

Measuring the Impact of Technology on Couple Relationships: The Development of the Technology and Intimate Relationship Assessment

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Abstract:

The goal of this study was to develop an instrument to operationalize the impact of technology use on romantic relationship intimacy. The sample consisted of 241 undergraduate and graduate students who identified as being in a committed, monogamous intimate relationship. An exploratory factor analysis was conducted on an initial set of test items to reduce the number of items to those that explained the relationship between technology and romantic relationship intimacy. The factor structure and psychometric properties of the resulting instrument, Technology and Intimate Relationship Assessment, are described, along with implications for couple therapy and future research.

Keywords: technology | intimacy | relationships | communication

Article:

INTRODUCTION

In recent years, technology development and usage have flourished (Cole et al., 2009), leading technology use to become an intricate part of people's daily lifestyles in modern society (Duggan & Brenner, 2013; Rainie, 2010; Smith, 2012). Individuals use technology for a variety of purposes, including for work, entertainment, and information and as part of their relationships with others. Many couples integrate technology into their everyday interactions with one another (Coyne, Stockdale, Busby, Iverson, & Grant, 2011). The dynamics of technology use within the couple system is complex (Hertlein, 2012; Hertlein & Blumer, 2014). Specifically, intimate relationships are impacted by the integration of technology use, and technology use patterns can reflect the existing relationship dynamics within each couple (Henline, 2006; Hertlein; Hertlein & Blumer). Thus, technology use can have both positive and negative implications for intimate

partners, although these implications vary based on relational dynamics (Hertlein, 2012; Pettigrew, 2009). Despite the growing recognition of the impact of technology on intimate relationships, there are few instruments created to measure the impact of technology on intimate relationship dynamics (Hertlein & Blumer). Thus, the purpose of this study was to develop an instrument intended to measure the impact of technology use on romantic relationship intimacy that is uniquely different from existing instruments.

LITERATURE REVIEW

Technology advancements have changed technology usage trends. As one example, about 75% of individuals in the United States are connected to the Internet (Rainie, 2010). Of those individuals who are online, about 92% choose e-mail as a primary source for communicating with others (Purcell, 2011a). In addition, an estimated 83% of individuals online between the ages of 18 and 29 have at least one social networking account (Duggan & Brenner, 2013). Another example of technological devices that have proliferated in the U.S. population is cellular phones (including smartphones). In fact, an estimated 85% of North Americans own a cell phone (Smith, 2012), and about 1 in 3 (34%) households only use cell phones (i.e., they do not have a landline; Blumberg, Luke, Ganesh, Davern, & Boudreaux, 2012). Text messaging has become an increasingly popular form of communication, with 31% of individuals preferring it to phone calls (Smith, 2011). The majority of cell phones sold today also include access to the Internet, as well as numerous downloadable applications used for a variety of purposes (Purcell, 2011b). The Internet and cell phones are but two examples of the many technologies that have changed the lives and relationships of people in modern society.

Technology and Romantic Relationships

The impact of technology on modern relationships is just beginning to be studied through research and theoretical scholarship. In general, technology use has changed human interactions by blurring the boundaries and rules for interacting with one another, ultimately changing the processes for initiating, maintaining, and terminating intimate relationships (Hertlein, 2012; Hertlein & Blumer, 2014). Inherently, technology is another aspect that must be navigated by couples (Perry & Werner-Wilson, 2011; Pettigrew, 2009).

POSITIVE IMPLICATIONS

Conjoint use of technology within romantic relationships can have positive effects on intimacy (Henline, 2006). Conjoint use occurs when couples have a shared intention of using technology to connect with one another that results in quality time spent together (Henline). For example, couples in long distance relationships may set a time to talk via visual video chat system at the end of each day. Similarly, couples can conjointly engage with entertainment (e.g., television) to create more opportunities for intimate moments (i.e., laughing, crying, and physical touch).

Interactive forms of technology create opportunities for couples to enhance their closeness and connection (Coyne et al., 2011; Valentine, 2006). Text messaging is the most commonly used technology by couples to communicate to one another (Coyne et al.). Many couples prefer texting over phone calls because of the privacy it affords (i.e., lack of verbal noise; Pettigrew,

2009). In fact, Coyne et al. found 75% of couples' text messages to one another are used to privately communicate affection to one another. Other examples of technology used to enhance intimacy include couples using e-mail and visual video chat systems to stay connected. Couples in which partners use interactive technology to connect report more confidence, open communication, emotional connection, and positive interactions with their partners (Johnson, Haigh, Becker, Craig, & Wigley, 2008; Neustaedter & Greenberg, 2012).

Last, technologies have created additional spaces for individuals to pursue intimacy, including chat rooms, dating sites, virtual worlds, and social networking sites (SNS). Dating sites, SNS, and virtual worlds are attractive ways that individuals are now connecting with others when in search of new relationships (Valentine, 2006). In particular, individuals with social anxiety report feeling safer to disclose personal information and to show their true self with other individuals when the interactions are mediated through a technology medium (Henline, 2006).

