



# Young people's digital lives: The impact of interpersonal relationships and digital media use on adolescents' sense of identity



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## ABSTRACT

The current study investigates the joint effects of interpersonal relationships and digital media use on adolescents' sense of identity. Questionnaires were administered to a sample of 2079 students (57% female) between the ages of 11 and 19 years ( $M = 15.4$  years) attending one of seven secondary schools in Bermuda. Using structural equation modeling, the author found that mothers and friends play an important role in adolescents' lives, with both relationships contributing in positive ways to respondents' self-concept clarity. Further, the results showed that mother relationship quality affected adolescents' self-concept clarity both directly and indirectly, through the positive impact it had on friendship quality. Friends also played a mediating role in relation to aspects of adolescents' digital media use. Specifically, the negative association detected between online identity expression/exploration and self-concept clarity was mediated partially by low friendship quality. Going online to communicate with one's friends appeared to play a more positive role in adolescents' sense of identity. The results showed that online peer communication affected self-concept clarity indirectly through its positive impact on friendship quality.

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## 1. Introduction

The development of a personally meaningful, socially validated identity constitutes a primary developmental task of adolescence (Erikson, 1950, 1968). As adolescents become newly aware of a world beyond their immediate circle of friends and family, they begin to contemplate the roles they will assume and the contributions they will make.

Interpersonal relationships and social contexts play a central role in the identity formation process (Adams & Marshall, 1996; Cote, 2009; Erikson, 1968; Youniss & Smollar, 1985). Parents and friends are particularly central (Erikson, 1968; Youniss & Smollar, 1985). Parents serve as models of identity (positive or negative) and validate the identities that their adolescent children express (Cooper, Grotevant, & Condon, 1983). Friends also play a validating role, as adolescents define themselves partly in relation to their peer group membership and articulate their identities in the context of intimate conversations with their close friends (Elliott & Feldman, 1990; Rubin, Bukowski, & Parker, 2006).

Adolescents, like all of us, experience their interpersonal relationships within distinct social contexts. Yet, the social contexts of today's adolescents differ markedly from those of their predecessors. Digital media technologies such as cell phones and social

network sites have created new social contexts and in some cases altered existing ones. These new contexts raise questions about how adolescents construct and experience their identities (Buckingham, 2007). Some theorists warn of the potential harmful effects of adolescents' digital media use (e.g., Turkle, 2011), while others take a more optimistic view (e.g., Ito et al., 2009). In recent years, scholars have begun to explore these questions empirically (e.g. Israelashvili, Kim, & Bukobza, 2012; Lee, Aiken, & Hung, 2012; Valkenburg & Peter, 2008). The current study investigates adolescents' sense of identity and the role that parents, friends, and digital media technologies play in the construction of the self.

## 2. Literature review

### 2.1. Identity during adolescence

While scholars generally agree that identity is a central concern among adolescents, there is less agreement on how to define identity as a construct (see Cote, 2009; Schwartz, 2001, 2007). The present investigation adopts an Eriksonian view of identity, which emphasizes coherence and consistency. In Erikson's own words:

The wholeness to be achieved at this stage I have called a sense of inner identity. The young person, in order to experience wholeness, must feel a progressive continuity between that which he has come to be during the long years of childhood and that which he promises to become in the anticipated

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future; between that which he conceives himself to be and that which he perceives others to see him and to expect of him (Erikson, 1968, p. 87).

According to Erikson, those individuals who navigate this stage of development successfully experience identity synthesis, which is marked by a sense of “self-sameness and inner continuity” (1968, p. 50) across one’s various social contexts and diverse roles. In contrast, the failure to craft a coherent and consistent picture of one’s self results in identity confusion. This focus on wholeness and continuity aligns with an earlier theorist of the self, James (1890), who emphasized the integrative function of personal identity. It is also well-aligned with Campbell, Trapnell, Heine, Katz, Lavallee, and Lehman’s (1996) self-concept clarity construct, which they operationalized in the form of a 12-item scale that measures the extent to which a person’s self-beliefs are clearly and confidently defined, internally consistent, and temporally stable.

The integrative function of identity described by Erikson (1968) is reflected in the work of subsequent identity scholars. According to Adams and Marshall (1996), identity’s core functions include providing a structure for understanding who one is, as well as a sense of personal coherence and consistency. Baumeister (1993) argues that “identity furnishes a basis for making stable, coherent, consistent choices” (p. 182). Berzonsky (2003a, 2003b) describes identity as an informal theory about the self that individuals use to make sense of and engage in their different social contexts. McAdams (1996, 1997) likens identity to a story that functions to integrate different aspects of the self. In each case, identity represents an organizing concept that gives structure and meaning to an individual’s varied experiences.

Some scholars, however, argue that integration and coherence are no longer defining features of identity, since individuals today assume different roles across multiple contexts. According to Gergen (2000), the postmodern identity is distinguished by its multiplicity. He contends that achieving a sense of personal coherence is not possible in such a rapidly changing and socially complex world. Others, such as Giddens (1991) and Lifton (1993), assert that multiplicity and coherence need not be incompatible. In fact, Lifton argues that finding coherence in an individual’s many forms of self-expression constitutes an important facet of psychological well-being.

## 2.2. Measuring adolescent identity

Despite the salience of identity during early and middle adolescence, most of the identity research conducted in the twentieth century focused on late adolescence and emerging adulthood (Schwartz, 2005). This focus likely reflects Marcia’s (1966) operationalization of identity as the degree to which an individual has committed to a set of goals, values, and beliefs within the domains of occupation, religion, and politics. One would not expect individuals to make such commitments at the age of 13 or 14. Yet, Schwartz and his colleagues argue that younger adolescents can be expected to achieve a coherent sense of identity (Schwartz, Pantin, Prado, Sullivan, & Szapocznik, 2005). Drawing on the attachment (Zimmerman, 2004) and self-concept (Harter, 1998) literatures, Schwartz et al. define *coherence* as “the ability to bring together disparate elements into an organized and well-functioning whole” (Schwartz et al., 2005, p. 394). Thus, instead of measuring identity statuses in specific domains, these researchers measure a more global sense of *identity coherence*. It is worth noting that this approach to studying identity is well-aligned with Erikson’s (1950), Erikson’s (1968) and other identity scholars’ focus on the integrative nature of identity (e.g. Adams & Marshall, 1996; Baumeister, 1993; Berzonsky, 2003a, 2003b; McAdams, 1996, 1997). For this

reason, it makes sense to investigate identity coherence in early and middle as well as late adolescence.

## 2.3. The role of parents and peers in adolescent identity development

Both parents and peers contribute in important ways to the identity formation process during adolescence. With respect to parents, Marcia (1988) and Josselson (1988) describe a process by which, as they form their own sense of identity, adolescents internalize the models of self provided to them by their parents. In particular, parents model the two processes of individuality and connectedness that are hypothesized to support the development of a healthy sense of identity (Cooper et al., 1983). They also play an active role in supporting the development of these two processes in their adolescent children.

As adolescents begin to spend more time interacting with their friends, the peer group becomes an increasingly important source of self-definition (Brechwald & Prinstein, 2011; Brown, 1990; Bukowski & Sippola, 2001; Rubin et al., 2006). The close friendships that are often established within the context of these peer groups are also important to the identity formation process (Rubin et al., 2006). Adolescents articulate their sense of themselves through conversations with their close friends; they also learn what they share with others as well as what makes them unique (Elliott & Feldman, 1990; Sullivan, 1953; Youniss & Smollar, 1985).

