

Adolescents' Identity Experiments on the Internet

Consequences for Social Competence and Self-Concept Unity

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The aim of this study was to investigate the effects of adolescents' online identity experiments on their social competence and self-concept unity. An online survey was conducted among 1,158 Dutch adolescents between 10 and 17 years of age. Using structural equation modeling, the authors investigated the validity of four opposing effects hypotheses in an integrative antecedents-and-effects model. Adolescents who more often experimented with their identity on the Internet more often communicated online with people of different ages and cultural backgrounds. This communication, in turn, had a positive effect on adolescents' social competence but did not affect their self-concept unity. In particular, lonely adolescents used the Internet to experiment with their identity. The social competence of lonely adolescents benefited significantly from these online identity experiments.

Keywords: Internet; instant messaging; chat; identity; social competence; social skills; loneliness; social anxiety; self-concept unity; self-concept clarity

There is general consensus among researchers that the Internet can offer adolescents many opportunities to experiment with their identities (e.g., Katz & Rice, 2002; Rheingold, 1993; Smith & Kollock, 1999; Stern, 2004; Subrahmanyam, Smahel, & Greenfield, 2006; Turkle, 1995). Internet communication has several characteristics that may stimulate online identity experiments. First, despite new technologies such as webcams, online communication is often characterized by reduced auditory and visual cues. These reduced cues may encourage adolescents to emphasize, change, or conceal certain features of their self. Second, Internet communication often happens in online social communities that are separate from those in real life. Such communities, in which social repercussions for offline life are reduced, may encourage identity experiments (Turkle, 1995).

A considerable percentage of adolescents use the Internet to experiment with their identities (Calvert, 2002; Gross, 2004; Huffaker & Calvert, 2005; Lenhart, Rainie, & Lewis, 2001; Lenhart & Madden, 2007; Maczewski, 2002; Valkenburg,

Schouten, & Peter, 2005). Online identity experiments are defined as adolescents' tendency to pretend to be someone else when being online. Lenhart et al. (2001) reported that almost a quarter of adolescents who used instant messaging (IM) indicated that they had pretended to be someone else. Gross (2004) and Valkenburg et al. (2005) reported that about 50% of Internet users had pretended to be someone else on the Web. Preadolescents and early adolescents experiment more often with their identity online than older adolescents. Boys and girls do not differ in the frequency with which they experiment with their identity online, but they do differ significantly in the types of online identities they choose (Valkenburg et al., 2005).

Although there is empirical evidence on the prevalence and the antecedents of adolescents' online identity experiments (Calvert, 2002; Gross, 2004; Huffaker & Calvert, 2005; Lenhart et al., 2001; Maczewski, 2002; Valkenburg et al., 2005), research on the consequences of such experiments is scarce. Existing research on the consequences of online identity experiments usually focuses on two outcome variables: offline social competence and self-concept unity. To date, four studies have investigated the relationships between online identity experiments (or online communication) and offline social competence (Caplan, 2005; Engelberg & Sjöberg, 2004; Harman, Hansen, Cochran, & Lindsey, 2005) or self-concept unity (Matsuba, 2006). The results of these studies were mixed. As for social competence, two studies found negative relationships between online communication and offline social competence (Caplan, 2005; Engelberg & Sjöberg, 2004), whereas one study found no significant relationship (Harman et al., 2005). However, the latter study did find that adolescents' online identity experiments were negatively related to their offline social competence. Finally, the only study that focused on the relationship between online communication and self-concept unity found no association between self-concept unity and the use of e-mail and chat rooms. However, this study did uncover a negative relationship between self-concept unity and "having secret screen names" (Matsuba, 2006).

Two reasons may account for the mixed findings regarding the relationship between online identity experiments, social competence, and self-concept unity. First, the studies have typically investigated simple relationships between the independent and dependent variables. As a result, they failed to identify *how* online identity experiments can influence adolescents' offline social competence and self-concept unity. Second, whereas studies on the antecedents of online identity experiments have usually ignored the consequences of these experiments, studies on the consequences of online identity experiments have usually ignored the antecedents of such experiments. However, Internet researchers have repeatedly requested that effects studies take the antecedents of online communication into account and investigate these in more integrative antecedents-and-effects models (e.g., Bargh, 2002; Boase & Wellman, 2006).

The aim of this paper is to fill these two gaps in the literature. First, we will analyze the existing explanatory effects hypotheses on the consequences of adolescents' online identity experiments. Based on these hypotheses, we will identify and test possible mediating variables that may explain *how* online identity experiments affect adolescents' offline social competence and self-concept unity. Second, we will consider potential antecedents of adolescents' online identity experiments in our effects model. By combining research on the antecedents and consequences of online identity experiments in an *integrative antecedents-and-effects* model, we hope to improve our understanding of this important phenomenon among adolescents.

Although many authors have attempted to define social competence, there seems to be no generally accepted definition of this concept (Merrell, 2003). For the purpose of our study, we define adolescents' social competence as their ability to effectively form and manage offline interpersonal relationships. To define adolescents' self-concept unity, we use a construct developed by Campbell, Trapnell, Heine, Katz, Lavallee, and Lehman (1996), referred to as self-concept clarity. Self-concept clarity is the extent to which adolescents' self-concept is "clearly defined, internally consistent, and temporally stable" (Campbell et al., 1996, p. 141).