NEGATIVE IMPLICATIONS

Of course, technology has created new obstacles for couples to overcome (Hertlein & Stevenson, 2010; Hertlein & Webster, 2008). Technology is appealing, accommodating, accessible, and affordable (Hertlein & Stevenson) and grants easy access to gratifying activities. Although technology is valued for these features, it also can undermine intimate interactions for couples (Hertlein & Stevenson; Hertlein & Webster). Partners' investment in technology absorbs time that otherwise could be invested in their relationship (Henline). Intimacy is negatively impacted when a person consistently chooses to use technology for individual fulfillment instead of spending time with their partner (Henline). For some individuals, this occurs unconsciously, and for others it is an intentional escape from stressors (Henline; Hertlein, 2012). For example, a nongaming partner may feel lonely and neglected because of the time gaming took away from the romantic relationship, as well as resentful because of the intimate connections the gaming partner made with other gamers (Coyne et al., 2012). Similarly, Bergner and Bridges (2002) found that partners of frequent online pornography users feel betrayed, disrespected, and less sexually desirable and have an overall decrease in commitment and intimacy within their romantic relationship. Thus, the emotional investments individuals make into technology can cause distress in romantic relationships if there are not appropriate boundaries in place (Hertlein & Webster).

Likewise, the Internet is a forum through which committed partners can pursue extrarelatinal intimacy with other people (Millner, 2008). The anonymity of the Internet can foster deceitful behaviors (Hertlein & Stevenson, 2010) because individuals are more likely to do things on the Internet (e.g., flirt, engage in cybersex, and lie) that they would not ordinarily do in real life (Rumbough, 2001). Perhaps, then, it is not surprising that approximately one-third (33%) of divorce cases have been associated with an Internet infidelity (Mileham, 2007).

Similarly, SNS can contribute to feelings of discontentment in romantic relationships. Self-comparison is a negative byproduct of SNS, when people compare the positives and negatives of their relationship to others' relationships (Henline, 2006). This can cause conflict and discontentment within one's own relationship (Hand, Thomas, Buboltz, Deemer, & Buyanjargal, 2013). In addition, SNS provide an array of alternative relationship options, detracting efforts

toward mending the current relationship, especially if that relationship is under a high level of distress. Romantic partners with a high investment in technology may be infiltrated with images that are unrealistic, unconsciously fostering unrealistic expectations for their significant partner and the romantic relationship (Zurbriggen, Ramsey, & Jaworski, 2011).

The ease of connecting through technology can create enmeshed relationships. This is considered a negative implication when too much connecting inadvertently decreases the autonomy necessary for healthy romantic relationships (Duran, Kelly, & Rotaru, 2011). For example, romantic partners may start expecting their partners to always be available or to respond immediately to communication, such as text messages. On the other hand, partners may impulsively respond to emotionally triggering stimuli. When technology is used impulsively, meaningful interactions between couples may decrease (Scott, Mottarella, & Lavooy, 2006).

Finally, the absence of nonverbal communication via technology can increase misunderstandings between partners (Pettigrew, 2009). With the exception of video chat programs, the lack of nonverbal (i.e., tone of voice, facial expressions, body language) communication cues can cause partners to misinterpret what is being communicated (Pettigrew, 2009). Similarly, technology may foster jealousy and mistrust (Papp, Danielewicz, & Cayemberg, 2012). Technology provides other ways in which jealous partners can check up on one another (Dijkstra, Barelds, & Groothof, 2010). For instance, technology serves as another vessel for dominating and violent partners to exert more control over their romantic partners (Schnurr, Mahatmya, & Basche, 2013). In sum, existing research demonstrates a range of potential positive and negative impacts of technology on couples' intimate relationships.

Technology and Couple Characteristics

Couples' patterns of technology use are influenced by several variables, including their relationship duration, status, and satisfaction, as well as individual age (Coyne et al., 2011). Couples in long lasting (i.e., postdating status) romantic relationships use technology less to communicate with their romantic partners. However, when these couples use technology, they are more likely to communicate affections (Coyne et al.). In comparison, couples in shorter-term relationships are more likely to use technological devices impulsively to discuss confrontational and hurtful messages (Coyne et al.). As a result, couples that use technology to communicate affectionately foster more intimacy and are more satisfied with their romantic relationships (Coyne et al.). Another important characteristic is age, which may affect the amount of technology use within romantic relationships (Hanson, Drumheller, Mallard, McKee, & Schlegel, 2010; Smith, Rainie, & Zickuhr, 2011). Specifically, younger couples are more likely to use technology to communicate with partners and more likely to demonstrate other destructive patterns of communication (i.e., communicate serious, hurtful, or confrontational issues) (Coyne et al.). As such, existing research exhibits several characteristics of couples that influence their patterns of technology use with one another.