Empirical investigations support the view that positive relationships with both parents and peers promote adolescents’ identity development. Meeus, Oosterwegel, and Vollebergh (2002) conducted a study with 148 middle adolescents ( $M = 15$  years) in which they found that adolescents who felt accepted and trusted by their parents tended to report greater adherence to an identity choice. The same was true for adolescents who felt accepted and trusted by their close friends. Similarly, in Osman’s (2007) investigation of 118 early adolescents and their mothers, adolescents who reported high levels of relationship security with mothers and fathers tended also to report higher self-worth and fewer self-discrepancies between their actual and ideal selves. The same pattern was found for adolescents who reported high levels of relationship security with their best friends.

Because both parents and peers contribute importantly to adolescents’ sense of identity, it is worth considering how these relationships may be themselves connected. Studies spanning early adolescence through emerging adulthood point to a significant, positive connection between parent and peer relationships (e.g. Bell, Avery, Jenkins, Feld, & Schoenrock, 1985; Feldman & Wentzel, 1990; Nada Raja, McGee, & Stanton, 1992). This body of research lends support to Meeus et al.’s (2002) contention that one of the ways parents affect adolescents’ sense of identity is indirectly, through the influence they have on the quality of adolescents’ friendships.

## 2.4. Digital media and identity

Erikson (1968) discussed the important role that context plays in shaping adolescents’ identities. Subsequent scholars have emphasized the centrality of context in the identity-formation process (e.g. Adams & Marshall, 1996; Baumeister & Muraven, 1996; Beyers & Çok, 2008). Indeed, Beyers and Çok (2008) describe identity development as a series of person-context transactions over time. Individuals draw on the values, beliefs, and signals embedded in their social contexts to shape their identities. In turn, the identities they shape influence the way they interact with their social environment.

Digital media technologies have given rise to many new contexts for adolescents to express and explore their identities, from social network sites, cell phones, and instant messaging platforms,

to blogs and vlogs, virtual worlds, and video-sharing sites. Given the newness and ubiquity of these technologies, it is opportune to consider what, if any, impact they have on adolescents' sense of identity. Gauging this impact poses distinct challenges, however, since technologies, and the ways people use them, change rapidly. In pursuing this line of inquiry, therefore, scholars must take care to identify not just the technologies that young people use (e.g. Facebook, MySpace, and Twitter), but the distinct characteristics of those technologies (e.g. portable and text-based) and youth's particular attraction to them (e.g. a desire to maintain constant connection to others). By teasing apart the characteristics of technologies from the technologies themselves, research conducted on today's technologies will still hold relevance when tomorrow's technologies arrive.

Both theory and empirical evidence paint a mixed picture of the relationship between digital media use and individuals' sense of identity. Valkenburg and Peter (2011) outline two opposite hypotheses: the *self-concept fragmentation hypothesis* and the *self-concept unity hypothesis*. In the former, the opportunities that the internet affords individuals to interact with many different people in diverse online environments—in some cases adopting a different personality in each one—undermines their ability to coordinate the multiple facets of their self into a coherent whole. Turkle warns, "Multiplicity is not viable if it means shifting among personalities that cannot communicate" (1995, p. 258). The challenge of coordinating these "shifting personalities" may be particularly great for adolescents, who are just beginning to form their identities. The self-concept unity hypothesis, by contrast, states that online activities provide adolescents with opportunities to experiment with their identities and receive feedback and validation from others. Such opportunities for self-expression and self-validation may enhance self-concept clarity (Valkenburg & Peter, 2008; Valkenburg & Peter, 2011).

Valkenburg and Peter (2011) chronicled three surveys exploring the relationship between adolescents' internet use and their self-concept clarity. Collectively, these three studies provide inconclusive results regarding the relationship between adolescents' internet use and self-concept clarity. In his investigation of 203 first-year university students in Canada, Matsuba (2006) found that students who spent more time using the internet for entertainment and communication (with unknown others rather than existing friends) experienced lower levels of self-concept clarity.

In their study of Dutch adolescents between 10 and 17 years of age, Valkenburg and Peter (2008) found no evidence for a connection between internet use and self-concept unity. The third study reviewed by Valkenburg and Peter (2011) examined the relationship between internet use and identity status in a sample of 161 undergraduate students between the ages of 18 and 25 years in Melbourne, Australia (Mazalin & Moore, 2004). The researchers found that respondents with less mature identity statuses tended to report more internet use. However, this relationship disappeared when the researchers accounted for the contribution of social anxiety and age. Specifically, high social anxiety and older age predicted more internet use, but only among male respondents. In contrast to Valkenburg and Peter (2008), Mazalin and Moore used identity as a predictor of internet use. This difference highlights the lack of theoretical clarity regarding the nature of the relationship between internet use and identity.

Two studies published since Valkenburg and Peter's (2011) review point to a negative relationship between internet use and self-concept clarity. Israelashvili et al. (2012) found that Israeli adolescents who reported higher levels of internet use tended also to report lower levels of self-concept clarity. In their study of college-age gamers, Lee et al. (2012) found that gamers with lower

levels of self-concept clarity spent more time playing video games on average than gamers with high levels of self-concept clarity. The findings from these more recent studies are consistent with Matsuba's (2006) earlier results.

### 2.5. Digital media and peer relationships

It is possible that internet use indirectly affects adolescents' sense of identity, by influencing the quality of their friendships. As reviewed earlier, friends are a driving force behind adolescents' internet use; they are also important contributors to adolescents' sense of identity. Thus, it is worth considering whether and how adolescents' internet use is affecting the way they experience their friendships.

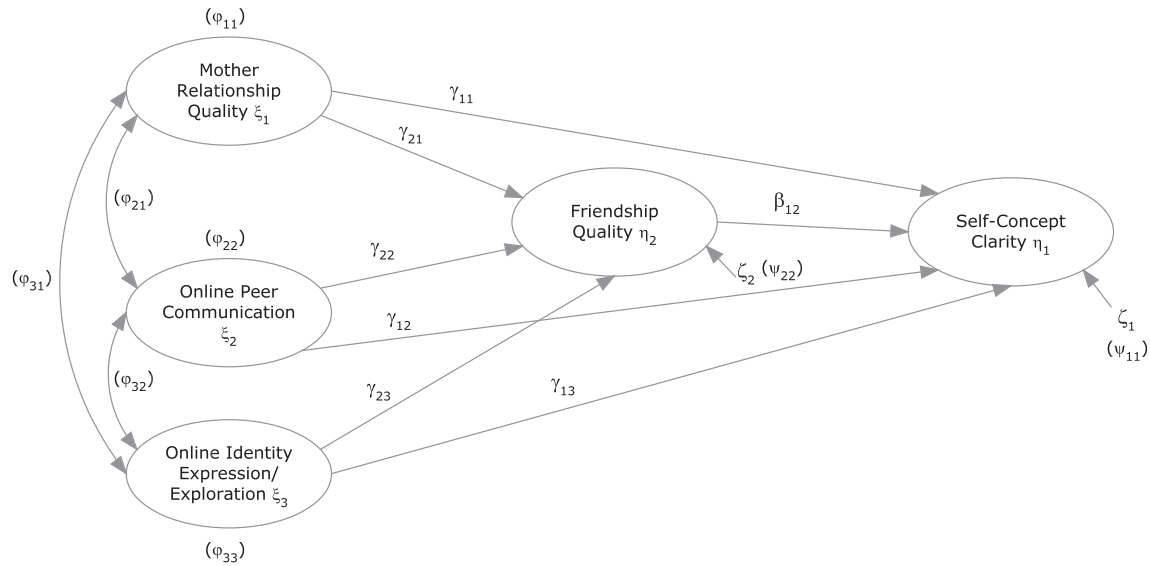
As with their review of research on internet use and identity, Valkenburg and Peter (2011) outline two competing hypotheses relating to internet use and friendship quality: the *displacement hypothesis* and the *stimulation hypothesis*. In the former, adolescents' online activities are thought to diminish the quality of their offline friendships by displacing the time they would otherwise spend engaging in face-to-face interactions with their friends. The stimulation hypothesis, by contrast, proposes that digital media provide adolescents with added opportunities to communicate with friends and thereby increase feelings of closeness to them.

