distress (Berman and Weems 2012) and existential anxiety (Weems and Berman 2012) that often accompany the identity crisis and exploration process. The term identity distress refers to "severe subjective distress regarding inability to reconcile aspects of the self into a relatively coherent and acceptable sense of self" (American Psychiatric Association 1987, p. 89). Existential anxiety, on the other hand, refers to trepidation and worry over the meaning of life and death (Weems and Berman 2012). Such concerns are common in adolescence and have been found to be related to the identity exploration process (Berman et al. 2006).

Communication technology can both help and hurt a young person's attempt to form his or her identity (Osit 2008). Some investigators have found positive effects of communication technology. For instance, Mikami et al. (2010) reported that youths who had been better adjusted at ages 13–14 years were more likely to be using social networking web

pages at ages 20–22 years. On the other hand, several studies have found negative effects. Pierce (2009) found a positive relationship between social anxiety and talking with others online and via text messaging. Shyam and Bhoria (2011) likewise found that internet use has significant adverse effects on social participation and well-being. Punamäki et al. (2009) reported that intensive usage of information and communication technology for entertainment was associated with poor relations with both parents and peers. Some of the problems associated with communication technology include an absence of meaningful barriers between impulse and the ability to act on them, issues of privacy with users sharing personal information indiscriminately with friends and strangers alike, and the state of social skills among today's youth, i.e., knowing the difference between how to interact in cyberspace versus real situations (Osit 2008).

Morrill (2010) conducted one of the most direct studies to date on the relationship between identity formation and communication technology. In a sample of 705 American college students, ages 18–24, who completed self-report measures of identity and cell phone usage, it was found that identity development was related to text messaging. Those rated higher in identity achievement most often texted to share thoughts and feelings with others. Participants scoring high on identity exploration, but lacking in identity achievement most often used texting as a means to escape and to meet others. Those who scored lowest in identity development tended to use texting as a means to enhance appearance and to meet others.

Suler (2010) discussed the "Online Disinhibition Effect" whereby emotional messages can easily be exaggerated and escalated. When people cannot see and hear others with whom they are communicating, they are deprived of the visual and auditory cues of facial expression, body language, and voice dynamics that convey emotion and meaning. The inherent ambiguity in this type of communication opens the door to miscommunication and, at times, a lack of civility. There is a large difference between expressing anger toward a close friend through a text message rather than in person. This buffer may allow individuals to distance themselves from owning and dealing more directly with feelings, and thus might hinder personal growth and development.

While social networking sites like Facebook and Myspace provide vehicles for exploring and constructing personal identities, it also makes it easier to construct false identities, extreme identities, and identities disconnected from reality (Mesch and Talmud 2010). Young people also routinely post content that may not be appropriate for all audiences, especially potential employers (Miller et al. 2010). Whether establishing genuine or alternate identities online, for many adolescents, using communication technology can help with the difficulties of being lonely or socially anxious when communicating with others. In a sample of 626 students ages 10–16 years, it was found that those who self-reported being lonely but not socially anxious and those who were both lonely and socially anxious, significantly communicated more online about personal and intimate topics than those who did not report being lonely (Bonetti et al. 2010). The adolescents who used more online communication to make up for weaker social skills reported feeling more relaxed. This raises questions as to whether such vehicles enhance or hinder the identity formation process.

With the intense growth of social networking media and the overall amount of communication technologies available, it also raises the question as to how much communication technology is too much. Young (1998) found that extensive internet use could result in problems such as depression, loneliness, low self-esteem, and anxiety as well as physical impairments such as lack of sleep, lack of eating, and limited physical activity. Young also found that internet users are more likely to spend less time with people and to become

more impatient. In a sample of 99 undergraduates with a mean age of 19 years, Schiffrin et al. (2010) found that increased internet usage was associated with decreased well-being.

Extensive internet use could be related to internet-addiction. Young (1998) created a scale called the Internet Addiction Scale and found very high rates of addiction. Using the Internet Addiction Scale, Kim et al. (2006) found of 1,573 Korean high school students ages 15–16, that 37.9 % of the sample was considered to be possible addicts and 1.6 % of the sample to be internet addicts. It was found that the internet addicted group scored significantly higher in depression and suicide-ideation than the non-addicted group. With the internet, web-based technology use and the potential for internet addiction, it is important to assess the potential relationship between identity formation and communication technology use.