A Framework for Technology, Intimacy, and Romantic Relationships

The Couple and Family Technology Framework (CFT Framework) is a framework for understanding technology in couple and family life (Hertlein

& Blumer, 2014). The integration of technology into U.S. lifestyles have changed the structures, boundaries, and processes within the relationship system. As human interactions are altered, boundaries and rules for commitment and intimacy are blurred (Hertlein & Blumer, 2014).

The CFT Framework integrates three theoretical perspectives: family ecology, structural-functional, and interaction constructionist (Hertlein & Blumer, 2014). First, the ecological perspective emphasizes how changes to humans' surrounding environment (i.e., technology advancements) influence smaller systems like couples and families. The ecological perspective includes seven elements (i.e., Seven As: accessibility, affordability, anonymity, acceptability, approximation, ambiguity, accommodation) to describe the ways in which the environment can influence individual and relational systems. Ecological influences initiate two types of change to relationship systems: (a) change to the structure (i.e., organization) of relationships and (b) change to the process of relationships. Structural changes, as identified by the structural-functional perspective, inherently redefine each system's set of rules, boundaries, and roles in relationships. Changes to relationship processes emerge from the interaction constructionist perspective. Human interactions are altered because of technology advancements. Thus, relationship development and intimacy are redefined because interactions for initiating, maintaining, and terminating relationships have expanded to include interactions through technology (Hertlein, 2012; Hertlein & Blumer, 2014 [Figure 4.1]).

As a result, couples' relationship commitment and intimacy are affected by technology (Hertlein, 2012; Hertlein & Blumer, 2014). In reference to the CFT Framework, relationship commitment and intimacy are products of relationship maintenance. Relationship intimacy emerges through communicative interactions and is redefined when interactional processes are mediated through technology. Thus, intimacy can be enhanced through technology use, such as for the initiation and maintenance of romantic relationships (Hertlein; Hertlein & Blumer). Also, intimacy can be hindered when technology is used for terminating relationships, fostering deviant behaviors, or detracting time from one's intimate partner (Hertlein & Stevenson, 2010; Hertlein & Webster, 2008; Millner, 2008).

Assessing Intimacy and Technology Use

The interconnections between technology use and romantic relationship intimacy are evident (Coyne et al., 2011, 2012; Hertlein, 2012; Hertlein & Blumer, 2014; Hertlein & Stevenson, 2010; Hertlein & Webster, 2008; Neustaedter & Greenberg, 2012). The ability to broadly generalize the results of existing research, however, is limited due to the assortment of assessment strategies that researchers have used to study the impacts of technology on romantic relationships. To date, most assessment strategies are study-specific questionnaires for which there are limited data regarding the psychometric properties of the instrumentation. In fact, only two instruments for assessing the impact of technology on couples and families exist: Ecological Elements Questionnaire and Technological Genogram (Hertlein & Blumer, 2014). The Ecological Elements Questionnaire is a structured assessment tool that measures an individual's technology use by focusing on the ecological influences of the Seven As. In contrast, the Technological Genogram is a semistructured interview tool used to explore the dynamics and patterns of technology use at the individual level, as well as at the intergenerational level (Hertlein & Blumer).

Neither instrument, however, accounts for a structured assessment that measures the interaction between individuals' perception of their technology use and how their technology use is perceived to impact their romantic relationship intimacy. Therefore, to enhance future research, a need exists for a psychometrically sound instrument to measure the impact of technology use on romantic relationship intimacy. In the present study, the researcher aimed to meet this need by developing the Technology and Intimate Relationship Assessment (TIRA).

METHOD

The following research questions guided this study: What are the psychometric properties (i.e., underlying factor structure, internal consistency coefficients, and item-scale correlations) of the final version of the TIRA total scale and any identified subscales? What are the relationships between TIRA total scale and subscale scores and (a) relationship satisfaction, (b) relationship status, (c) relationship duration, and (d) age?

Scale Development

ITEM GENERATION

The first step in developing the scale included creating an initial item pool, which was developed based on existing research, primarily the Multitheoretical Model (Hertlein, 2012), which has since been updated to the CFT Framework (Hertlein & Blumer, 2014), and the clinical experience of the researchers. The researchers aimed to include all possible item choices that represented both positive and negative impacts of technology on romantic relationship intimacy. A four-phase iterative process of reviewing, revising, and refining the items in the initial pool resulted in a total of 47 test items. Next, the item pool was reviewed by a panel of individuals who had content knowledge on the topic of couple relationships. Four mental health professionals reviewed the survey (i.e., two master's-level professional counselors and two doctoral students in a Council for Accreditation of Counseling and Related Educational Programs [CACREP]-accredited counselor education program). Three reviewers were women, and one was a man. Each reviewer provided feedback on the clarity of questions and formatting, as well as content and items that might be missing related to this topic. The reviewers' feedback was used to revise and finalize the items in the pool.