The empirical evidence accumulated over the last decade favors the stimulation over the displacement hypothesis (Davis, 2012; Dolev-Cohen & Barak, 2013; Subrahmanyam & Šmahel, 2011; Valkenburg & Peter, 2009; Valkenburg & Peter, 2011). For instance, in a longitudinal study involving Canadian adolescents, Blais, Craig, Peller, and Connolly (2008) found that over a one-year period, instant messaging (IM) with friends predicted positive changes in best friendship quality. Specifically, those adolescents who communicated with existing friends via IM at Time 1 scored higher on measures of friendship quality at Time 2 than adolescents who did not. Notably, however, the researchers also found that using the internet for entertainment purposes, or to communicate with strangers, predicted decreases in best friendship quality between Time 1 and Time 2. Thus, it appears that the stimulation hypothesis may apply only to specific forms of internet use.

## 3. Focus of the present study

Though interpersonal relationships are recognized as contributing in important ways to adolescents' sense of identity, little is known about the extent to which these contributions may be changing in light of adolescents' changing communication patterns. During the last decade, digital media have created new contexts for adolescents to interact with other people and to construct and experience their identities. It is thus opportune to investigate both the direct and indirect effects of adolescents' digital media practices on their sense of identity. To that end, the current study investigates the joint effects of interpersonal relationships and digital media use on adolescents' sense of identity.

Data on a sample of 2079 adolescents resident in Bermuda were used to investigate the structural relationship among latent representations of mother relationship and friendship quality, two forms of digital media use, and self-concept clarity. In Fig. 1, the principal hypotheses are expressed as a path diagram. In the figure, an exogenous construct of mother relationship quality ( $\xi_1$ ) and two exogenous constructs representing different forms of digital media use ( $\xi_2$  and  $\xi_3$ ) are hypothesized to have both *direct* and *indirect* effects on an endogenous construct of self-concept clarity ( $\eta_1$ ), controlling for the effects of age, gender, and school affiliation. In addition, it is hypothesized that the endogenous construct of



**Fig. 1.** Path model depicting the hypothesized associations between the three exogenous factors mother relationship quality, online peer communication, and online identity expression/exploration, and the two endogenous factors friendship quality and self-concept clarity. Covariates female, age, and school are not depicted in order to reduce the complexity of the figure.

friendship quality ( $\eta_2$ ) will mediate the relationships between the three exogenous constructs and self-concept clarity. In the analyses, each of these hypothesized constructs is articulated using several indicators (see Appendix A). These indicators (and the three covariates) have been omitted from Fig. 1 in order to reduce the complexity of the figure, and to focus attention on the hypothesized theoretical relationships among the latent constructs.

On the path diagram, parameters are specified to represent the magnitude and direction of the hypothesized direct and indirect relationships among the latent constructs. Structural parameters  $\gamma_{11}$ ,  $\gamma_{12}$ , and  $\gamma_{13}$  (Fig. 1) denote the hypothesized direct pathways linking the latent exogenous constructs of mother relationship quality, online peer communication, and online identity expression/exploration, respectively, and the latent endogenous construct of self-concept clarity. Parameters  $\gamma_{21}$ ,  $\gamma_{22}$ , and  $\gamma_{23}$  denote the hypothesized direct pathways linking each of the three exogenous constructs and the endogenous construct of friendship quality. Parameter  $\beta_{12}$  denotes the hypothesized direct pathway linking friendship quality and self-concept clarity (all parameters are represented by solid lines in Fig. 1).

The research questions guiding the current study are framed in terms of the structure of this hypothesized path model and its constituent parameters:

- 1a. Do adolescents with higher quality maternal relationships experience higher levels of self-concept clarity?
- 1b. Is this relationship mediated by the experience of high quality friendships?
- 2a. Do adolescents who go online to communicate with their existing friends experience higher levels of self-concept clarity?
- 2b. Is this relationship mediated by the experience of high quality friendships?
- 3a. Do adolescents who go online to express and explore different aspects of their identities experience higher levels of self-concept clarity?
- 3b. Is this relationship mediated by the experience of high quality friendships?
4. Do the relationships among digital media use, maternal relationships, friendship quality, and self-concept clarity differ by age or gender?

## 4. Methods

### 4.1. Sample

Survey data were collected in March and April 2010 from a sample of 2079 students (57% female) between the ages of 11 and 19 years ( $M = 15.4$  years) attending one of seven secondary schools in Bermuda, a British Dependent Territory located approximately 650 miles off the coast of North Carolina. Across the schools, survey response rates were high to excellent, and ranged from 75% to 94% (see Appendix B). With approximately 2600 students attending senior school in Bermuda, overall, the sample contained roughly 80% of all senior school students on the Island.

Private school students represented 52% of the sample, whereas approximately 40% of Bermuda's students attend private school. In total, 52% of the students identified as Black, 22% as White, and 16% as Other.<sup>1</sup> Though Black students formed a majority of the sample, the percentage of Bermuda's total population that identifies as Black is closer to 60%. (See Appendix C for a complete overview of the demographic characteristics for the survey sample.)

With respect to digital media ownership and use, fully 94% of survey respondents reported owning a cell phone, 83% owned<sup>2</sup> a laptop computer, and 86% owned a portable media player such as an iPod. As in the United States, Facebook was the most popular social networking platform, with 90% of respondents reporting that they regularly visited the site. Instant messaging services such as AOL Instant Messenger (AIM) and Skype were used by 87% of the sample, and email was used by 82%. These and other forms of digital media use in the sample are summarized in Appendix D.

Though Bermudian youth engage in digital media activities paralleling those of their American counterparts, including text messaging, social networking, and instant messaging, it should be noted that a higher proportion of Bermudian adolescents engage in these activities than American adolescents. Whereas 80% of US adolescents with internet access use social network sites (Lenhart

<sup>1</sup> These racial categories are the same categories used by the Bermuda Government.

<sup>2</sup> In two of the schools (one private and one public), students are issued school laptop computers to use until they graduate. These students were counted as laptop owners.



et al., 2011), 90% of the Bermudian survey respondents reported using Facebook alone (Appendix D). Cell phone ownership was also higher among Bermudian adolescents: 77% of US adolescents (Lenhart, 2012) compared to 94% of the survey respondents in this study. Thus, in addition to Bermuda's distinct cultural and socio-economic characteristics, these high rates of digital media use preclude generalization of the results to the population of adolescents living in the United States.

#### 4.2. Procedure

At least 2 weeks prior to survey administration, students' parents or guardians received a letter that provided them with details of the study. If parents did not want their child to participate in the survey, they were asked to sign and return the form. In each school, fewer than five forms were returned. Students from compliant families then completed the survey on a computer in school, though paper versions were used by students who experienced a slow internet connection or technical difficulties with the school computers. The survey was completed anonymously and included questions about students' digital media ownership, online activities, motivations for going online, their feelings about themselves, their close friends, and parents, and selected demographic characteristics. Upon completion of their survey, students were asked to complete a student information form. This form was used to keep track of the number of completed surveys and to enter students into a raffle drawing for a chance to win one of several \$25 gift certificates.