As modern society has become increasingly more complex and diverse, the transition to adulthood has posed a more formidable challenge, and increasingly many young people are experiencing considerable distress as part of this transition (American Psychiatric Association 1987; Arnett 2002; Berman et al. 2004). Communication technology may be one contributing factor to an increase in identity disruption and distress, both directly, with the ease with which one can create false identities, extreme identities and identities disconnected from reality; and indirectly by disrupting the quality of social relationships, through which identity issues are often explored and resolved (Erikson 1968; Sullivan 1953). Relationship disruptions might be caused by the disinhibition effect described above, whereby people tend to become more impulsive and less modulated in their emotional communication over the internet. Relationship disruptions might also be caused by the use of communication technology to avoid dealing directly with others. When technology usage changes from being a convenient method of communication to becoming a preferred method of communication, it could be particularly problematic, especially when this preference stems from a desire to avoid direct face to face social contact. Such avoidance might interfere with the development of appropriate social skills, with lack of practice increasing fears of social inadequacy which in turn increases avoidance, in a cyclical pattern. Research to date on communication technology usage seems to be exclusively focused on the amount of time spent on such activities, however, an examination of preference for using technology over direct face to face or voice to voice interpersonal communication may yield stronger associations with negative identity and relationship outcomes, than simply using gross measures of time spent on these activities.

Berman and Wilson (2010) investigated changes in identity development among high school adolescents, in grades 9–12. The first data collection wave ($n = 140$) occurred in 2004 and the second wave ($n = 133$) occurred in 2009. Findings suggested that the recent group was significantly less committed in their identity and reported significantly higher rates of identity distress and psychological symptoms (i.e., anxiety, depression, somatization). Among their conclusions, the authors conjectured that their findings might be due to changes in communication technology which might be affecting peer relationships and subsequently, the identity formation process. As discussed above, there is some evidence that communication technology usage may be linked to social difficulties, and adolescents often use their social relationships with peers to try on different roles and explore their identity issues (Morgan and Korobov 2012). In addition, the online environment is a place where one can create false and extreme identities which may not be healthy, nor helpful, in resolving real life identity issues.

The purpose of the current study was to specifically examine communication technology usage to determine if it is related to adolescent development in regard to peer relationships, identity development, and psychological adjustment. It was hypothesized that

high school students' use of communication technology would be related to difficulties in identity formation, problems with interpersonal relationships, and overall maladjustment. It was further hypothesized that this would be especially true for those who express a preference for using technology rather than face to face or voice to voice for interpersonal communication. Specifically in regard to identity, based on the suggestion by Mesch and Talmud (2010) and Osit (2008) that communication technology usage can be related to problematic identity development, it was predicted that communication technology usage, and preference for usage, would be positively correlated with identity exploration, identity distress, and existential anxiety, and negatively correlated with identity commitment. In regard to interpersonal relationships, based on the findings of Punamäki et al. (2009) as well as Shyam and Bhoria (2011), it was predicted that communication technology usage, and preference for usage, would be positively correlated with relationship anxiety, relationship avoidance, and peer conflict. Lastly in regard to adjustment, based on the findings of Pierce (2009), Schiffrin et al. (2010), and Young (1998), it was hypothesized that communication technology usage, and preference for usage, would predict psychological adjustment (i.e., symptom severity of anxiety, depression, and somatization) even after controlling for these identity and relationship variables.

Method

Participants

Participants in this study ($N = 268$) were recruited from three public high schools in Central Florida ($n = 88$, $M_{age} = 16.55$, $SD = .73$; $n = 56$, $M_{age} = 16.25$, $SD = 1.18$; and $n = 123$, $M_{age} = 15.85$, $SD = .83$). The three samples were not significantly different in gender nor racial/ethnic distribution. The overall sample was 69 % female, and 81.9 % White, with 7.5 % Hispanic, 3 % Black, 1.5 % Asian, and 5.6 % mixed or other. The grade distribution included 30.7 % Freshmen, 28.5 % Sophomores, 34.8 % Juniors, and 6.0 % Seniors.