Hypotheses About the Effects of Online Identity Experiments on Offline Social Competence

Several authors have reflected on the consequences of online identity experiments for adolescents' offline social competence. We summarize these reflections under the label Internet-affected social compensation hypothesis. This hypothesis has an optimistic and a pessimistic variant. The optimistic variant assumes that online identity experiments are beneficial to adolescents' offline social competence. Online identity experiments provide adolescents with many opportunities to communicate with people of different ages and cultural backgrounds. Through online identity experiments, adolescents can learn how to relate to a wide variety of people (Huffaker, 2006; Steinkuehler & Williams, 2006; Suler, 2005). These online experiences may carry over to adolescents' offline lives, so that their offline social competence will improve (e.g., Huffaker, 2006; Suler, 2005).

The pessimistic variant of the Internet-affected social compensation hypothesis states that online identity experiments have profound negative implications for adolescents' social competence. Harman et al. (2005), for example, assume that adolescents' online identities are less inhibited than their offline identities because adolescents mainly talk with anonymous strangers online. Adolescents who use the Internet to experiment with identities may eventually relate more to their online identities than their own offline self, and may, as a result, become less socially competent in offline situations.

Hypotheses About the Effects of Online Identity Experiments on Self-Concept Unity

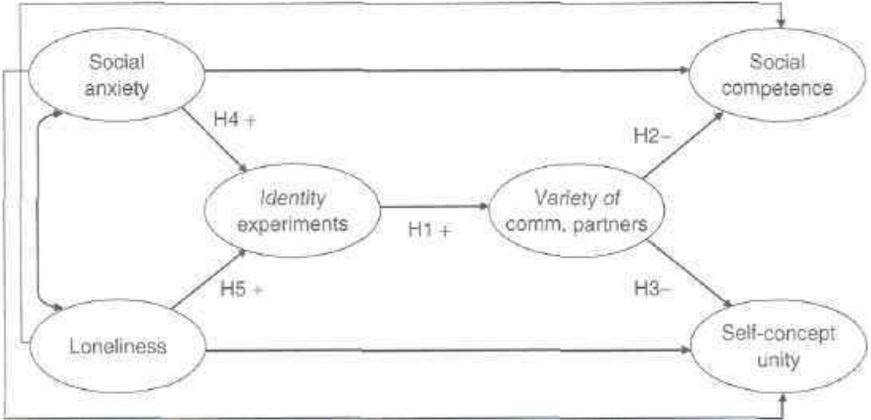
Opinions about the effects of online identity experiments on adolescents' self-concept unity also diverge. We summarize these opinions under the label Internet-affected self-concept unity hypothesis. The positive variant of this hypothesis assumes that online identity experiments foster adolescents' self-concept unity. In adolescence, the number of identities increases because the adolescent starts to participate in more relational contexts (Harter, 1999). A major developmental task for adolescents is to achieve a firm and unitary sense of who they are by exploring new identities (e.g., Erikson, 1963; Harter, 1999; Marcia, 1993). Peers, family, and the school have historically served as sounding boards for adolescents' identity explorations. However, with the advent of the Internet, the forums for identity experimentations and feedback on the self have expanded greatly. On the Internet, adolescents can encounter a wide variety of people, which offers them opportunities for self-discovery and self-validation (Huffaker & Calvert, 2005). These extra opportunities may foster the development of self-concept unity (e.g., Bruckman, 1992; Huffaker, 2006),

The pessimistic variant of the Internet-affected self-concept unity hypothesis sees online identity experiments as detrimental to adolescents' self-concept unity (e.g., Reid, 1998). Gergen (2000), for example, argues that adolescents' easy access to technology has dramatically increased their social connectedness and has pushed them into a dazzling multiplicity of relationships. Adolescents are overexposed to different relationships and ideas, which may increase doubts about their true self and decrease their self-concept unity (see also Reid, 1998).

Identifying the Mediator: Online Communication With a Wide Variety of People

Comparing the arguments of the Internet-affected social competence and the Internet-affected self-concept unity hypothesis, it becomes clear that these hypotheses are based on the same underlying mechanism. Both hypotheses attribute the positive or negative outcomes of online identity experiments to adolescents' tendency to communicate online with a wide variety of people. Specifically, they both argue that online identity experiments encourage adolescents to communicate online with a wide variety of people. In addition, they both assume that adolescents' online communication with these people affects their offline lives, in the sense that their social competence and/or self-concept unity will increase or decrease. However, although this mediated process (i.e., online identity experiments → online communication with a wide variety of people → offline social competence/self-concept unity) has

Figure 1
Hypothesized Model of the Antecedents and
Effects of Online Identity Experiments



been implicitly assumed in these hypotheses, the mediator “online communication with a wide variety of people” has never been systematically investigated.

In this study, we will address this omission in the literature. In a first step, we will investigate the hypothesis that online identity experiments will stimulate online communication with a wide variety of people. In doing this, we will not only investigate how often adolescents use the Internet to experiment with their identity but will also ask how frequently they communicate online with partners who differ from them in terms of variables such as age, gender, place of residence, educational level, ethnicity, political preference, language, and music preference. This hypothesis, which is graphically presented via path H1 in Figure 1, reads as follows:

Hypothesis 1 (H1): Adolescents who often use the Internet to experiment with their identity will more often communicate online with a wide variety of people.

In a second step, we will investigate how adolescents’ communication with a wide variety of people influences their offline social competence and self-concept unity. Although the scarce literature on the effects of online identities on offline social competence is mixed, the weight of evidence favors the negative variants of the Internet-induced social competence and the Internet-induced self-concept unity hypothesis (Caplan, 2005; Engelberg & Sjöberg, 2004; Harman et al., 2005; Matsuba, 2006). Therefore, we formulated the following two hypotheses, which are modeled through paths H2 and H3 in Figure 1:

Hypothesis 2 (H2): Online communication with a wide variety of people will reduce adolescents' offline social competence.