INSTRUMENTATION

The instrumentation included a demographic and background questionnaire and the 47-item pool for the TIRA. The demographic questionnaire assessed participants' age, relationship duration, number of children, distance apart (if in a long-distance relationship), income, current living location and arrangements, gender, ethnicity, education, relationship status, and experiences in couples counseling. Relationship satisfaction was assessed with a single item (i.e., "Overall, how satisfied are you with your relationship with your partner?"), which participants rated on a 7-point Likert scale ranging from 1 ("very dissatisfied") to 7 ("very satisfied"). To assess for general patterns of technology use, a single item was used (i.e., "First, please check the box to indicate which of the following technologies you use on at least a weekly basis. Then, for the

technologies you checked, please indicate about how many hours per day you use each identified technology.”), in which participants had the following technology device options to choose from (e.g., computer, smartphone, television) and the following technology service options to choose from (the Internet, online gaming, e-mail, social networking sites, text messaging, television, Internet television, Internet radio, Internet chat rooms, a blog I write, a blog I follow, visual video chat service). The initial item pool for the TIRA was composed of 47 items with an overall ninth-grade Flesch-Kincaid readability level. The 47 test items were assessed on a Likert scale ranging from 1 (“strongly disagree”) to 5 (“strongly agree”). A sixth response option (not applicable) was provided for those participants who did not believe that the item applied to them.

Data Collection and Participant Recruitment Procedures

Following institutional review board (IRB) approval, the electronic survey was distributed through an Internet-based survey-hosting platform. Participants were required to read and indicate agreement with the informed consent document before they could access the online survey. Survey responses were anonymous. Participants entered the e-gift card drawing by using a survey link that was separate from the survey link with their responses to the main instrument. The sample was recruited from a population of undergraduate and graduate students at a mid-sized (i.e., approximately 18,000 students) public university in the southeastern United States. In order to achieve a sufficient sample size, the researchers received a list of 3,000 randomly selected undergraduate and graduate students’ e-mail addresses from the university institutional research office. It was not possible to determine which students met the relationship status inclusion criteria (i.e., they were in a committed, monogamous relationship) for study participation, because the institutional research office does not have records of students’ relationship statuses. Thus, of the 3,000 prospective participants, whether or not they were in a committed, monogamous relationship, received a total of three recruitment e-mails, which provided the link to the electronic survey. As such, the final sample should be considered a convenience sample.

Data Analyses

An exploratory factorial analysis (EFA) was used to reduce the initial item pool to a concise and theoretically consistent final version of the TIRA. The EFA analyzed the underlying factor structure of the items without prior knowledge of the number of factors or the loadings on each factor for that particular observed variable (Kim & Mueller, 1978). Researchers sought consultation with a statistician to ensure appropriate implementation and interpretation of the EFA. Once the EFA results were interpreted and the final TIRA was developed, its internal consistency and item-scale correlations were calculated to demonstrate the instrument’s psychometric properties. Then, to address research question 2, correlation and one-way analysis of variances (ANOVAs) were performed to examine the relationships among the TIRA total and subscale scores and the key demographic and background variables as a preliminary measure of the TIRA’s validity.

RESULTS

Description of the Sample

Of the 3,000 prospective participants who received an e-mail, 319 (10.6%) responded to at least some part of the survey. Of these, 174 (55%) of respondents resulted from the first recruitment e-mail, 94 (30%) from the second, and 49 (15%) from the third. Only 243 of the 319 participants completed the online survey, resulting in an 8.1% response rate of the total sample. Another 18 participants were dropped from the study as a result of excessive unanswered survey questions (missing data at random; Acock, 2005) resulting in 225 participants included in the analyses. One hundred seventy-seven (78.7%) participants were women, 45 (20%) were men, and 3 (1.3%) identified as “other,” 2 of which specified that they were transgender. Of the 177 women participants, 165 (93.2%) reported the gender of their partners as men, and 12 (6.8%) women reported the gender of their partners as women. Of the 45 men participants, 38 (84.4%) reported the gender of their partners as women, and 7 (15.6%) reported the gender of their partners as men. Of the 2 transgender participants, both reported the gender of their partners as women. Most participants were Caucasian ($n = 176$; 78.2%), followed by African American ($n = 32$; 14.2%), Asian ($n = 7$; 3.1%), Latino/Hispanic ($n = 12$; 5.3%), Native American ($n = 3$; 1.3%), and other ($n = 9$; 4%). Participants were allowed to identify with more than one ethnicity. Participants’ ages ranged from 18 to 78 years old with a mean of age of 27.9 years ($SD = 10.67$).