Measures

Technology Usage Scale (TUS)

A measure was created for this study which asked participants the degree to which they used various communication technologies (CT) such as texting, instant messaging, twitter, and social networking. Two subscales were created by summing responses related to time spent using communication technologies (CT Time), and the preference for using communication technology for interpersonal communication (CT Preference). The CT Time scale was comprised of eight questions such as "How much time do you spend on social networking sites?" followed by five choices (1 = Not at all, 2 = Less than a half hour per day, 3 = Between a half hour and 2 h per day, 4 = Between two and 4 h a day, 5 = More than 4 h per day). Internal consistency reliability (Cronbach's α) for CT Time was .71. The CT Preference scale was comprised of 31 statements such as "I prefer to meet people for the first time on the internet rather than face to face.", which were rated on a five point scale (1 = Strongly Disagree, 2 = Slightly Disagree, 3 = Neutral, 4 = Slightly Agree, 5 = Strongly Agree). Internal consistency reliability (Cronbach's α) for the CT Preference was .92.

The Ego Identity Process Questionnaire (EIPQ)

The EIPQ (BalistreriBalistreri et al. 1995) is a 32-item self-report measure of Identity Status. Statements were rated on a 5 point scale, ranging from strongly disagree to strongly agree. It has two subscales, "Identity Exploration" and "Identity Commitment". Items on the Identity Exploration scale include statements such as "I have considered adopting different kinds of religious beliefs." Items on the Identity Commitment scale include statements such as "I have definitely decided on the occupation I want to pursue." Cronbach's α for the Exploration subscale has been reported to be .86 with a test–retest reliability of .76. Cronbach's α for the Commitment subscale has been reported to be .80 with a test–retest reliability of .90. Participants with low scores (based on cutoffs suggested by Wiley and Berman 2012) on Exploration and Commitment are classified as diffused, low in Exploration but high in Commitment are classified as foreclosed, high in Exploration but low in Commitment classified as moratorium, and high in both Exploration and Commitment are classified as achieved. In this study Cronbach's α was .71 for Identity Exploration and .70 for Identity Commitment.

The Identity Distress Survey (IDS)

The IDS (Berman et al. 2004) is a 10 item measure used to assess distress associated with unresolved identity issues (i.e., identity disorder symptoms, the time frame associated with experiencing those symptoms, and the overall impairment of the endorsed symptoms). Participants are asked to rate on a 5 point scale (1 = Not at all, 2 = Mildly, 3 = Moderately, 4 = Severely, 5 = Very Severely) "To what degree have you recently been upset, distressed, or worried over the following issues in your life": long-term goals, career choice, friendships, sexual orientation and behavior, religion, values and beliefs, and group loyalties. Distress ratings are averaged to form an overall identity distress score. In addition to asking for a distress rating in each of these seven areas, it also includes an assessment of how long they have been experiencing distress over these issues and to what degree the symptoms are interfering with daily functioning. Internal consistency of the overall distress rating scale has been reported as .84 with test–retest reliability of .82, and the survey has demonstrated convergent validity with other measures of identity development. In this study Cronbach's α was .69.

Existential Anxiety Questionnaire (EAQ)

The EAQ (Weems et al. 2004) is a 13 item, true–false rating scale designed to assess existential anxiety based on the six specific facets of existential anxiety outlined in Tillich's (1952) conceptualization: death, fate, meaninglessness, emptiness, condemnation, and guilt. Existential anxiety has been found to be related to unresolved identity issues (Berman et al. 2006; Weems and Berman 2012). Example items include "I know that life has meaning", "I never think about emptiness", "I often think about death and this causes me anxiety". Results of reliability analyses in samples of young adults have indicated that the EAQ has adequate internal consistency (coefficient $\alpha = .71$), good 2-week test–retest reliability ($r = .72$) and a factor structure consistent with theory (Weems et al. 2004). In this study, the internal consistency reliability (Cronbach's α) was calculated as .86.

Experiences in Close Relationships (ECR)

The ECR (Brennan et al. 1998) is a 36–item self–report measure of romantic attachment. Statements were rated on a 5 point scale, ranging from strongly disagree to strongly agree. The ECR has two sub-scales labeled "Relationship Anxiety" and "Relationship Avoidance", respectively. For the Relationship Anxiety scale, higher scores indicate more anxiety about rejection by others and feelings of personal unworthiness regarding interpersonal relationships. For the Relationship Avoidance scale, higher scores indicate more interpersonal distrust and avoidance of closeness with others. The Relationship Anxiety scale contains items such as the following: "I worry about being abandoned". The Relationship Avoidance scale contains such items as "I try to avoid getting too close to my partner". Individuals with high scores (based on cutoffs provided by Brennan et al. 1998) on both the anxiety and avoidance subscales are classified as fearful. Individuals with low scores on the anxiety subscale and high scores on the avoidance subscale are classified as dismissive. Individuals with high scores on the anxiety subscale and low scores on the avoidance subscale are classified as preoccupied. Lastly, individuals with low scores on both subscales are classified as secure. Internal consistency and test re-test reliability for its two subscales have been reported at .94 and .90 for avoidance and .91 and .91 for anxiety, respectively (Brennan, et al. 1998; Fraley et al. 2000). In this study Cronbach's α was .91 for relationship avoidance and .88 for relationship anxiety.