Hypothesis 3 (H3): Online communication with a wide variety of people will reduce adolescents' self-concept unity.



Finally, we will test whether adolescents' online communication with a wide variety of people acts as a mediator of the effects of online identity experiments on offline social competence and self-concept unity. If this is the case, adolescents' online identity experiments will not directly impact their social competence and self-concept unity. Rather, this effect will be carried by adolescents' online communication with a wide variety of people. By means of a formal mediation test, we will assess the validity of the Internet-affected social competence and the Internet-affected self-concept unity hypotheses. We have modeled our mediation assumptions through path H1 and H2 for social competence and H1 and H3 for self-concept unity in Figure 1.

An Integrative Antecedents-and-Effects Model

The second aim of our study was to simultaneously investigate the antecedents and consequences of online identity experiments in an integrative antecedents-and-effects model. Recent research recognizes that, in particular, loneliness and social anxiety may affect adolescents' tendency to use the Internet for online communication (Gross, Juvonen, & Gable, 2002; Kraut et al., 2002; Valkenburg & Peter, 2007). In addition, there are several indications that lonely or socially anxious adolescents communicate differently when being online. In comparison to their nonlonely and non-socially anxious peers, lonely and socially anxious adolescents use the Internet more often to talk with strangers rather than with existing friends (Gross et al., 2002). They also perceive the Internet as more suitable than face-to-face meetings to disclose themselves (Valkenburg & Peter, 2007). Therefore, lonely and socially anxious adolescents may use the Internet more often than nonlonely and non-socially anxious adolescents to experiment with their identities, and may, consequently, experience different outcomes from these identity experiments. Our expectations regarding lonely and social anxious adolescents, which are modeled via paths H4 and H5 in Figure 1, are as follows:

Hypothesis 4 (H4): Socially anxious adolescents will use the Internet more often than non-socially anxious adolescents to experiment with their identity.

Hypothesis 5 (H5): Lonely adolescents will use the Internet more often than nonlonely adolescents to experiment with their identity.

In addition to our research hypotheses, we have modeled several other relationships in our antecedents-and-effects model. First, we assume that social anxiety and

loneliness are positively related to one another because such a relationship has repeatedly been found in previous research (e.g., Gross et al., 2002). However, because there is as yet no decisive evidence for the causal direction of this relationship, we modeled covariance between these variables. Finally, we modeled four paths from social anxiety and loneliness to social competence and self-concept unity. There is evidence that both adolescents' loneliness and social anxiety are negatively related to their social competence (Caldarella & Merrell, 1997; Segrin & Flora, 2000) and self-concept unity (Bigler, Neimeyer, & Brown, 2001; Chang, 2001).

Gender and Developmental Differences

Adolescents may differ significantly with respect to some variables included in our model, such as social anxiety (Inderbitzen-Nolan & Walters, 2000), social competence (Buhrmester, 1996), and self-concept unity (Campbell et al., 1996). For example, girls generally report higher levels of social anxiety than boys (Inderbitzen-Nolan & Walters, 2000; La Greca & Lopez, 1998). Social anxiety is also curvilinearly related to age, indicating that social anxiety is commonly higher in early and middle adolescence than in preadolescence and late adolescence (Inderbitzen-Nolan & Walters, 2000). Because gender and age may be either linearly or curvilinearly related to some independent and dependent variables in our study, our model may not equally hold for boys and girls in different stages of adolescence. However, because there is not enough earlier research on gender and developmental differences in the antecedents and effects of online identity experiments on social competence and self-concept unity, we are not able to formulate hypotheses on these possible differences. Therefore, we investigated the following research question:

Research Question 1: To what extent does the model presented in Figure 1 hold for (a) boys and girls and (b) preadolescents, early, middle, and late adolescents?

Method

Sample and Procedure

In May 2006, an online survey was conducted among 1,158 Dutch adolescents between 10 and 17 years of age (49.9% girls, 50.1% boys). Sampling and fieldwork were done by Qrius, a research company in Amsterdam, the Netherlands, specializing in research among teenagers. Respondents were recruited from an existing online panel managed by Qrius. Qrius had sampled the respondents in all parts of the Netherlands, partly via e-mail invitations and partly through respondents' social networks.

Prior to the implementation of the survey, parents' and adolescents' informed consents were obtained. Adolescents received an e-mail in which they were invited to fill in an online survey in their home. They were notified that the study would be about the Internet and relationships and that they could stop participation at any time. Completing the questionnaire took about 10-15 minutes.

We took the following measures to improve the confidentiality and privacy of the response process (Mustanski, 2001): On the introduction screen of the online questionnaire, we emphasized that the answers would be analyzed only by us, the principal investigators. Moreover, we assured the respondents that their answers would be treated confidentially. Finally, respondents were asked to make sure that they completed the questionnaire in privacy on their own time. This procedure has proven successful in various other Dutch studies among adolescents and ensures the protection of respondents' privacy.

Analyses showed that the gender, age, and education level of our respondents did not deviate from official statistics in the Netherlands (CBS, 2005). By the end of 2005, 99% of Dutch adolescents had home access to the Internet (Duimel & De Haan, 2007). As a result, problems typically associated with online surveys, such as systematically biased samples, are less troublesome in the Netherlands than in countries with lower levels of access.