#### 4.3. Measures

*Online peer communication and online identity expression and exploration.* Existing digital media use scales (e.g., Courtois, Mechant, De Marez, & Verleye, 2009; Leung, 2007) and relevant literature were used to create two six-item scales, one measuring *online peer communication* and the other measuring *online identity expression and exploration* (see Appendix A). The former scale assessed the degree to which respondents are motivated to go online to communicate and maintain their relationships with existing friends, e.g., "By going online, I feel more involved with what's going on with my friends". The latter scale assessed the degree to which respondents are motivated to go online to express and explore different aspects of their personality, e.g., "I enjoy using the internet to try out different ways of expressing myself". For each scale, respondents were asked to rate each of the six statements on a seven-point scale that ranged from *completely untrue* to *completely true*. The estimated value for the Cronbach's alpha internal consistency reliability for the *online peer communication* and *online identity expression and exploration* scales were .84 and .82, respectively.

*Mother relationship quality.* The 10-item *mother trust* scale from the revised version of Armsden and Greenberg's (1987) *Inventory of Parent and Peer Attachment* (IPPA) was used to measure *mother relationship quality* (see Appendix A).<sup>3</sup> Respondents were asked to rate each of the 10 statements on a seven-point scale from *completely untrue* to *completely true*, e.g., "My mother understands me". An item analysis revealed that the internal consistency reliability of the scale could be improved considerably if the following item was removed, "My mother expects too much from me". The

estimated value of the Cronbach's alpha reliability for the remaining 9 items was .93.

*Friendship quality.* The 10-item *peer trust* scale from the revised version of the IPPA (Armsden & Greenberg, 1987) was used to measure friendship quality (see Appendix A). To capture the reciprocal nature of adolescent friendships (Youniss & Smollar, 1985), four additional items were included that focused on what respondents do for their friends. Participants were asked to rate each of the 14 statements on a seven-point scale from *completely untrue* to *completely true*. An item analysis revealed that the internal consistency reliability of the scale would be improved considerably if the following item were removed, "I wish I had different friends". The estimated value of the Cronbach's alpha reliability for the remaining 13 items was .95.

*Self-concept clarity.* Campbell et al. (1996) define self-concept clarity as the extent to which an individual's self-beliefs are clearly and confidently defined, internally consistent, and temporally stable. As noted earlier, this construct is well-aligned with the sense of "wholeness" and "continuity" that, according to Erikson (1968), forms the core of a successful identity. To measure their self-concept clarity, participants were asked to rate 12 statements on a seven-point scale from *completely disagree* to *completely agree*, e.g., "In general, I have a clear sense of who I am and what I am" (see Appendix A). An item analysis revealed that the internal consistency reliability of the scale would be improved considerably if the following item were removed, "I rarely experience conflict between the different aspects of my personality". The estimated value of Cronbach's alpha reliability for responses to these 11 items was a respectable .88.

*Control predictors.* Respondents' *School, Age, and Gender* were included as control variables in the statistical models. A series of dichotomous variables was created to represent each respondent's *School*, each coded 1 if the student was in the corresponding school (0, otherwise) in order to account for the nesting of students within seven different schools. The students' *Age* in years was included as a continuous covariate to account for age heterogeneity among members of the sample. Lastly, a dichotomous predictor was included to represent a respondent's *Gender* (males coded as 1, females coded as 2) because of the interest that gender differences have historically garnered in the adolescent development literature, including theory and research on adolescents' friendships and sense of identity (e.g. Archer, 1989; Berndt, 1996; Collins & Steinberg, 2006; Gilligan, 1982, 1996; Harter, 1999).

##### 4.3.1. Parceling survey items

Having established the dimensionality of the items used to represent the latent constructs in the hypothesized model (Fig. 1), item parcels were created to serve as indicators of each construct. Parcels are composite manifest variables that are created by averaging together two or more individual survey items. Parceling items is appropriate when researchers are interested in relations among the latent constructs rather than among the individual survey items (Little, Cunningham, Shahar, & Widaman, 2002). Using parcels instead of individual items to estimate latent constructs leads to a more parsimonious model, decreases the likelihood of distributional violations, and results in fewer chances for residuals to be correlated or dual loadings to occur (Bandalos & Finney, 2001; Little et al., 2002).

For each latent construct, parcels were created using the item-to-construct relations procedure (Little et al., 2002; Russell, Kahn, Spoth, & Altmaier, 1998). First, factor loadings were obtained for each item by specifying a single construct model that included all items associated with a particular construct. After arranging the items in descending order of factor loading, items with the highest loadings were selected to anchor each parcel. The items with the next highest loadings were then added to these parcels

<sup>3</sup> Although the survey also included the *father trust* scale, I chose not to use it in the analysis due to concerns about the reliability of students' answers. This scale was among the final group of questions on the survey, and I suspected that some participants had begun to experience survey fatigue by the time they encountered these items.

in inverted order. This process of placing lower loaded items with higher loaded items was repeated until all items were assigned to a parcel.

#### 4.4. Data analysis

Structural equation modeling (SEM) with *MPlus* version 6.11 was used to fit the hypothesized model in Fig. 1 using a complete data set containing actual and imputed data.

Following the recommendation of SEM methodologists (e.g., Hatcher, 1994; Kline, 2005), multiple indices were examined to evaluate the fit of each hypothesized model to the data, including: (1) the Chi-square ( $\chi^2$ ) Statistic, (2) the Standardized Root Mean-Square Residual (SRMR), (3) the Root Mean-Square Error of Approximation (RMSEA), (4) Bentler's Comparative-Fit Index (CFI), and (5) the Tucker-Lewis Fit Index (TLI). The  $\chi^2$  statistic is a widely reported goodness-of-fit index that summarizes the extent to which the covariances predicted by the fitted model differ from the observed covariances. Small values of the  $\chi^2$  statistic and correspondingly large *p*-values suggest that the hypothesized model fits the data well.

Because the  $\chi^2$  statistic is known to be proportional to sample size and sensitive to departures from multivariate normality, SEM methodologists generally recommend that additional fit statistics be used to assess model fit (Hatcher, 1994). For instance, the SRMR index is derived from the residual correlation matrix and summarizes the difference between predicted and observed correlations (Brown, 2006). Values close to, or below, .06 are assumed to suggest good model fit (Hu & Bentler, 1999). The RMSEA is another commonly used index that is relatively insensitive to sample size (Brown, 2006). Values close to, or below, .08 are assumed to indicate adequate model fit (Browne & Cudeck, 1993). The CFI and TLI also work well with large sample sizes. For both indices, values over .90 indicate acceptable model fit (Hatcher, 1994).

Research questions 1a, 2a, and 3a seek to assess the direct effects of mother relationship quality, online peer communication, and online identity expression/exploration on self-concept clarity. To address this set of questions, the friendship quality construct was removed temporarily from the hypothesized path model in Fig. 1. In this "reduced" model, estimates of the following structural parameters then become the focus of research interest: (a)  $\gamma_{11}$ , the direct effect of mother relationship quality on self-concept clarity; (b)  $\gamma_{12}$ , the direct effect of online peer communication on self-concept clarity; and (c)  $\gamma_{13}$ , the direct effect of online identity expression/exploration on self-concept clarity. In this and all subsequent models, respondents' school, age, and gender were controlled by introducing into the model an exogenous manifest indicator for each covariate as a predictor of the outcome: self-concept clarity.

Research questions 1b, 2b, and 3b were addressed by fitting the full hypothesized path model shown in Fig. 1. The following parameters were estimated and interpreted: (a)  $\gamma_{11}$ ,  $\gamma_{12}$ , and  $\gamma_{13}$ , the direct effects of mother relationship quality, online peer communication, and online identity expression/exploration on self-concept clarity; (b)  $\gamma_{21}$ ,  $\gamma_{22}$ , and  $\gamma_{23}$ , the direct effects of mother relationship quality, online peer communication, and online identity expression/exploration on friendship quality; and (c)  $\beta_{12}$ , the direct effect of friendship quality on self-concept clarity. Particular paths were tested for possible mediating effects only if they included structural parameter estimates that were determined to be statistically significant and non-zero in the reduced model (and hence the corresponding hypothesized direct effect was non-zero, in the population). Indirect effects were tested using standard errors estimated by Sobel's (1982) method. For all

statistical tests reported here, an alpha (Type I error) level of .05 was adopted, as is typical in these types of analyses.