Peer Conflict Scale (PCS)

The PCS (Marsee and Frick 2007; Marsee et al. 2008) is a 40 item self-report measure of peer aggression. It has four subscales: proactive overt (e.g., "I have hurt others to win a game or contest"), proactive relational (e.g., "I enjoy making fun of others"), reactive overt (e.g., "When I am teased, I will hurt someone or break something"), and reactive relational (e.g., "Sometimes I gossip about others when I'm angry at them"). Each of these scales have been found to be related to identity exploration and existential anxiety (Carter et al. 2013). The four scales can also be combined to form a total aggression score. Items are rated on a 4-point scale (0 = "Not at all true", 1 = Somewhat true, 2 = Very true, 3 = Definitely true). Internal consistency for the four subscales has been reported to range from .79 to .89 (Marsee et al. 2011). In this study, Cronbach's α for total aggression score was .92.

Brief Symptom Inventory-18 (BSI-18)

The BSI-18 (Derogotis 2000) is a self-report measure that consists of 18-items assessing psychological symptoms and is a briefer version of the Symptom Checklist-90-R (Derogatis 1994). Items are rated on a 5-point scale (0 = Not at all, 1 = A little bit, 2 = Moderately, 3 = Quite a bit, 4 = Extremely) to reflect the level of distress an individual has experienced by each of the symptoms (e.g., "faintness or dizziness", "feeling lonely", "spells of terror or panic") during the previous week. Designed to be brief and easy to administer, the test measures three primary internalizing symptom dimensions (Depression, Anxiety, and Somatization) as well as a global severity score. The BSI-18 is also designed to provide an overview of a patient's symptoms and their intensity at a specific point in time. The global severity index has an internal consistency of .84 for inpatients and .91 in follow-up participants. Cronbach's α for the depression, anxiety, and somatization dimensions range from .61 to .84. Dimension and global scores form the

BSI-18 test correlate highly (i.e., >.90) with analogous scores from the SCL-90-R test based in a large community population ($N = 1{,}122$; 605 males and 517 females). In this study, Cronbach's α for the global severity index (total score) was .91.

Procedure

For this cross-sectional, correlational design study, participants were recruited from classes at three public high schools in Central Florida. Approximately 1 week before the assessment day, participants were provided with an IRB approved informed consent form to be taken home and signed by a parent or guardian. They were told that the nature of the study was to survey students' beliefs and feelings about their sense of self. All of the students who returned the signed consent form were allowed to participate in the study. Participants completed the survey packet in group classroom settings. Directions were read and assistance was given by the authors as needed. Participation rates at all schools were over 95 %.

Results

Examination of the distribution of scores on all continuous variables were examined for skew and kurtosis, and were found to have acceptable levels for the planned analyses, with the exception of the aggression and existential anxiety scores, which were both positively skewed. Given the skew, main analyses were supplemented with identical analyses using logarithmic transformations to normalize the distributions. Overall, the analyses yielded extremely similar findings, with all significant results from the parametric analyses remaining significant in the transformed analyses. Because of this, parametric analyses of the non-transformed variables are emphasized in this report. Twenty-seven cases had at least one missing data point and were handled by pairwise or list wise deletion.

On a five point scale where 1 = Not at all, 2 = Less than half an hour per day, 3 = Between half an hour and 2 h per day, 4 = Between 2 and 4 h per day, and 5 = More than 4 h per day, the time spent on communication technology scores (CT Time) ranged from 1 to 4.5 with a mean of 2.46 and standard deviation of .60. In regard to preference for using communication technology for interpersonal communication (CT Preference), on a scale that ranged from 1 (strongly disagree) to 5 (strongly agree), subscale scores ranged from 1 to 3.68 with a mean of 1.99 and a standard deviation of .60. A two by four (gender by grade) Multivariate Analysis of Variance (MANOVA) was conducted with regard to all the psychological variables under study (identity exploration, identity commitment, identity distress, existential anxiety, psychological symptom severity, relationship avoidance, relationship anxiety, and peer conflict). There were no significant main effects for either gender or grade nor was there a significant interaction effect. The gender by grade MANOVA was repeated in regard to CT Time and CT Preference. There was no significant difference between males and females in regard to CT Time, however, males reported significantly more CT Preference (Wilks' Lambda = .97; F (2, 231) = 4.25, $p = .015$). There was no significant main effect for grade and no interaction effect.