Measures

Online identity experiments. This variable was used to measure the frequency with which adolescents pretend to be someone else when communicating online. We asked adolescents the following question: "When you use the Internet for online communication, do you ever pretend to be someone else?" If adolescents responded positively to this question, we presented them with 10 items to measure online identity experiments. Examples of items were: "When you are online, how often do you pretend to be... (a) someone who is more beautiful? (b) someone who is more glamorous? (c) someone who is more intelligent? or (d) someone who is less shy?" Response options ranged from 0 (*never*) to 4 (*almost always*). These 10 items loaded on one factor, which explained 80% of the variance. The resulting scale led to a Cronbach's alpha of .97 ($M = 0.25$; $SD = 0.66$).

Variety of online communication partners. We created 12 items to measure adolescents' tendency to communicate with people of various ages and cultural backgrounds when being online. Examples of these items were: "When you are online, how often do you talk to people who... (a) are older than you? (b) have a different skin color? (c) live abroad? (d) have another view on politics? and (e) like another style of clothing?" Response options ranged from 1 (*never*) to 5 (*almost always*). We formed a cumulative scale from the 12 items. Cronbach's alpha of the scale was .87 ($M = 2.89$; $SD = 0.63$).

Social competence. We used a newly created 19-item self-report instrument to measure adolescents' offline social competence. The items of this instrument were based on several earlier instruments measuring social skills, interpersonal competence, or communicative efficacy among adolescents (i.e., Buhrmester, 2002; Buhrmester, Furman, Wittenberg, & Reis, 1988; Connolly, 1989; Inderbitzen & Foster, 1992). The 19 items were meant to measure four social competence dimensions that have been most consistently identified in earlier instruments and that are theoretically relevant to our research purpose: initiation of (offline) relationships/interactions, supportiveness, assertiveness, and ability to self-disclose. The social competence items were presented to the respondents before the items measuring adolescents' Internet activities. The exact instruction was: "Some teenagers find it easy to talk and deal with people, others find it hard. The questions below deal with how you communicated with people in the past 6 months. Can you indicate how easy or difficult each of the situations below has been for you in the past 6 months? If you haven't experienced one or more of the situations below, please imagine how easy or difficult each of the situations would have been for you. How easy or difficult was it in the past six months to . . ." (see items in Table 1). Response options for the items were: 1 (*very difficult*), 2 (*difficult*), 3 (*not difficult, not easy*), 4 (*easy*), and 5 (*very easy*).

The four dimensions that were distinguished a priori were empirically verified in an exploratory factor analysis. The items, factor loadings, eigenvalues, and Cronbach's alphas of the scales are presented in Table 1. We also used a second-order confirmatory factor analysis to test whether the four hypothesized subscales of our social competence measure are explained by one general social competence factor. Following Byrne (2001), we allowed error covariances among the observed items within the same subscale. The confirmatory factor model led to a satisfactory fit, $\chi^2(138, N = 1,158) = 644.47, p < .001, CFI = .952, RMSEA = .056$ (90% CI: .052, .061), which means that the four subscales validly reflect the underlying construct social competence. Our final model is schematically presented in the appendix. For reasons of clarity, the error covariances are not depicted in the model. We found 10 error covariances (i.e., $e01-e02, e01-e05, e02-e05, e07-e09, e8-e9, e12-e14, e13-e14, e13-e15, e14-e15, e18-e19$). The coefficients of these covariances ranged from $r = -.31$ to $.16$.

Self-concept unity. We adapted the self-concept clarity scale developed by Campbell et al. (1996) to measure adolescents' self-concept unity. Campbell et al.'s instrument has been successfully used among adolescents (e.g., Chang, 2001). We selected the 5 items with the highest factor loadings from Campbell et al.'s 12-item self-concept clarity scale. In Campbell et al., the 12 items loaded on one factor that accounted for 41% of the variance. The 5 selected items yielded an averaged corrected item-total correlation of .62 (range .58 to .66) in Campbell et al. These high item-total correlations and the fact that the remaining items in Campbell et al.'s scale

Table 1
Four Dimensions in Adolescents' Social Competence

How Easy or Difficult Was It for You in the Past 6 Months to . . .	Factor 1	Factor 2	Factor 3	Factor 4
Factor 1: Initiation				
SC01. Start a conversation with someone you did not know very well?	.78			
SC02. Introduce yourself for the first time to someone?	.76			
SC03. Start a new friendship?	.75			
SC04. Call someone whom you wanted to get to know better?	.74			
SC05. Ask someone to get together and do something?	.66			
Factor 2: Supportiveness				
SC06. Listen carefully to someone who told you about a problem he or she is experiencing?		.77		
SC07. Comfort someone who is feeling down?		.75		
SC08. Help others cope with an unpleasant experience?		.71		
SC09. Help someone when he or she asked you?		.71		
SC10. Help someone to feel at ease?		.70		
Factor 3: Self-disclosure				
SC11. Express your feelings to someone else?			.76	
SC12. Tell others about things you are ashamed of?			.74	
SC13. Tell someone that he or she is attractive or charming?			.71	
SC14. Tell someone that you liked him or her?			.60	
SC15. Show your sensitive side to others?			.58	
Factor 4: Assertiveness				
SC16. Stand up for your rights when someone wronged you?				.88
SC17. Stand up for yourself when someone made a fool of you?				.86
SC18. Stand up for yourself when someone accused you of something you did not do?				.85
SC19. Stand up for someone else who was made a fool of?				.56
Eigen values	3.1	3.3	2.8	2.8
Cronbach's alphas	0.86	0.83	0.83	0.86
Scale means	3.11	3.57	2.78	3.31
Standard deviations	0.79	0.67	0.73	0.83

Note: Factor loadings < .40 are not reported.

were highly similar to the 5 items that we selected provided the justification to use only a subset of items from Campbell et al.'s scale.