About one-half of the participants identified as being in an exclusively dating relationship ($n = 107$, 47.6%), with the remaining participants identifying as being in casual dating relationships ($n = 7$, 3.1%), engaged ($n = 25$, 11.1%), married ($n = 73$, 32.4%), domestic partnerships ($n = 11$, 4.9%), and other ($n = 2$, 0.9%). The range of relationship duration consisted of a little less than 1 month to 37 years (444 months), with a mean of 5.4 years ($SD = 7.1$). Most participants identified as being very satisfied in their romantic relationship ($n = 132$, 58.7%), followed by satisfied ($n = 64$, 28.4%), somewhat satisfied ($n = 12$, 5.3%), neutral ($n = 6$, 2.7%), somewhat dissatisfied ($n = 6$, 2.7%), dissatisfied ($n = 1$, 0.4%), and very dissatisfied ($n = 4$, 1.8%). In viewing these responses along the response scale, the sample’s mean score was 6.3 ($SD = 1.2$) on a scale from 1 to 7, indicating a high level of satisfaction among the sample. Of the 225 participants included in the study, 204 participants (90.7%) reported using computer devices, 165 (73.3%) smartphone technology devices, and 139 participants (61.8%) reported using television. In addition, 81 participants (36%) reported used e-mail technology service, 225 (100%) Internet, 35 (15.6%) online gaming, 179 (79.6%) Facebook, 67 (29.5%) use other social network, 204 (90.7%) text messaging, 81 (36%) Internet television, 64 (28.4%) Internet radio, 16 (7.1%) blog I write, 26 (11.6%) blog I follow, 7 (3.1%) chat rooms, 38 (16.9%) video chat service, and 3 participants (1.3%) reported using other technology services.

Psychometric Properties of the TIRA

Research Question 1: What are the psychometric properties (i.e., underlying factor structure, internal consistency coefficients, and item-scale correlations) of TIRA total scale and any identified subscales?

The EFA process resulted in a final instrument with 22 items containing two subscales. The Intimacy-Enhancing Subscale contains 11 items that describe ways the participants’ use of technology is perceived to positively influence their romantic relationships. The Intimacy-Reducing Subscale includes 11 items that describe ways the participants’ use of technology is

perceived to negatively influence their romantic relationships. Items that demonstrated factor loading coefficients less than 0.30 were suppressed during data analyses (Costello & Osborne, 2005) and did not load on factors. Thirty-nine items remained. Test items that demonstrated adequate factor loadings but did not conceptually make sense with other items that loaded on the intended factors of intimacy enhancing and intimacy reducing also were deleted. Items that crossloaded on both factors were deleted to minimize shared variance (Costello & Osborne, 2005). The remaining 22 items demonstrated moderate to strong factor loadings as evidenced by factor loadings between 0.40 to greater than 0.70 (Costello & Osborne, 2005). Table 1 provides the factor loadings for each of the scale's items.

Cronbrach's alpha coefficients were used to assess the internal consistency of the TIRA Subscales. The analyses revealed a Cronbrach's alpha of .860 for factor 1 (Intimacy-Enhancing scale items). Similarly, the analyses revealed a Cronbrach's alpha of .826 for factor 2 (Intimacy-Reducing scale items).

TABLE 1 Varimax Rotated Component Matrix

Item no.	Test item	Intimacy-enhancing factor loading	Intimacy-reducing factor loadings
1	My use of technology affects my romantic relationship positively.	0.781	
2	My use of technology helps me feel more emotionally connected to my partner.	0.726	
3	My partner's use of technology affects our romantic relationship positively.	0.713	
4	I feel like I know my partner better because of what I have learned about him or her through technology.	0.662	
5	Technology helps my partner and me make plans for sharing time together.	0.648	
6	When my partner and I are facing conflict, I communicate with my partner through technology more frequently.	0.548	
7	Being "friends" with my partner on Facebook and/or other social networking sites helps to strengthen our emotional connection.	0.525	
8	My use of technology helps me feel more sexually connected to my partner. I send flirtatious text messages to my partner.	0.504	
9	If I am feeling anxious about how my partner feels about me, I will check in with him or her using technology (e.g., texting, e-mailing).	0.452	
10	My partner and I talk in person about how we use technology in our relationship.	0.440	
11	Technology helps me to stay connected to my partner when we are not together in the same place.	0.428	
12	When my partner and I are having problems, using technology helps me avoid these problems.		0.650
13	When my partner and I are together in the same place, it seems like we do not communicate much because we are both distracted by technology.		0.635
14	Using technology helps distract me when I am having problems in my relationship with my partner.		0.629
15	Sometimes, I wish my partner would use technology less to communicate with me.		0.582
16	My partner is demanding in terms of how soon I respond to his or her text messages, phone calls, and/or e-mails.		0.535
17	I have felt jealousy as a result of seeing how my partner interacts with others on social networking sites.		0.525
18	When I am feeling neglected in my		0.500