Inter-correlations among study variables can be seen in Table 1. CT Time was significantly correlated with internalizing symptom severity ($r = .26$, $p < .001$), identity distress ($r = .16$, $p = .012$), peer aggression ($r = .32$, $p < .001$), and existential anxiety ($r = .17$, $p = .005$). CT Time was also significantly but negatively correlated with relationship avoidance ($r = -.20$, $p = .001$). CT Preference was significantly correlated with peer

aggression ($r = .28$, $p < .001$), relationship anxiety ($r = .21$, $p = .001$), and existential anxiety ($r = .20$, $p = .001$).

To determine if the categorical variables of romantic attachment style and identity status varied by CT Time or CT Preference, several One-Way ANOVAs were conducted. In regard to CT Time, a significant difference between romantic attachment styles was found ($F(3, 255) = 6.23$, $p < .001$). A Scheffe post hoc analysis suggested that those with a preoccupied style (high in relationship anxiety, low in relationship avoidance) spent significantly more time ($p < .05$) using communication technology than those in the dismissive (high in avoidance, low in anxiety), fearful (high in both), and secure (low in both) styles. In regard to CT Preference, no differences between the styles were found, nor were there any differences found between identity status groups on either of the CT measures.

To determine if communication technology would predict psychological symptom severity over and above identity and relationship variables, a multiple regression analysis was conducted with gender and grade entered on step one, identity exploration, identity commitment, identity distress, existential anxiety, relationship anxiety, relationship avoidance, and peer aggression entered on step 2, CT Time and CT Preference entered on step 3, with internalizing symptom severity score as the dependent variable. The overall model was significant sample ($R^2 = .43$, Adjusted $R^2 = .40$, $F(11, 226) = 15.47$, $p < .001$). At step 3, the change in R^2 was significant (change in $F(2, 226) = 5.33$, $p = .005$; change in $R^2 = .03$) with standardized beta coefficients reaching significance for identity distress, existential anxiety, relationship avoidance, relationship anxiety, and CT Time (See Table 2).

Discussion

In the past 20 years, access to various types of communication technology has grown exponentially with little accompanying research to understand its benefits and consequences. More importantly, with the delicate state of economic affairs, many educational institutions and groups are promoting these communication technologies, such as web-based classrooms, to control spending and to cut costs. This pressure, along with items such as hand-held devices and the influx of individuals with personal computers and web-based devices, has caused use of these technologies to grow at an astonishing rate.

With many young people having constant and easy access to various forms of communication technology, it is important to understand the potential effects of this usage. Most students have access to items such as a cellphone, a computer, or a tablet; even gaming consoles, e-readers and printers have access to web-based applications and social networking sites such as Facebook or Twitter. This constant and easy access may affect our youth in regards to formation of an identity because of the lack of in-person communication which allows for cues such as facial expressions, tone and prosody of voice as well as immediate reprisal or dismissal to become unavailable. Online or virtual communication allows for misrepresentation and assuming false identities and aggression where consequences are often delayed and sometimes even avoided.

With the massive expansion of technology available and the increase of technology use, the question arises as to how this popularity of use and growth of technology could influence identity development, interpersonal relationships and psychological adjustment for adolescents. This research was conducted to analyze the interaction between communication technologies such as text messaging, email, instant messaging and social networking sites, and their influences on psychosocial development among adolescents. It

Table 1 Intercorrelations among study variables

	Measures	1	2	3	4	5	6	7	8	9
1.	CT time	–								
2.	CT preference	.30***	–							
3.	Identity exploration	−.08	.03	–						
4.	Identity commitment	.04	−.09	−.26***	–					
5.	Identity distress	.16*	.10	.22***	−.28***	–				
6.	Existential anxiety	.17**	.20**	.11	−.17**	.29***	–			
7.	Relationship anxiety	.13*	.21**	.23***	−.21***	.29***	.36***	–		
8.	Relationship avoidance	−.20**	−.01	.00	−.22***	.11	.09	.00	–	
9.	Peer aggression	.32***	.28***	−.01	−.08	.28***	.40***	.25***	.03	–
10.	Internalizing symptom severity	.26***	.10	.10	−.13*	.45***	.44***	.376***	.24***	.35***