The 5 items in our study loaded on one factor that explained 70% of the variance. Our scale resulted in a Cronbach's alpha of .89 ($M = 3.41$, $SD = 0.71$). The exact instruction for respondents was: "Below, you will find some statements. Those statements refer to the past six months. Could you indicate to what extent you agree or disagree with those statements? In the past six months I felt that... (a) my beliefs about myself changed very often, (b) my beliefs about myself often conflicted with one another, (c) I was not really the kind of person I appeared to be, (d) my opinion of myself changed very frequently, and (e) my descriptions of myself differed from one day to another." Response categories ranged from 1 (*disagree entirely*) to 5 (*agree entirely*). The response categories were inversely coded so that a high score on our self-concept unity scale indicated a high self-concept unity.

Social anxiety. We used four items from the social avoidance and distress—new people subscale of the Social Anxiety Scale for Adolescents developed by La Greca and Lopez (1998). La Greca and Lopez's subscale consists of 6 items that resulted in a Cronbach's alpha of .78. However, because 2 of these items loaded less than .40 on the principal component that they helped to define, we used only the 4 remaining items of the original subscale. Response categories ranged from 1 (*never*) to 5 (*very often*). These 4 items loaded on one factor and resulted in a Cronbach's alpha of .90 ($M = 2.68$, $SD = 0.84$).

Loneliness. Following earlier Internet studies among adolescents (e.g., Gross et al., 2002; Kraut et al., 2002; Valkenburg & Peter, 2007), we used the UCLA loneliness scale (Russell, 1996) to measure loneliness. We selected the 5 negatively worded items with the highest item-total correlations from the 20-item UCLA loneliness scale. Response categories ranged from 1 (*never*) to 5 (*very often*). We formed a scale from these items, which resulted in a Cronbach's alpha of .92 ($M = 2.09$, $SD = 0.84$). In a pilot study among 1,210 teenagers that was fielded in December 2005, the shortened 5-item loneliness scale correlated .93 with the original 20-item scale.

Results

Descriptive Analyses

Of the 1,158 adolescents who participated in our survey, 91% ($n = 1,051$) used the Internet for online communication. Girls (94%) used the Internet more for online communication than boys did (87%), $\chi^2(1, 1,158) = 15.51$, $p < .001$. Because adolescents cannot experiment with their identity online if they do not use the Internet for online communication, the analyses reported in this article are based on the 1,051 adolescents who had indicated that they use the Internet for online communication.

Eighteen percent of the adolescents who used the Internet for online communication indicated that they *sometimes* or *often* experimented with their identity when being online. In addition, 82% indicated that they *never* experimented with their identity online.

As for online communication with a broad variety of online communication partners, 28% of the adolescents reported that they *often* or *very often* communicated with people of different ages and cultural backgrounds while being online, whereas 41% indicated that they did this *sometimes*. Finally, 31% indicated that they *never* or *rarely* communicated with people of different ages and cultural backgrounds while being online.

Adolescents differed greatly in their self-perceived social competence. For example, 20% of the respondents indicated that they had found it *difficult* or *very difficult* to initiate a new friendship in the past half year, 34% had found it *not easy, not difficult*, and 46% had found it *easy* or *very easy*. The remaining items measuring social competence also showed substantial variance in scores among the adolescents.

Finally, about 49% of the respondents indicated to *agree* or *agree entirely* that their self-concept was clearly defined, internally consistent, and temporally stable. In addition, 16% of the adolescents reported to *disagree* or *disagree entirely* that their self-concept was clearly defined, internally consistent, and temporally stable. The remaining 35% of the adolescents indicated *agree/disagree* when asked about their self-concept unity.

Zero-Order Correlations Between the Variables Included in the Model

Table 2 provides the zero-order correlation matrix of the variables included in the model as presented in Figure 1, as well as their correlations with gender and age. Online identity experiments were negatively related to self-concept unity and to three out of four social competence subscales. Online identity experiments were significantly positively related to the variety of online communication partners. The variety of communication partners was positively related to all subscales of social competence but was not associated with self-concept unity. Finally, both loneliness and social anxiety were positively related to online identity experiments, and negatively to self-concept unity and all subscales of social competence.

Relationships of gender and age with the variables in the model. Gender (boys = 0; girls = 1) was not related to online identity experiments. However, it was positively related to social anxiety, loneliness, and the variety of communication partners, and negatively to self-concept unity. Gender was differentially related to the four social competence subscales: It was not related to initiation, positively related

to supportiveness and self-disclosure, and negatively related to assertiveness. Age was not related to social anxiety, loneliness, online identity experiments, and self-concept unity. It was positively related to the variety of online communication partners, as well as to all four social competence subscales.

Testing the Hypothesized Model

The hypothesized model (see Figure 1) was tested with structural equation modeling (SEM) using AMOS 5.0 (Arbuckle, 2003). All variables in our model in Figure 1 represented latent variables, which were estimated from two to four manifest indicators. The latent construct social competence was estimated from the four subscales meant to measure social competence: initiation, supportiveness, self-disclosure, and assertiveness. For the remaining latent variables, two item parcels served as indicators. These item parcels were created using a procedure suggested by Russell, Kahn, Spoth, and Altmaier (1998). First, we factor analyzed the items meant to measure each variable. Based on the sizes of the factor loadings, we alternately assigned each item to the first or second item parcel. Item parceling has become common in SEM, most notably in psychology, education, and organizational research (for a review, see Bandalos & Finney, 2001). It is advised to use item parcels rather than individual items to estimate latent constructs because item parcels lead to more parsimonious models, reduce the chances for residuals to be correlated and for double loadings to occur, and diminish the impact of the various sources of sampling error (e.g., Little, Cunningham, Shahar, & Widaman, 2002). Moreover, individual items are more likely than item parcels to violate the assumption of normal distribution (e.g., Bandalos, 2002; Little et al., 2002). However, item parceling should only be used if researchers are interested in relations among the latent constructs and not among the items (Little et al., 2002). This is clearly the case in this study. Furthermore, item parceling is allowed only if the underlying construct is unidimensional, that is, when all items load on one factor (Bandalos, 2002; Bandalos & Finney, 2001; Little et al., 2002; Russell et al., 1998). All of our latent variables met this condition.