##### 4.4.1. Testing for age and gender differences

Two sets of multiple group analyses were conducted to determine whether the measurement and structural relations in the final model differed by gender or age. Starting with gender, construct-level metric invariance was first tested by constraining all factor loadings for girls and boys to be identical and then comparing the fit to an unconstrained model. The constrained model provided an adequate fit ( $\chi^2 = 309.95$  ( $df = 131$ ,  $p < .001$ ), SRMR = .047, RMSEA = .036, CFI = .992, and TLI = .990), but the difference in the chi-square goodness-of-fit statistic between the unconstrained and constrained models was statistically significant ( $p < .01$ ). However, Cheung and Rensvold (2002) observe that when the sample size is large, as is the case in the present study, differences in chi-square statistics are likely to be statistically significant even when the difference is substantively trivial. In place of the difference in chi-square statistics test, they recommend using indices that are not sensitive to sample size, such as  $\Delta$ CFI. They suggest differences in CFI that do not exceed .01 as a suitable criterion for concluding that the hypothesized pattern of relationships in the two groups is the same. In the present study,  $\Delta$ CFI = .001, well under this criterion. Thus, it can be concluded that, overall, the pattern and strength of the relationships among items and their underlying constructs were the same for boys and girls.

To test whether the hypothesized structural relations in the final model differed by gender, all structural parameter estimates for boys and girls were constrained to be identical. This constrained model was then compared to the unconstrained model. Again, the CFI cut-off criterion of .01 was used to check that there were no differences between boys and girls with respect to the structural relations hypothesized in the final model.

The second set of multiple group analyses involved comparing early (11–13 years), middle (14–16 years), and late (17–19 years) adolescents. The constrained model also provided an adequate fit here, with a chi-square goodness-of-fit statistic of 383.28 ( $df = 207$ ,  $p < .001$ ), SRMR = .043, RMSEA = .035, CFI = .992, and TLI = .991. Though the difference in the chi-square statistic between the constrained and unconstrained models was statistically significant ( $p < .01$ ), the  $\Delta$ CFI was again less than .01 ( $\Delta$ CFI = .001). Thus, it can be concluded that, overall, the pattern and strength of the relationships among items and their underlying constructs were the same for early, middle, and late adolescents.

In addition, to test whether the hypothesized structural relations in the final model differed by age, all structural parameter estimates for early, middle, and late adolescents were constrained to be identical. This constrained model was then compared to the unconstrained model. The CFI cut-off criterion of .01 was again used to test the null hypothesis that there were no differences between early, middle, and late adolescents with respect to the pattern and strength of the structural relations in the final model.

#### 4.5. Threats to validity

##### 4.5.1. Missing data

Between 0% and 9% of responses were missing across the survey items included in the present analysis. In order to be able to include all available data, missing values were imputed using the PROC MI command in SAS. This command uses the expectation-maximization (EM) algorithm to compute the maximum-likelihood estimate (MLE) of the data with missing values, assuming a multivariate normal distribution for the data. Mindful that it is possible to draw an idiosyncratic sample when imputing values for a single data set, all models were fitted with the singly-imputed data set and then again with a more conservative listwise-deleted

**Table 1**  
Means, standard deviations, and possible ranges of variables included in model testing.

	Online identity express/ explore	Online peer communication	Mother relationship quality	Friendship quality	Self-concept clarity	Female	Age
M	3.42	4.43	5.69	5.81	4.51	1.57	15.39
SD	1.40	1.34	1.32	1.02	1.28	.50	1.41
Possible range	1–7	1–7	1–7	1–7	1–7	1–2	11– 19

data set containing 1,934 observations. The two sets of models produced comparable goodness-of-fit indices, parameter estimates, and standard errors.

#### 4.5.2. Sample imbalance

As previously noted, private school students represented 52% of the sample, even though approximately 40% of Bermuda's students attend private school. This disparity is a consequence of the lower response rates in the public schools and the inclusion of eighth grade students from the private schools. Reasons for the lower response rates in the public schools include difficulties accessing a computer or the internet, refusal to take the survey, and absence from school. Had the students who fell into the latter two categories taken the survey, it is possible that mean levels of mother relationship quality, friendship quality, and self-concept clarity would be lower in the sample. However, there is no reason to believe that mean levels of other constructs in the sample, or the relationships among any of the constructs, would be different. Moreover, as there is no indication of a systematic cause for why certain students had difficulties accessing a computer or the internet in school, there is no reason to believe that inclusion of these students would alter any of the results.

## 5. Results

### 5.1. Descriptive statistics

Table 1 presents information for the measure scale scores, such as means, standard deviations, and ranges, for the variables included in Fig. 1, as well as for the covariates *Female* and *Age*. With respect to the digital media scales, the sample appeared to be more motivated to go online in order to communicate with existing friends than to express and explore aspects of their identities. The sample mean for the online peer communication measure (4.43) was fully one point higher than the mean for the online identity expression and exploration measure (3.42) on a 7-point scale (1 = completely untrue, 7 = completely true).

On average, the adolescents in this sample reported high quality relationships with both their mothers and their friends. On a 7-point scale where 1 represents low quality relationships and 7 represents high quality relationships, the sample means for the mother relationship and friendship quality measures were 5.69 and 5.81, respectively. Adolescents also reported fairly high levels of self-concept clarity, on average. On a 7-point scale where 1 represents low self-concept clarity and 7 represents high self-concept clarity, the sample mean was 4.51.

### 5.2. Testing the direct effects ("reduced") model

The fit indices summarized in Table 2 indicate that the reduced model provided an adequate fit to the data, with a chi-square goodness-of-fit statistic of 353.01 ( $df = 101$ ,  $p < .001$ ), SRMR = .033, RMSEA = .035, CFI = .983, and TLI = .979. The results depicted in Fig. 2 show that adolescents who reported high qual-

**Table 2**

Goodness-of-fit indices for two fitted structural models describing the direct and indirect associations between the three exogenous factors mother relationship quality, online peer communication, and online identity expression/exploration, and the two endogenous factors friendship quality and self-concept clarity, controlling for gender, age, and school ( $n = 2079$ ).

Model	$\chi^2$	$df$	SRMR	RMSEA	CFI	TLI
<i>Model 1<sup>a</sup></i>						
Direct effects model	353.01	101	0.033	0.035	0.983	0.979
<i>Model 2<sup>b</sup></i>						
Mediation model	487.21	143	0.031	0.034	0.984	0.980

<sup>a</sup> Model includes mother relationship quality, online peer communication, online identity expression/exploration, and self-concept clarity.

<sup>b</sup> Model includes mother relationship quality, online peer communication, online identity expression/exploration, friendship quality, and self-concept clarity.