(Continued on next page)

TABLE 1 Varimax Rotated Component Matrix (*Continued*)

	romantic relationship, I use technology to seek other companionship.	
19	I feel like my partner gets distracted by technology when I am trying to talk with him/her.	0.492
20	Sometimes, I feel like my partner uses technology to check up on me.	0.465
21	My partner would say that I get distracted by technology when she/he is trying to talk with me.	0.463
22	I have snooped in one or more of my partner's technology accounts or devices (e.g., a phone call log, e-mail account, or social networking site account).	0.426

Item–subscale correlations were calculated. Items on the Intimacy- Enhancing Subscale resulted in moderate to high correlations ranging from 0.487 to above 0.700. In contrast, items that loaded moderate to high on Intimacy-Enhancing Subscale demonstrated low correlations on the Intimacy- Reducing Subscale, ranging from 0.056 to 0.303. Similarly, Intimacy-Reducing Subscale items demonstrated moderate to high correlations ranging from 0.522 to just below 0.70. However, these subscale items demonstrated low correlations with the Intimacy-Enhancing Subscale, ranging from 0.031 to 0.294.

Preliminary Validity

Research Question 2: What are the relationships between TIRA subscale scores and (a) relationship satisfaction, (b) relationship status, (c) relationship duration, and (d) age?

The means of the TIRA subscale scores were correlated with relationship satisfaction, relationship duration, and age. TIRA items were measured on a Likert scale of 1 (“strongly disagree”) to 5 (“strongly agree”). Scores for each of the TIRA’s subscales can range from 11 to 55 when all questions are answered. Higher Intimacy-Enhancing Subscale scores represent that participants view technology as more positively enhancing their romantic relationship intimacy, and higher Intimacy-Reducing Subscale scores represent that participants view technology as more negatively reducing romantic relationship intimacy. “Not applicable” responses were not calculated as part of the subscale scores. Participants that responded Not Applicable on 20% or more subscale test items were dropped from further analyses. For those participants with some, but less than 20% of, Not Applicable responses, subscale averages were calculated to account for missing items. Participants’ mean scores for the Intimacy-Enhancing Subscale ranged from 1 to 4.55. Average scores for the Intimacy-Reducing Subscale ranged from 1 to 5.

TABLE 2 ANOVA Summary Table for TIRA Subscales and Relationship Status

Source	SS	df	MS	F	P
Intimacy-enhancing					
Between groups	20.36	1	20.36	34.53	.000*
Within groups	130.27	221	0.59		
Total	150.63	222			
Intimacy-reducing					
Between groups	2.05	1	2.05	3.55	.061
Within groups	127.43	221	0.58		
Total	129.48	222			

Note. * $p < .05$.

TIRA subscale scores and participant relationship satisfaction scores were correlated. Scores for relationship satisfaction could range from 1 (“very dissatisfied”) to 7 (“very satisfied”). A positive, weak, but not statistically significant correlation emerged between Intimacy-Enhancing Subscale scores and relationship satisfaction ($0.56, p < .01$). A statistically significant, negative, and weak correlation was found between the Intimacy-Reducing Subscale and relationship satisfaction ($-0.310, p < .01$). Weak correlations were expected given the limited variability of responses to relationship satisfaction (i.e., the sample demonstrated a generally high level of relationship satisfaction). Relationship duration and age also were correlated with the TIRA subscales, and all of these correlations were statistically significant. Participants’ mean Intimacy-Enhancing Subscale scores correlated negatively with relationship duration ($-0.426, p < .01$) and age ($-0.317, p < .01$). Negative, weak correlations were found between Intimacy-Reducing scores with relationship duration ($-0.277, p < .01$) and age ($-0.259, p < .01$). Thus, younger age and newer relationships were related to higher scores on both the Intimacy-Enhancing Subscale and the Intimacy-Reducing Subscale.

A one-way ANOVA was conducted to examine the differences Intimacy-Enhancing and Intimacy-Reducing Subscale mean scores based on participants’ relationship status. Participants were grouped into two relationship status categories: those in dating phases (i.e., casually dating and exclusively dating) and those who were past the dating phase (i.e., engaged, married, and domestic partnership). The ANOVA (Table 2) revealed a statistically significant difference between participants’ mean scores on the Intimacy-Enhancing Subscale based on relationship status. Participants in the dating phases of their relationship scored significantly higher ($\mu = 3.06$) than participants in postdating phases ($\mu = 2.46$) by an average difference of 0.60. There was not a statistically significant difference between participants’ Intimacy-Reducing Subscale mean scores and relationship status.