CT Time = Time spend using Computer Technology; CT Preference = Preference for using Computer Technology in social interactions

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

Table 2 Regression analysis summary for study variables predicting internalizing symptom severity

Variable	B	SEB	β	t	p
Sex	.11	.09	.07	1.26	.210
Grade	.02	.04	.02	.38	.703
Identity exploration	−.00	.01	−.02	−.36	.719
Identity commitment	.01	.01	.04	.78	.434
Identity distress	.27	.06	.28	4.74	.000
Existential anxiety	.04	.01	.23	3.85	.000
Relationship anxiety	.20	.06	.19	3.35	.001
Relationship avoidance	.22	.06	.22	4.04	.000
Peer aggression	.22	.13	.10	1.73	.085
CT time	.23	.07	.19	3.14	.002
CT preference	−.14	.07	−.11	−1.93	.055

CT Time = Time spend using Computer Technology; CT Preference = Preference for using Computer Technology in social interactions

was hypothesized that high school students' use of communication technology would be associated with both interpersonal relationship and identity problems. Specifically, it was hypothesized that greater communication technology usage would be correlated with higher levels of identity exploration and distress, as well as lower levels of identity commitment. Although, there were no significant correlations between technology usage and identity exploration, commitment, or status, there was a significant correlation in regard to time spent using communication technology with identity distress and with existential anxiety, as predicted. This suggests that communication technology usage may not be interfering with the identity development process per se, but might be exacerbating the level of anxiety and distress often associated with this process. Alternatively, young people with higher levels of identity related anxiety and distress may be using communication technology to manage their discomfort. Perhaps the ease which one can create and modify alternative identities online is more comfortable for those who might be having difficulty managing this developmental task of identity formation in real life, face to face, social interactions.

Communication technology usage was also hypothesized to be positively correlated with relationship anxiety, relationship avoidance and peer aggression. Preference for using communication technology for interpersonal interactions was found to be significantly correlated with relationship anxiety and peer aggression as hypothesized, however, counter to prediction, relationship avoidance was *negatively* correlated with amount of time spent using communication technology. Similar to results in regard to identity, it would appear that communication technology is not interfering in development of relationships, but it does seem to be related to a decrease in the quality of peer relationships. Then again, difficulties in managing peer relationships may encourage communication technology usage as a means of distancing oneself from direct contact with others.

Lastly, communication technology usage was hypothesized to predict psychological adjustment (i.e., symptom severity of anxiety, depression, and somatization) even after controlling for identity and relationship variables. This hypothesis was also confirmed. Taken together, these results support the notion that communication technology might be increasing psychological maladjustment in general, and specifically in regard to identity

formation and relationship quality. However, it could also be that identity and relationship problems affect communication technology usage, in that people who are having difficulty with social interaction may retreat further into a virtual world that provides a buffer from more direct, in person contact. Whether this helps or hurts the psychological processes of identity and intimacy development in the long run is a question for further study. However, in the short run, without knowing the causal direction of these associations, communication technology usage is clearly linked to greater maladjustment, even after controlling for identity and relationship difficulties. Longitudinal studies could be particularly helpful in clarifying cause and effect relationships among these variables.

Possible limitations of this research should be noted. One possible limitation within this research is the question of accuracy of self-report. Future studies may want to use collateral sources such as teachers, parents, and peer ratings on some of the dimensions examined in this study. Perhaps the most important limitation in this study is the cross-sectional and correlational nature of this investigation which precludes making causal assumptions. As noted above, although communication technology usage may be interfering with adolescent adjustment, it is just as plausible that psychological adjustment might affect the quantity of, and preference for, using communication technology for interpersonal interactions. As suggested above, longitudinal studies could be very informative in this regard.

At the scale of technological growth along with the pressures and normative use of communication technology, effects of these technologies need to be further assessed. Future research should be conducted to replicate the findings of this study and to explore them in more depth. Increased knowledge about the effects of communication technology on identity and relationship development might be very useful in the creation and refinement of prevention and intervention programs aimed at promoting positive youth development.

References

American Psychiatric Association. (1987). *Diagnostic and statistical manual of mental disorders* (3rd ed., revised). Washington, DC: American Psychiatric Association.