We used two indices to evaluate the fit of our models: the root mean square error of approximation (RMSEA) and the comparative fit index (CFI). Particularly in the case of large samples, these indices are considered as informative criteria in SEM (Byrne, 2001). A good model fit is expressed in an RMSEA value less than .06 and a CFI value greater than .95 (Byrne, 2001).

Our hypothesized model as presented in Figure 1 fit the data well, $\chi^2(67, N = 1,051) = 211.11, p < .001, CFI = .985, RMSEA = .045$ (90% CI: .038, .052). The direct relationships between online identity experiments and social competence and between online identity experiments and self-concept unity as reported in Table 2 were both nonsignificant in the final model. The independent and mediator variables

Table 2
Zero-Order Correlations Among All Variables in the Hypothesized Model

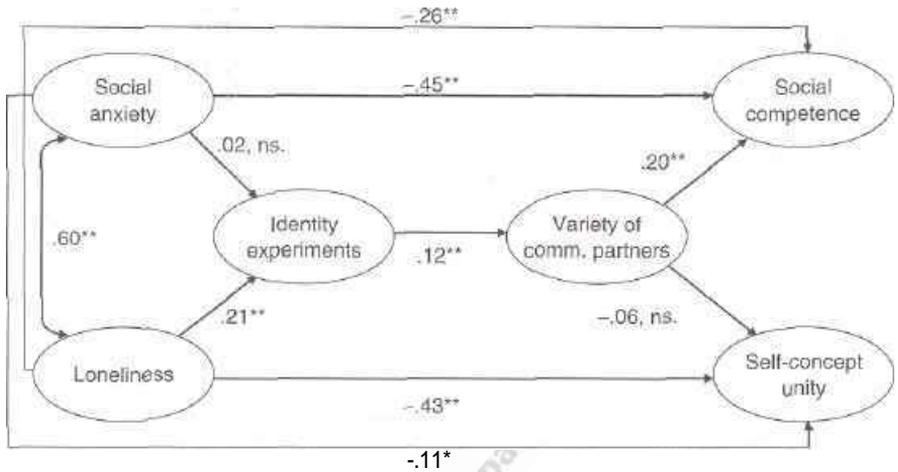
Variable	1	2	3	4	5	6	7	8	9
1. Online identity experiments									
2. Variety of communication partners	.12***								
3. Self-concept unity	-.11**	-.04							
4. Initiation	-.07*	.14***	.10						
5. Supportiveness	-.08*	.21***	.14	.42***					
6. Self-disclosure	-.08**	.14***	.16***	.60***	.48***				
7. Assertiveness	-.05	.13***	.21***	.39***	.36***	.38***			
8. Loneliness	.21***	-.02	-.45***	-.41***	-.28***	-.36***	-.34***		
9. Social anxiety	.13***	-.04	-.34***	-.35	-.23	-.39***	-.30***	.56***	
Gender (girls)	.01	.07*	-.15***	-.01	.20***	.08**	-.08*	.09**	-.13***
Age	.01	.31***	-.02	.06*	.07*	.08*	.13***	-.01	-.05

accounted for 45.1% of the variance of social competence and 26.4% of the variance of self-concept unity. Figure 2 shows the final observed model. All parameters in the model are either correlations or standardized betas. Please note that, for reasons of visual clarity, the measurement models (i.e., the factor analytic models) are not shown in Figure 2. However, all measurement models adequately represented the data; the factor loadings for the constructs were all above .53.

We tested whether our data met the assumption of multivariate normality, which is an important assumption in SEM (Byrne, 2001). Our data indeed showed significant positive multivariate kurtosis, indicating that the assumption of multivariate normality was not met. A common procedure to address multivariate nonnormality is bootstrapping (Byrne, 2001). Therefore, we requested AMOS to perform a bootstrap on 1,000 samples using the ML estimates and to provide bias-corrected 95% confidence intervals for each of the bootstrap estimates. Our bootstrap results did not deviate from those based on normal theory. None of the bias-corrected 95% confidence intervals for significant paths in Figure 2 included zero. In other words, the significant paths in Figure 2 remained significant in the bootstrapping procedure.

Our first hypothesis predicted that online identity experiments would stimulate communication with a wide variety of people. This hypothesis was confirmed, $\beta = .12, p < .001$ (see Figure 2). Our second and third hypotheses predicted that adolescents' online communication with a wide variety of people would negatively predict both their social competence and their self-concept unity. Both hypotheses were not supported. We found no significant relationship between adolescents' communication with a wide variety of people and self-concept unity, $\beta = -.06, ns$ (path H3 in Figure 1). In addition, in diametric contrast with our second hypothesis, adolescents' online communication with a wide variety of people stimulated (rather than reduced) their offline social competence, $\beta = .20, p < .001$ (path H2 in Figure 1).