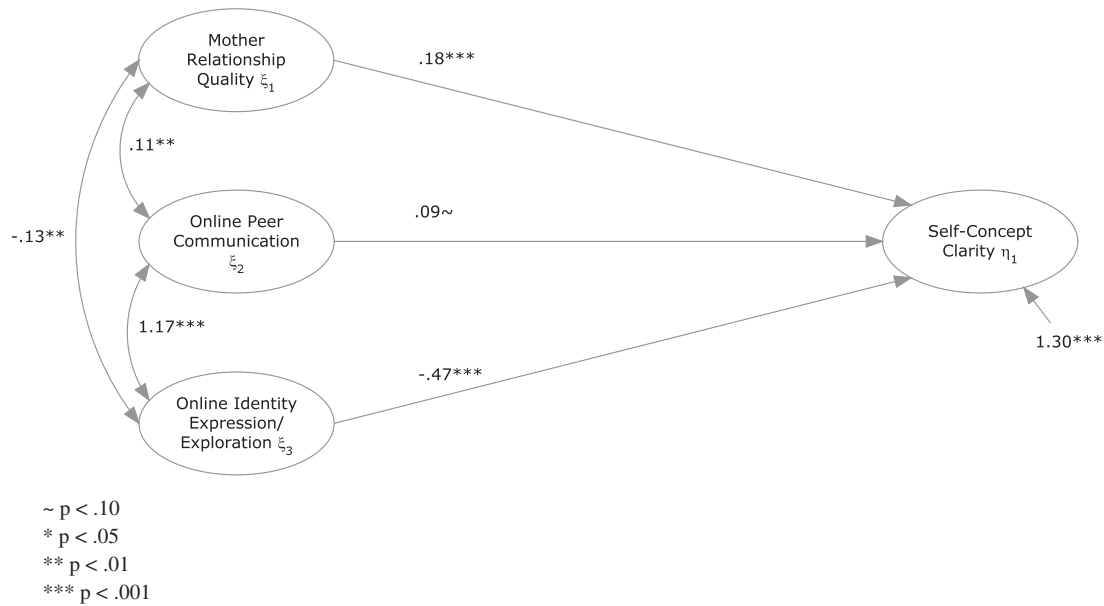
ity relationships with their mothers tended to experience high self-concept clarity, controlling for gender, age, and school ( $\hat{\gamma}_{11} = .18$ ,  $p < .001$ ). With respect to the two digital media constructs, the association between online peer communication and self-concept clarity was positive and approached statistical significance ( $\hat{\gamma}_{12} = .09$ ,  $p = .058$ ). On average, adolescents who were motivated to go online to communicate and maintain their relationships with existing friends tended to experience higher self-concept clarity. In contrast, online identity expression/exploration was negatively associated with self-concept clarity ( $\hat{\gamma}_{13} = -.47$ ,  $p < .001$ ). On average, adolescents who were motivated to go online to express and explore different aspects of their identities tended to experience lower self-concept clarity, controlling for gender, age, and school. These results are summarized in Table 3.

### 5.3. Testing the mediation ("full") model

Fig. 3 presents the path coefficients from the final fitted model, with only statistically significant paths represented. The fit indices summarized in Table 2 indicate that the model provided an adequate fit to the data, with a chi-square goodness-of-fit statistic of 487.21 ( $df = 143$ ,  $p < .001$ ), SRMR = .031, RMSEA = .034, CFI = .984, and TLI = .980.

The results of mediation tests based on the Sobel test indicated that friendship quality partially mediated the positive relationship between mother relationship quality and self-concept clarity ( $z$  score = 4.73,  $p < .001$ ). Specifically, adolescents who enjoyed high quality relationships with their mothers tended to experience greater self-concept clarity, partly as a result of the mediating role of high friendship quality.

Friendship quality fully mediated the positive relationship between online peer communication and self-concept clarity ( $z$  score = 4.63,  $p < .001$ ). Adolescents who were motivated to go online to communicate and maintain their relationships with existing friends tended to experience high self-concept clarity, and this relationship could be explained entirely by the mediating role of high friendship quality.



**Fig. 2.** Structural model describing the fitted associations between the three exogenous factors mother relationship quality, online peer communication, and online identity expression/exploration, and the endogenous factor self-concept clarity, controlling for gender, age, and school ( $n = 2079$ ).

**Table 3**

Selected parameter estimates with their standard errors and p-values for the fitted structural model describing the direct associations between the three exogenous factors mother relationship quality, online peer communication, and online identity expression/exploration, and the endogenous factor self-concept clarity, controlling for gender, age, and school ( $n = 2079$ ).

		Estimate	Standard error	p-Value
<i>Fixed effects</i>				
Mother <sup>a</sup> → SCC	$\gamma_{11}$	0.18	0.02	<0.0001
OPC → SCC	$\gamma_{12}$	0.09	0.05	0.058
OIEE → SCC	$\gamma_{13}$	-0.47	0.04	<0.0001
<i>Variances</i>				
Mother	$\phi_{11}$	1.68	0.06	<0.0001
OPC	$\phi_{22}$	1.45	0.07	<0.0001
OIEE	$\phi_{33}$	1.67	0.07	<0.0001
Mother/OPC	$\phi_{21}$	0.11	0.04	0.006
Mother/OIEE	$\phi_{31}$	-0.13	0.04	0.001
OPC/OIEE	$\phi_{32}$	1.17	0.05	<0.0001
<i>Residual variances</i>				
SCC	$\psi_{11}$	1.30	0.06	<0.0001

<sup>a</sup> Mother: Mother Relationship Quality; OPC: Online Peer Communication; OIEE: Online Identity Expression/Exploration; SCC: Self-Concept Clarity.

Lastly, friendship quality partially mediated the negative relationship between online identity expression/exploration and self-concept clarity ( $z$  score =  $-4.29$ ,  $p < .001$ ). Adolescents who were motivated to go online to express and explore different aspects of their identities tended to experience low self-concept clarity, partly as a result of the mediating role of low friendship quality (see Table 4 for a summary of these results).

#### 5.4. Testing for age and gender differences

To address the fourth research question, two multiple group analyses were conducted to determine whether the structural relations hypothesized in the final path model differed by gender or age. In the first multiple group analysis, all structural parameters for boys and girls were constrained to be identical and this constrained model was compared to the unconstrained model. The CFI cut-off criterion of .01 was used to check that there were no differences between boys and girls with respect to the structural

relations in the final model. The constrained model provided an adequate fit, with a chi-square goodness-of-fit statistic of 254.38 ( $df = 129$ ,  $p < .001$ ), SRMR = .036, RMSEA = .031, CFI = .994, and TLI = .993. Though the difference in the chi-square statistic between the constrained and unconstrained models was statistically significant ( $p < .05$ ), the difference in the CFI criterion was small ( $\Delta CFI = .001$ ). Thus, it can be concluded that there were no differences between boys and girls with respect to the structural relations in the final model. The goodness-of-fit indices for both the constrained and unconstrained models are summarized in Table 5.

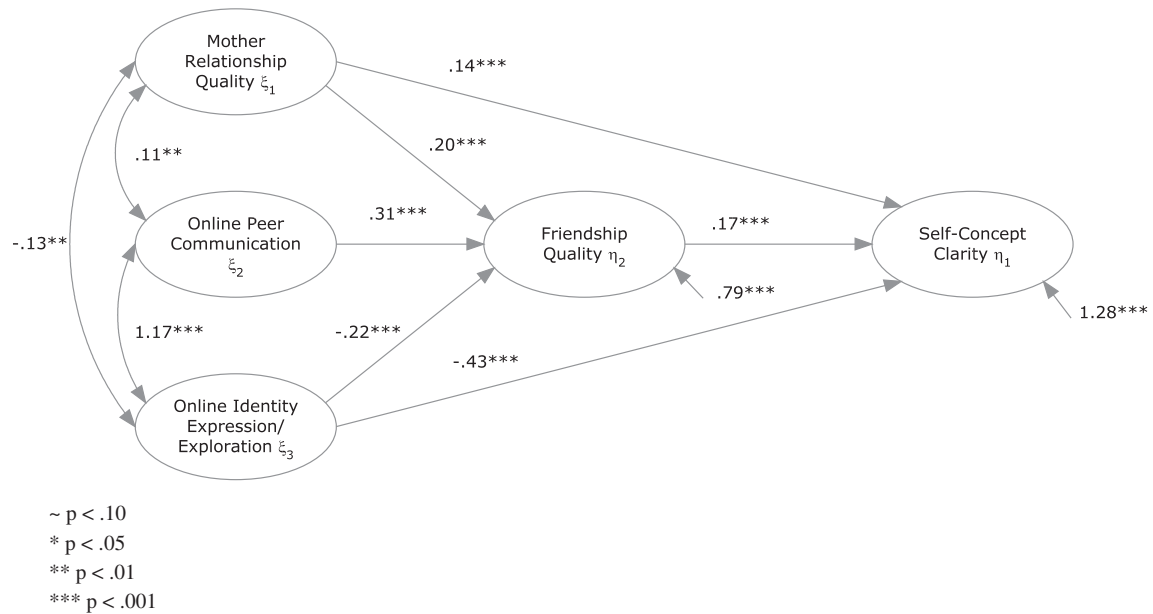
In the second multiple group analysis, structural parameters for early, middle, and late adolescents were constrained to be identical and this constrained model was compared to the unconstrained model. Again, the CFI cut-off criterion of .01 was used to compare the models. The constrained model provided an adequate fit, with a chi-square goodness-of-fit statistic of 356.44 ( $df = 202$ ,  $p < .001$ ), SRMR = .040, RMSEA = .033, CFI = .993, and TLI = .992. The difference in the chi-square goodness-of-fit statistic between the constrained and unconstrained models was not statistically significant ( $p > .10$ ), and  $\Delta CFI = .000$  (see Table 5). Thus, it can be concluded that there were no differences between early, middle, and late adolescents with respect to the structural relations hypothesized in the final model.