Arnett, J. J. (2002). The psychology of globalization. *American Psychologist, 57*, 774–783.

Baker, R. K., & White, K. M. (2010). Predicting adolescents' use of social networking sites from an extended theory of planned behaviour perspective. *Computers in Human Behavior, 26*, 1591–1597.

Balistreri, E., Busch-Rossnagel, N. A., & Geisinger, K. F. (1995). Development and validation of the Ego Identity Process Questionnaire. *Journal of Adolescence, 18*, 179–192.

Berman, S. L., Montgomery, M. J., & Kurtines, W. M. (2004). The development and validation of a measure of identity distress. *Identity: An International Journal of Theory and Research, 4*, 1–8.

Berman, S. L., & Weems, C. F. (2012). Identity distress in adolescence. In R. J. R. Levesque (Ed.), *Encyclopedia of adolescence, part 9* (pp. 1357–1361). New York: Springer.

Berman, S. L., Weems, C. F., & Petkus, V. (2009). The prevalence and incremental validity of identity problem symptoms in a high school sample. *Child Psychiatry and Human Development, 40*, 183–195.

Berman, S. L., Weems, C. F., & Stickle, T. R. (2006). Existential anxiety in adolescents: Prevalence, structure, association with psychological symptoms and identity. *Journal of Youth and Adolescence, 35*, 303–310.

Berman, S., & Wilson, J. (2010, March). *Changing individuals in a changing world: Recent trends in identity development.* Presented at the Society for Research in Identity Formation's annual convention, Philadelphia, PA.

Bonetti, L., Campbell, M., & Gilmore, L. (2010). The relationship of loneliness and social anxiety with children's and adolescents' online communication. *Cyberpsychology, Behavior, and Social Networking, 13*(3), 279–285. doi:10.1089/cyber.2009.0215.

Brennan, K. A., Clark, C. L., & Shaver, P. R. (1998). Self-report measurement of adult attachment: An integrative overview. In J. A. Simpson & W. S. Rholes (Eds.), *Attachment theory and close relationships* (pp. 46–76). New York, NY: Guilford Press.

Carter, J., Berman, S. L., Marsee, M. A., & Weems, C. F. (2013). Identity exploration, commitment, and existential anxiety as predictors of the forms and function of aggression. *Identity: An International Journal of Theory and Research, 13*, 348–367.

Crocetti, E., Rubini, M., & Meeus, W. (2008). Capturing the dynamics of identity formation in various ethnic groups: Development and validation of a three-dimensional model. *Journal of Adolescence, 31*, 207–222.

Derogatis, L. R. (1994). *SCL-90-R: Administration, scoring, and procedures manual* (3rd ed.). Minneapolis, MN: National Computer Systems Inc.

Derogotis, L. R. (2000). *BSI-18: Administration, scoring, and procedures manual*. Minneapolis, MN: Pearson Assessments.

Erikson, E. H. (1968). *Identity, youth and crisis*. New York: Norton.

Fraley, R. C., Waller, N. J., & Brennan, K. A. (2000). An item response theory analysis of self-report measures of adult attachment. *Journal of Personality and Social Psychology, 78*, 350–365.

Kim, K., Ryu, E., Chon, M., Yeun, E., Choi, S., Seo, J., et al. (2006). Internet addiction in Korean adolescents and its relation to depression and suicidal ideation: A questionnaire survey. *International Journal of Nursing Studies, 43*, 185–192. doi:10.1016/j.ijnurstu.2005.02.005.

Luyckx, K., Goossens, L., Soenens, B., & Beyers, W. (2006). Unpacking commitment and exploration: Preliminary validation of an integrative model of late adolescent identity formation. *Journal of Adolescence, 29*(3), 361–378. doi:10.1016/j.adolescence.2005.03.008.

Luyckx, K., Schwartz, S. J., Berzonsky, M. D., Soenens, B., Vansteenkiste, M., Smits, I., et al. (2008). Capturing ruminative exploration: Extending the four-dimensional model of identity formation in late adolescence. *Journal of Research in Personality, 42*(1), 58–82. doi:10.1016/j.jrp.2007.04.004.

Madden, M., Lenhart, A., Duggan, M., Cortesi, S., & Gasser U. (2013). *Teens and technology 2013*. Pew Research Center, The Berkman Center for Internet & Society at Harvard University. Retrieved from http://www.pewinternet.org/files/old-media//Files/Reports/2013/PIP_TeensandTechnology2013.pdf.