Figure 2
Observed Model of the Antecedents and Effects of Online Identity Experiments



Note: Ovals represent latent variables. Coefficients are correlations or standardized betas.
 $*p < .01$. $**p < .001$.

Finally, unlike our fourth hypothesis, social anxiety was unrelated to adolescents' online identity experiments, $\beta = .02, ns$ (path H4 in Figure 1). However, in agreement with our fifth and final hypothesis, loneliness was a significant positive predictor of adolescents' online identity experiments, $\beta = .21, p < .001$ (path H5 in Figure 1).

Testing the Validity of the Mediator

In Figure 1, we hypothesized mediated effects of adolescents' online identity experiments on their social competence and self-concept unity. We only found a significant effect of online communication with a wide variety of people on social competence. Therefore, our mediation test will focus only on social competence and not on self-concept unity.

We first used a SEM approach (Holmbeck, 1997) to test whether the effect of online identity experiments on social competence was mediated by online communication with a wide variety of communication partners. A SEM approach to mediation is similar to Baron and Kenny's (1986) approach in two respects. First, it also tests whether the independent variable (online identity experiments) influences the mediating variable (online communication with a wide variety of people), which in turn influences the dependent variable (offline social competence). Second, it also

tests whether the influence of the independent variable on the dependent variable disappears when the mediating variable is included.

In our SEM causal steps approach, we tested a nested model under two conditions: when the direct path from online identity experiments to social competence was constrained to 0 and when it was not constrained to 0. Mediation is warranted if the model with the constrained path does not improve the model's fit, because in that case, the direct path from online identity experiments to social competence is not significant. Our results showed that the model containing the constrained path did not lead to a significant χ^2 change, $\chi^2(1, N = 1,051) = 0.17, p = .68$, $\Delta\text{TLI}_{\text{change}} = .000$. This meant that the effect of adolescents' online identity experiments on social compensation was completely mediated by their online communication with a wide variety of people.

We subsequently performed a formal significance test of the indirect effect using a bootstrap procedure developed by Preacher and Hayes (2004). In this bootstrap procedure, a computer generates a series of samples of size n (where n is the original sample size) from the data. In each bootstrap sample, the indirect effect is computed. Then, a confidence interval for the indirect effect is computed across all the bootstrap samples. If this confidence interval includes a zero, the indirect effect is nonsignificant; if it does not include a zero, the indirect effect is significant.

We used the bootstrap procedure (1,000 samples, $N = 1,051$) to generate a 95% confidence interval for the indirect effect of adolescents' identity experiments on their social competence. As expected, the *direct* effect of online identity experiments (controlled for social anxiety and loneliness as in Figure 1) on social competence was not significant, $B = -.01, SE = .02, t = -.36, p = .72$. However, the 95% bias corrected and accelerated confidence interval for the *indirect* effect was estimated to lie between 0.0095 and 0.0324. Because zero was not in this confidence interval, it is safe to conclude that the indirect effect was significantly different from zero at $p < .05$ (see Preacher & Hayes, 2004, for a detailed explanation of this procedure).

Testing for Age and Gender Differences

Our research question asked whether our model in Figure 2 held for boys and girls as well as for preadolescents (10 to 11 years), early (12 to 13 years), middle (14 to 15 years), and late (16 to 17 years) adolescents. We performed two multiple group analyses, one with gender and one with age as the grouping variable (Arbuckle, 2003). The unconstrained model for girls and boys fit the data well, $\chi^2(134, N = 1,051) = 282.34, p < .001, CFI = .985, RMSEA = .032$ (90% CI: .027, .037). Imposing the cross-group constraints for the measurement and the structural models did not lead to a significant chi-square change, $\chi^2_{\text{change}}(17, N = 1,051) = 25.42, p = .09$. This meant that the model presented in Figure 1 held for both boys and girls.

The unconstrained models for the four age groups also yielded a good fit, $\chi^2(268, N = 1,051) = 475.04, p < .001, CFI = .979, RMSEA = .027$ (90% CI: .023, .031).

Constraining both the measurement and the structural model did not lead to a significant chi-square change, $\chi^2_{\text{change}}(51, N = 1,051) = 58.58, p = .22$. This meant that the model found for the whole group also held for preadolescents, early adolescents, middle adolescents, and late adolescents.

Discussion

The main aim of this study was to investigate the validity of two hypotheses on the effects of adolescents' online identity experiments: the Internet-affected social competence and the Internet-affected self-concept unity hypothesis. Both hypotheses are based on the premise that online identity experiments stimulate adolescents to communicate with a wide variety of communication partners when being online. Both hypotheses have positive and negative variants in the literature. The positive variants assume that online identity experiments are beneficial to adolescents' social competence and self-concept unity; the negative variants argue that such experiments reduce adolescents' social competence and self-concept unity.

The scarce earlier literature is more in line with the negative than with the positive variants of both hypotheses (Caplan, 2005; Engelberg & Sjoberg, 2004; Harman et al., 2005; Matsuba, 2006). Based on this literature, we hypothesized negative indirect effects of online identity experiments on adolescents' offline social competence and their self-concept unity. However, in contradiction to our indirect effects hypotheses, we did not find any support for the negative variants of the Internet-affected social competence hypothesis and the Internet-affected self-concept unity hypothesis.

The Internet-Affected Social Competence Hypothesis

Engaging in online identity experiments had an indirect positive effect on adolescents' social competence. This result may at first sight seem opposite to earlier studies that reported negative relationships between social competence and online communication (e.g., Engelberg & Sjoberg, 2004). However, in our study, the zero-order correlations between online identity experiments and the social competence subscales were also negative (see Table 2) and, therefore, comparable to the results found in earlier studies. However, these negative relationships disappeared entirely when the influence of antecedents and mediators of online identity experiments were taken into account.