Even though the hypothesized model appeared to hold equally well for both boys and girls and early, middle, and late adolescents, the inclusion of age and gender in the model as covariates revealed noteworthy associations between the endogenous constructs and the covariates. For instance, age was positively associated with self-concept clarity. On average, older adolescents tended to report higher levels of self-concept clarity than younger adolescents ( $p < .01$ ). Though age was also positively associated with friendship quality, this association was not statistically significant ( $p = .13$ ). With respect to gender, boys were more likely than girls to report high levels of self-concept clarity ( $p < .001$ ), while girls were more likely than boys to report high quality friendships ( $p < .001$ ).

## 6. Discussion

The findings from this study confirmed that positive relationships with one's parents and friends contribute to a positive sense





**Fig. 3.** Structural model describing the fitted associations between the three exogenous factors mother relationship quality, online peer communication, and online identity expression/exploration, and the two endogenous factors friendship quality and self-concept clarity, controlling for gender, age, and school ( $n = 2079$ ).

**Table 4**  
Selected parameter estimates with their standard errors and  $p$ -values for the fitted structural model describing the fitted associations between the three exogenous factors mother relationship quality, online peer communication, and online identity expression/exploration, and the two endogenous factors friendship quality and self-concept clarity, controlling for gender, age, and school ( $n = 2079$ ).

		Estimate	Standard error	$p$ -Value
<i>Fixed effects</i>				
Mother <sup>a</sup> → SCC	$\gamma_{11}$	0.14	0.02	<0.0001
Mother → Friend	$\gamma_{21}$	0.20	0.02	<0.0001
OPC → SCC	$\gamma_{12}$	0.04	0.05	0.458
OPC → Friend	$\gamma_{22}$	0.31	0.03	<0.0001
OIEE → SCC	$\gamma_{13}$	-0.43	0.04	<0.0001
OIEE → Friend	$\gamma_{23}$	-0.22	0.03	<0.0001
Friend → SCC	$\beta_{12}$	0.17	0.03	<0.0001
<i>Variations</i>				
Mother	$\phi_{11}$	1.68	0.06	<0.0001
OPC	$\phi_{22}$	1.47	0.06	<0.0001
OIEE	$\phi_{33}$	1.68	0.07	<0.0001
Mother/OPC	$\phi_{21}$	0.11	0.04	0.005
Mother/OIEE	$\phi_{31}$	-0.13	0.04	0.001
OPC/OIEE	$\phi_{32}$	1.17	0.05	<0.0001
<i>Residual variances</i>				
SCC	$\psi_{11}$	1.28	0.06	<0.0001
Friend	$\psi_{22}$	0.79	0.03	<0.0001

<sup>a</sup> Mother: Mother Relationship Quality; OPC: Online Peer Communication; OIEE: Online Identity Expression/Exploration; Friend: Friendship Quality; SCC: Self-Concept Clarity.

of self among adolescents (e.g. Cooper et al., 1983; Meeus et al., 2002; Osman, 2007). The findings also support Brown and Bakken's (2011) conclusion that the empirical evidence accumulated over the past 10 years is sufficient to dispel the popular myth that parents and peers represent opposing influences on adolescents. The results from the current study add insight to this body of research by showing how parent and peer relationships work together to impact adolescent identity. Specifically, the analyses revealed that the experience of positive mother relationships had a positive impact on levels of self-concept clarity, partly as a result of the mediating role of high friendship quality.

These findings hold important implications for our understanding of the role of parenting in a digital era. First, though much has been made of the uniqueness of today's "digital natives" (Palfrey & Gasser, 2008), it is not the case that their "digital immigrant" parents have become obsolete. The results reported here show that positive maternal relationships support both positive peer relationships and higher self-concept clarity. Digital natives may appear on the surface quite different from their pre-digital forebears, but they still require supportive, face-to-face relationships in order to thrive.

With respect to adolescents' digital media use, the results showed a positive association between online peer communication and friendship quality. This finding aligns with empirical evidence accumulated over the last decade, which favors the stimulation over the displacement hypothesis (Davis, 2012; Subrahmanyam

**Table 5**  
Goodness-of-fit indices associated with the multiple-group analyses that tested whether the structural relations in the final fitted model differ by gender or age ( $n = 2079$ ).

Model	$\chi^2$	$\Delta\chi^2$	$df$	$\Delta df$	SRMR	RMSEA	CFI	$\Delta CFI$	TLI
<i>Gender</i>									
Constrained	254.38		129		.036	.031	.994		.993
Free	236.17		120		.023	.031	.995		.993
		18.21*		9				.001	
<i>Age</i>									
Constrained	356.44		202		.040	.033	.993		.992
Free	334.65		184		.026	.034	.993		.991
		21.79		18				.000	

\*  $p < .05$ .

& Šmahel, 2011; Valkenburg & Peter, 2009, 2011). Of course, not all peer interactions are positive; in the wake of a number of high-profile teen suicides, the issue of cyberbullying has gained the attention of parents, educators, policymakers, and scholars (Lam & Li, 2013; Levy et al., 2012). Despite this concerning and growing trend (Finkelhor, 2013), the existing evidence—including the results of the current study—suggests that online peer interactions are primarily positive for most adolescents.

In light of the positive association identified in previous research between online peer communication and friendship quality, on the one hand, and friendship quality and identity development (e.g. Brechwald & Prinstein, 2011; Brown, 1990; Bukowski & Sippola, 2001; Rubin et al., 2006), on the other, the current investigation explored the possibility that friendship quality mediated the relationship between online peer communication and self-concept clarity. This hypothesis was supported. The results showed that adolescents who were motivated to go online to communicate with their existing friends tended to experience high levels of self-concept clarity, and this positive relationship was completely mediated by high friendship quality (Fig. 3).

Lastly, the results from the current study showed a negative association between online identity expression/exploration and self-concept clarity, and this negative association was partially mediated by friendship quality. In other words, adolescents who were motivated to go online to express and explore different aspects of their identities tended to experience low self-concept clarity, partly as a result of the mediating role of low friendship quality. These results support the self-concept fragmentation hypothesis, outlined by Valkenburg and Peter (2011), which proposes that adolescents' diverse online experiences undermine their ability to coordinate the multiple facets of their self into a coherent whole. As Valkenburg and Peter observe, research on the relationship between adolescents' digital media use and self-concept clarity is still sparse and inconclusive. Thus, the findings from the current study contribute important insight into this emerging body of literature.