Marcia, J. E. (1966). Development and validation of ego-identity status. *Journal of Personality and Social Psychology, 3*, 551–558.

Marsee, M. A., Barry, C. T., Childs, K. K., Frick, P. J., Kimonis, E. R., Muñoz, L. C., et al. (2011). Assessing the forms and functions of aggression using self-report: Factor structure and invariance of the Peer Conflict Scale in youth. *Psychological Assessment, 23*, 792–804.

Marsee, M. A., & Frick, P. J. (2007). Exploring the cognitive and emotional correlates to proactive and reactive aggression in a sample of detained girls. *Journal of Abnormal Child Psychology, 35*, 969–981.

Marsee, M. A., Weems, C. F., & Taylor, L. K. (2008). Exploring the association between aggression and anxiety in youth: A look at aggressive subtypes, gender, and social cognition. *Journal of Child and Family Studies, 17*, 154–168.

Meeus, W., Van de Schoot, R., Keijsers, L., Schwartz, S. J., & Branje, S. (2010). On the progression and stability of adolescent identity formation. A five-wave longitudinal study in early-to-middle and middle-to-late adolescence. *Child Development, 81*, 1565–1581.

Mesch, G. S., & Talmud, I. (2010). *Wired Youth: The social world of adolescence in the information age*. New York, NY: Routledge.

Mikami, A., Szwedo, D. E., Allen, J. P., Evans, M. A., & Hare, A. L. (2010). Adolescent peer relationships and behavior problems predict young adults' communication on social networking websites. *Developmental Psychology, 46*, 46–56.

Miller, R., Parsons, K., & Lifer, D. (2010). Students and social networking sites: The posting paradox. *Behaviour & Information Technology, 29*, 377–382.

Morgan, E. M., & Korobov, N. (2012). Interpersonal identity formation in conversations with close friends about dating relationships. *Journal of Adolescence, 35*, 1471–1483.

Morrill, T. B. (2010). Cell phone use and psychosocial development among emerging adults. *Dissertation Abstracts International Section A*, 70.

Osit, M. (2008). *Generation text: Raising well-adjusted kids in an age of instant everything*. New York, NY: AMACOM.

Pierce, T. (2009). Social anxiety and technology: Face-to-face communication versus technological communication among teens. *Computers in Human Behavior, 25*, 1367–1372.

Punamäki, R., Wallenius, M., Hölttö, H., Nygård, C., & Rimpelä, A. (2009). The associations between information and communication technology (ICT) and peer and parent relations in early adolescence. *International Journal of Behavioral Development, 33*, 556–564.

Schiffrin, H., Edelman, A., Falkenstern, M., & Stewart, C. (2010). The associations among computer-mediated communication, relationships, and well-being. *Cyberpsychology, Behavior, and Social Networking, 13*(3), 299–306. doi:10.1089/cyber.2009.0173.

Shyam, R., & Bhoria, A. (2011). Information technology (internet): Effects on social participation and well-being of users. *Journal of the Indian Academy of Applied Psychology, 37*, 157–162.

Suler, J. (2010). Interpersonal guidelines for texting. *International Journal of Applied Psychoanalytic Studies, 7*, 358–361.

Sullivan, H. S. (1953). *The interpersonal theory of psychiatry*. New York: Norton.

Tillich, P. (1952). *The courage to be*. New Haven: Yale University Press.

United States Census Bureau. (2014). *Measuring America: Computer and internet trends in America.* U. S. Department of Commerce, Economics and Statistics Administration. Retrieved from https://www.census.gov/how/infographics/computer_and_internet_trends.html.

Weems, C. F., & Berman, S. L. (2012). Adolescent existential anxiety. In R. J. R. Levesque (Ed.), *Encyclopedia of adolescence, part 5* (pp. 890–895). New York: Springer.

Weems, C. F., Costa, N. M., Dehon, C., & Berman, S. L. (2004). Paul Tillich's theory of existential anxiety: A conceptual and empirical analysis. *Anxiety Stress & Coping: An International Journal, 17*, 383–399.

Wiley, R. E., & Berman, S. L. (2012). The relationships among caregiver and adolescent identity status, identity distress, and psychological adjustment. *Journal of Adolescence, 35*, 1203–1213.

Young, K. S. (1998). *Caught in the Net: How to recognize the signs of Internet addiction and a winning strategy for recovery*. New York, NY: Wiley.