DISCUSSION

This research study provided preliminary evidence that the TIRA and its subscales demonstrate sound psychometric properties. The EFA resulted in two 11-item subscales: the Intimacy-Enhancing Subscale and the Intimacy-Reducing Subscale. The TIRA subscales demonstrated good internal consistency, as indicated by Cronbach’s alpha coefficients greater than .80 (Costello & Osborne, 2005). Intimacy-Enhancing Subscale items demonstrated moderate to strong correlations with the Intimacy-Enhancing Subscale and weak correlation with Intimacy-Reducing Subscale. Parallel findings were shown for the Intimacy-Reducing Subscale items.

Preliminary construct validity for the TIRA was established through re- search question 2, although some unexpected findings suggest that further examination of the nature of the relationship between technology and relationship intimacy is warranted. A surprising finding was that there was not a statistically significant relationship between relationship satisfaction and Intimacy-Enhancing Subscale mean scores. One would expect that couples with higher levels of relationship satisfaction would welcome technology as a positive extension of other means of expressing positive regard and affection for one other. It is possible that this finding resulted from the use of only one item assess for relationship satisfaction, and a multidimensional scale may reveal more differences in this variable. Further, this could be a byproduct of having a generally well-functioning sample. This finding, however, could be a result of participants that have greater relationship satisfaction using technology less, thus viewing technology as having a smaller impact on the positive aspects of their relationship. Although the correlation between Intimacy-Reducing Subscale mean scores and relationship satisfaction was negative and significant, the relationship was relatively weak. These findings, however, suggest that partners' use of technology may have more negative than positive influences on their relationship satisfaction. This relationship is in need of further examination by future researchers.

The correlations between the Intimacy-Enhancing and Intimacy- Reducing Subscales and relationship duration and participant age all were statistically significant. The correlation analyses revealed negative and moderate correlation between the Intimacy-Enhancing Subscale and relationship duration and a negative weak correlation between participants' age. Both correlations were significant, indicating that higher scores on the Intimacy- Enhancing Subscale were related to participants' younger ages and shorter relationship duration. One possible explanation for these unexpected results could be related to the technology use generation effect, meaning older individuals simply do not use technology as frequently as younger generations (Hanson et al., 2010). Thus, older participants may have viewed technology as having a lesser impact on their intimacy because they simply do not overtly use technology within their romantic relationship. Another possible explanation for the negative correlation is that, as romantic relationships persist, romantic partners may use technology less to interact with one another. Similarly, correlation analyses revealed negative and weak correlations between Intimacy-Reducing Subscale mean scores and relationship duration and age, suggesting that higher scores on Intimacy-Reducing Subscale were related to participants' younger age and shorter relationship duration. Thus, not only are younger participants viewing their use of technology as positively impacting their relationships, but they perceive technology to have negative impacts on their romantic relationship as well. One possible explanation for the negative correlations is that couples in early romantic relationship stages may rely on technology use for communication of more negative content (i.e., use technology to discuss a confrontational issue, communicate hurtful messages, or to end a relationship) (Coyne et al., 2011; Smith et al., 2011), creating more opportunities for technology use to negatively impact their romantic relationship intimacy.

The ANOVA revealed significant differences between participants' scores on the Intimacy-Enhancing Subscale based on relationship status. Average scores for participants in dating relationships (i.e., casually dat- ing, exclusively dating) were significantly higher on the Intimacy-Enhancing Subscale than participants in postdating relationships (i.e., engaged, married). One possible explanation for the significant difference is as romantic relationships persevere, romantic partners may be more secure in their re- lationship and use technology less

to connect with one another, further reducing their perceived positive impact. Another possible explanation is as romantic relationships continue, partners may perceive technology as a form of distraction. Thus, couples' positive (i.e., Intimacy-Enhancing) experiences using technology with their partner are significantly impacted by relationship status. Couples' negative (i.e., Intimacy-Reducing) experiences with technology, however, were not significantly impacted by their relationship status. A possible explanation for this result is that other pre-existing relationship dynamics (i.e., communication style, attachment style) may contribute to couples negative experiences with technology.

Overall, the development of TIRA contributes to the effects of technology on couples' intimacy research literature. Specifically, TIRA differs from other similar instruments because it is a brief and structured assessment tool that specifically measures the interaction between individuals' perception of their technology use and how their technology use is perceived to impact their romantic relationship intimacy. Unlike the other instruments, TIRA items assess for both intimacy-enhancing and intimacy-reducing effects of technology on couples intimacy. Additionally, the context of couples' intimate relationships is the sole focus of TIRA items. Because of these evident differences between TIRA and other instruments that measure similar constructs, TIRA is an innovative assessment tool that contributes to research literature in different ways than previously created instruments.

LIMITATIONS

In the current study, a new instrument was developed. Because this is the original study for developing TIRA, there are several limitations of this study that must be considered. First, the response rate was relatively low, although it is unknown what percentage of recruited individuals met the study inclusion criteria. A declining response rate to survey research has become a common trend within the past decade and one cause of this is attributed to recruited individuals not meeting the study criteria (Tourangeau, 2004). Although response rates are important, the representation of the sample related to the targeted population is found considered more relevant to the results of a study (Fincham, 2008).