This set of findings holds important implications for our understanding of the relationship between digital media use, peer relationships, and identity during adolescence. In contrast to the popular view of the internet serving as a space for unprecedented identity exploration (Turkle, 1995), the current study suggests that adolescents are considerably more motivated to go online in order to communicate with their existing friends than to explore different aspects of their identities. Moreover, this online peer communication does not appear to be displacing adolescents' offline friendships but rather augmenting them, with positive residual effects on their self-concept clarity. These findings illustrate just how integrated online and offline lives have become in recent years as smartphones, broadband internet access, and social media platforms have permeated Western societies.

### 6.1. Limitations and future research

Because the data are cross-sectional and observational, it is not possible to reach causal conclusions about the relationships among adolescents' digital media use, parent and peer relationships, and sense of identity. For instance, it is possible that adolescents with low self-concept clarity are more likely to use digital media to express and explore different aspects of their identity. It is also possible that online identity expression/exploration and self-concept clarity are related reciprocally. In other words, it may be the case that adolescents with low self-concept clarity are more likely to explore different identities online, and this exploration may in turn contribute further to self-fragmentation. It is recommended that future research make use of research designs that can support

causal conclusions and tease out the directions of these hypothesized relationships, such as longitudinal studies and randomized experiments. Such research is needed to enhance the theoretical clarity regarding the causal nature of the relationship between internet use and identity.

Finally, because many features of Bermuda distinguish it from the United States, these findings are only generalizable to the population of Bermudian adolescents. Bermuda's distinct cultural and socioeconomic characteristics and racial make-up may have influenced some of the findings in this study. For instance, Bermuda's relative affluence and high standard of living may have contributed to participants' overwhelmingly positive parent and peer relationships and high levels of self-concept clarity. Further, while Bermudian adolescents make use of digital media technologies similar to those employed by US adolescents, their digital media use and ownership is somewhat higher than that of their American counterparts. Bermuda's racial make-up is another factor setting it apart from the United States. Future research should investigate the associations among digital media use, interpersonal relationships, and sense of identity for adolescents living in other geographic regions to determine whether the findings reported here hold true for other populations.

## 7. Conclusion

In this digital age of smartphones, social network sites, and massively multiplayer online games, parents and peers continue to play an influential role in adolescents' developing sense of identity. Nevertheless, the proliferation of digital technologies over the last decade has had an effect on adolescents. The findings from the current study suggest that, depending on the uses to which adolescents put them, digital media may either enhance or diminish their interpersonal and intrapersonal experiences. By examining factors traditionally associated with investigations of adolescent development in light of the new technologies that are reshaping adolescents' social contexts, the current study contributes to the growing body of literature concerned with identifying how adolescents' digital media practices affect their experiences of themselves and others.

## Appendix A: Survey scales

### *Online identity expression/exploration*

1. I enjoy using the Internet to try out different ways of expressing myself.
2. I feel that I'm able to express my personality online.
3. I can show a better version of myself online.
4. I feel I can express who I want to be online.
5. There are certain things I can express about myself more freely online than I can offline.
6. When I'm online, I can present myself how I want others to view me.

### *Online peer communication*

1. By going online, I feel more involved with what's going on with my friends.
2. By going online, my friends and I can maintain our relationship with each other.
3. By going online, I can improve my relationship with my friends.
4. I show friends encouragement online.
5. I go online to communicate with friends I see regularly.
6. Going online helps me to maintain my position with my group of friends.

*Mother relationship quality (Armsden and Greenberg, 1987)*

1. My mother respects my feelings.
2. I feel my mother does a good job as my mother.
3. I wish I had a different mother.
4. My mother accepts me as I am.
5. My mother expects too much from me.<sup>a</sup>
6. When we discuss things, my mother cares about my point of view.
7. My mother trusts my judgment.
8. My mother understands me.
9. When I am angry about something, my mother tries to be understanding.
10. I trust my mother.

*Friendship quality (Armsden and Greenberg, 1987)*

1. I wish I had different friends.<sup>a</sup>
2. My friends understand me.
3. My friends accept me as I am.
4. My friends listen to what I have to say.
5. I feel my friends are good friends.
6. When my friends are angry about something, I try to be understanding.<sup>b</sup>
7. My friends can count on me when they need to get something off their chest.<sup>b</sup>
8. I respect my friends' feelings.<sup>b</sup>
9. I listen to what my friends have to say.<sup>b</sup>
10. My friends are fairly easy to talk to.
11. When I am angry about something, my friends try to be understanding.
12. I can count on my friends when I need to get something off my chest.
13. I trust my friends.
14. My friends respect my feelings.

*Self-concept clarity scale (Campbell et al., 1996)*

1. My beliefs about myself often conflict with one another.
2. On one day I might have one opinion of myself and on another day I might have a different opinion.
3. I spend a lot of time wondering about what kind of person I really am.
4. Sometimes I feel that I am not really the person that I appear to be.
5. When I think about the kind of person I have been in the past, I'm not sure what I was really like.
6. Sometimes I think I know other people better than I know myself.
7. My beliefs about myself seem to change very frequently.
8. If I were asked to describe my personality, my description might end up being different from one day to another day.
9. Even if I wanted to, I don't think I would tell someone what I'm really like.
10. In general, I have a clear sense of who I am and what I am.
11. It is often hard for me to make up my mind about things because I don't really know what I want.
12. I rarely experience conflict between the different aspects of my personality.<sup>a</sup>

<sup>a</sup> Item removed after internal reliability analysis.<sup>b</sup> New items added to reflect reciprocal quality of adolescent friendships.**Appendix B: Survey response rates by school**

	Survey respondents (n)	Students enrolled in school (n)	Survey response rate (%)
<i>Private school</i>			
School 1	228	249	92
School 2	148	162	91
School 3	155	181	86
School 4	279	326	86
School 5	268	284	94
<i>Public school</i>			
School 6	478	635	75
School 7	523	659	79

**Appendix C: Demographic characteristics of participants**

Characteristics	Survey respondents (n = 2079)	
	n	%
<i>Gender</i>		
Girls	1180	57
Boys	895	43
No answer	4	.002
<i>Race</i>		
Black	1078	52
White	467	22
Other	323	16
No answer	211	10
<i>School type</i>		
Public	1001	48
Private	1078	52
<i>School year</i>		
Grade 8 (year 9)	252	12
Grade 9 (year 10)	579	28
Grade 10 (year 11)	470	23
Grade 11 (IB1)	397	19
Grade 12 (IB2)	381	18
<i>Mother's highest education level</i>		
Some high school	99	5
Finished high school	468	23
Some college	228	11
Finished college	586	28

(continued on next page)

**Demographic characteristics of participants** (continued)

Characteristics	Survey respondents (n = 2079)	
	n	%
School beyond college	218	10
Don't know	250	12
No mother	9	0.4
No answer	221	11
<i>Father's highest education level</i>		
Some high school	173	8
Finished high school	463	22
Some college	175	8
Finished college	437	21
School beyond college	211	10
Don't know	348	17
No father	48	2
No answer	224	11

**Appendix D: Inventory of participants' digital media use**

Type of digital media used	Survey (n = 2079) <sup>a</sup>	
	n	%
Own cell phone	1808	94
Maintain Facebook profile	1818	90
Instant messaging (e.g. MSN, AIM, and Skype)	1751	87
Email	1634	82
<i>Games</i>		
Play games on game console	1044	59
Play single-player online/cell phone games	879	50
Play multiplayer online games/virtual worlds	526	30
Online shopping	897	56
YouTube	1924	96
Own laptop computer	1603	83
Own portable media player (e.g. iPod)	1665	86

<sup>a</sup> Missing values not included in calculation of survey percentages.

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