Second, this study's sample consisted of university students, and college students typically have easier access to technological devices and engage in higher rates of technology use as compared to noncollege populations (Han-son et al., 2010; Smith et al., 2011). Third, because some participants were missing data in this study (i.e., either due to nonresponding and/or using the "Not Applicable" option for the TIRA, missing items were considered to be "missing at random" (Acock, 2005), and strategies were used to account for the missing data in the analyses. In future research, however, researchers should eliminate the "Not Applicable" option when using the final version of the TIRA. Because there are more advanced strategies for addressing missing data, implementing mean solutions is considered another limitation to the results of this study (Acock; Schafer & Graham, 2002).

Fourth, specific types of technology were not directly correlated with participants' responses. In fact, participants reported on several technology platforms utilized in their day-to-day lifestyle in order for this study to provide a general understanding for technology use impact on intimate relationships. Future area of research resides in correlating specific type (s) of technology

platform(s) and its impact on relationship intimacy. Fifth, the majority of participants reported being “satisfied” or “very satisfied” in their relationships, and it may be that couples with lower levels of relationship satisfaction differ in the ways that they use technology within their relationships. A sixth and final limitation to this instrument is its inability to assess for couples’ preexisting relationship dynamics that contribute to the underlying patterns of technology use within their intimate relationship.

The purpose of this study was to create an assessment tool to measure the impact of technology use on couple relationship intimacy. As this was the first study examining the TIRA, there are several future research implications to address. Additional research is needed to examine the generalizability and psychometric properties of the TIRA. Administering the TIRA to a clinical or community sample will help identify the populations that are suitable for use of the TIRA. To further examine the validity of the TIRA, researchers can study the relationships among the TIRA subscale scores and other direct measures of intimacy and other relevant relationship characteristics (e.g., communication, relationship satisfaction, commitment, and attachment style). Similarly, researchers can administer TIRA with the intention of developing test-retest reliability with a specific sample.

In general, additional research is needed to examine the ways and extent to which couples’ use of technology both hinders and promotes intimacy within their relationships. Specifically, other researchers have suggested that couples’ preexisting relationship dynamics can influence how they use and perceive the use of technology within their intimate relationship (Coyne et al., 2011; Perry & Werner-Wilson, 2011; Weisskirch, 2012); however, the research supporting the individual and relational factors that contribute to couples’ preexisting relationship dynamics that contribute to the positive and negative impacts of technology on couples intimacy is limited. Thus, studying individual and relational factors with the TIRA’s Intimacy-Enhancing and Intimacy-Reducing Subscales will be important for further understanding the multifaceted interaction between couples intimacy and technology use. For example, couples communication patterns and attachment styles could heavily influence how individuals use technology to communicate with their partner, as well as determine how individuals perceive their partners’ use of technology to impact their relationship intimacy.

THERAPEUTIC IMPLICATIONS

Technology use can affect the time and energy that partners put into their romantic relationships. The infusion of technology into romantic relationships can impact intimacy both positively and negatively (Henline, 2006; Hertlein, 2012). Therapists can help couples minimize the destructive consequences of technology use between partners. Because technology is such an integrated aspect of North American lifestyles (Cole et al., 2009; Duggan & Brenner, 2013; Rainie, 2010; Smith, 2012), therapists need to possess a reasonable amount of knowledge around the different types, uses, and implications of technology (Hertlein & Webster, 2008). Given the limited opportunities, it could be challenging for counselors to be informed of this topic (Blumer, Hertlein, Smith, & Allen, 2014). For instance, Blumer et al. (2014) found a limited and misrepresentation of the implications for technology use on couple and family relationships in counselor trainings and conference presentations, as well as in counseling literature. Similar to suggestions found in Hertlein and Blumer (2014), given the high rates of technology use within

relationships, we recommend that therapists include a brief assessment (e.g., TIRA) of how technology influences client couples' intimate connections and relationship satisfaction. Depending on the clients' responses, therapists may want to ask more specific questions related to the functioning of technology use in the relationship.

Couples tend to have differing perceptions of the types of technology use that are problematic (Parker & Wampler, 2003). For example, some partners believe that on-line communications with other people are harmless flirtations, while others view this as a form of emotional betrayal that is as harmful as physical infidelities. Thus, therapists can use instruments like TIRA to assess for the positive and negative impact of technology on couples' intimacy so that therapists can help couples reach agreed-upon definitions for the technology use behaviors that present concerns, identify problematic technology use dynamics (Hertlein & Webster, 2008), and help couples establish boundaries and rules to minimize the destructive patterns of technology use in relationships in the future (Young et al., 2000).

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