By showing this discrepancy in zero-order and mediated relationships, our results provide an important extension to the literature. Several scholars have pointed to the fact that there is no such thing as a direct impact of online communication (e.g., Bargh, 2002; Boase & Wellman, 2006). Instead, we need to specify the mechanisms that underlie these impacts. Our approach underscores the importance of investigating theoretically grounded expectations. If we had limited our analyses to zero-order

correlations between our independent and dependent variables, we would have reported results that were consistent with earlier literature. However, such negative zero-order correlations would have been spurious due to the omission of explanatory mediators.

Validity of Our Social Competence Scale

A possible reason for the scarcity of research into the effects of online communication on adolescents' social competence is the lack of state measures to investigate their social competence. As Merrell (2003, p. 333) observed: "Little has been done in the area of developing a self-report assessment instrument for measuring social competence with children or adolescents." The published instruments that are available are usually trait measures developed to classify children or adolescents as high and low in social competence. Most of these measures are meant to be used in educational contexts and include dimensions that are not relevant to our study, such as self-management skills (e.g., follow rules) and academic skills (e.g., accomplishes tasks, completes individual seatwork).

To measure adolescents' (offline) social competence, we created a new social competence scale that consisted of four subscales: initiation, supportiveness, self-disclosure, and assertiveness. The reliabilities of these subscales were very high and a second-order factor analysis demonstrated that they indeed reflected one underlying construct offline social competence. The high negative correlations of both the latent construct and the four subscales with loneliness and social anxiety provided evidence for the validity of our instrument, because such negative correlations have repeatedly been reported in earlier research using other measures of social competence (e.g., Caldarella & Merrell, 1997; Segrin & Flora, 2000).

Following earlier scales, our social competence scales were designed to measure offline social competence. Social competence was defined as adolescents' ability to effectively form and manage offline interpersonal relationships. However, adolescents regularly establish relationships that originate online and then develop offline (Lenhart & Madden, 2007; Peter, Valkenburg, & Schouten, 2005). The latter type of friendships has been referred to as mixed-mode friendships (Walther & Parks, 2002). Concurring with Walther and Parks (2002), we believe that mixed-mode relationships pose many challenges for current theoretical approaches, as well as for further research into the social consequences of the Internet. Future research should, therefore, attempt to distinguish between online and offline social competence and investigate to what extent online social skills transfer to the offline world.

The Internet-Affected Self-Concept Unity Hypothesis

We found no support for either the positive or the negative variant of the Internet-affected self-concept unity hypothesis. Although adolescents' self-concept showed

considerable variance, there was no evidence that their level of self-concept unity is affected by engaging in online identity experiments. Again, consistent with the only earlier study (Matsuba, 2006), we found a negative zero-order correlation between online identity experiments and self-concept unity. This direct relationship disappeared when the effects of the antecedents and the mediator were taken into account.

Traditional developmental theories generally assume that the achievement of self-concept unity is a major developmental task in adolescence (Erikson, 1963; Marcia, 1993). This assumption is also the basis of much Internet research that addresses identity issues in adolescence (e.g., Huffaker & Calvert, 2005; Subrahmanyam et al., 2006). Both the positive and negative variants of the Internet-affected self-concept hypothesis consider self-concept unity as a desirable state. However, our results showed that a considerable percentage of adolescents perceived little unity in their self-concept. Moreover, unlike the developmental norm in traditional identity theories, self-concept unity did not increase with age, despite the broad age range of our sample.

An important question, then, is whether a low self-concept unity is something that is undesirable. On the one hand, it could be argued that a low self-concept unity reflects adolescents' adaptability to the challenges of a rapidly changing society, in which little can be taken for granted and identity has become a matter of choice. In the past two decades, psychologists (e.g., Markus & Wurf, 1987) and sociologists (e.g., Burke, 1980) progressively agree that the self should be seen as a dynamic, multifaceted phenomenon that is capable of change, rather than as a static, unitary entity, as assumed in many early identity theories.

On the other hand, the high negative correlations between loneliness, social anxiety, and self-concept unity do suggest that a low self-concept unity may be an unfavorable state. We were not able to demonstrate whether self-concept unity predicts psychological well-being or vice versa. Causality between these variables has also never been established in earlier research. In order to clarify whether low self-concept unity is beneficial or not, a next step is to further explore the nature of the relationships between self-concept unity and psychological well-being.

Lonely and Socially Anxious Adolescents

Lonely adolescents experimented more often with their identities online than did nonlonely adolescents. In their offline lives, lonely adolescents typically engage in fewer social interactions, have fewer close friends, and have more difficulty disclosing themselves than their nonlonely peers (Frantzoï & Davis, 1985; Gross et al., 2002). Although we did not find a positive relationship between social anxiety and online identity experiments, our result did reveal that lonely adolescents significantly more often used the Internet to experiment with their identity than nonlonely adolescents. Lonely adolescents apparently benefit from the relative anonymity of the Internet to learn how to relate to people and to practice their social skills. This is

an important result because loneliness can be very pervasive in adolescence. According to Brennan (1982, p. 269), adolescence seems to be "the time of life when loneliness first emerges as an intense recognizable phenomenon." In this period, being included and accepted is of crucial importance in the formation of one's identity (Rokach & Neto, 2000). Our results suggest that the Internet, with its abundant opportunities for online identity experiments, may especially help lonely adolescents in their search for identity and struggle for connectedness.

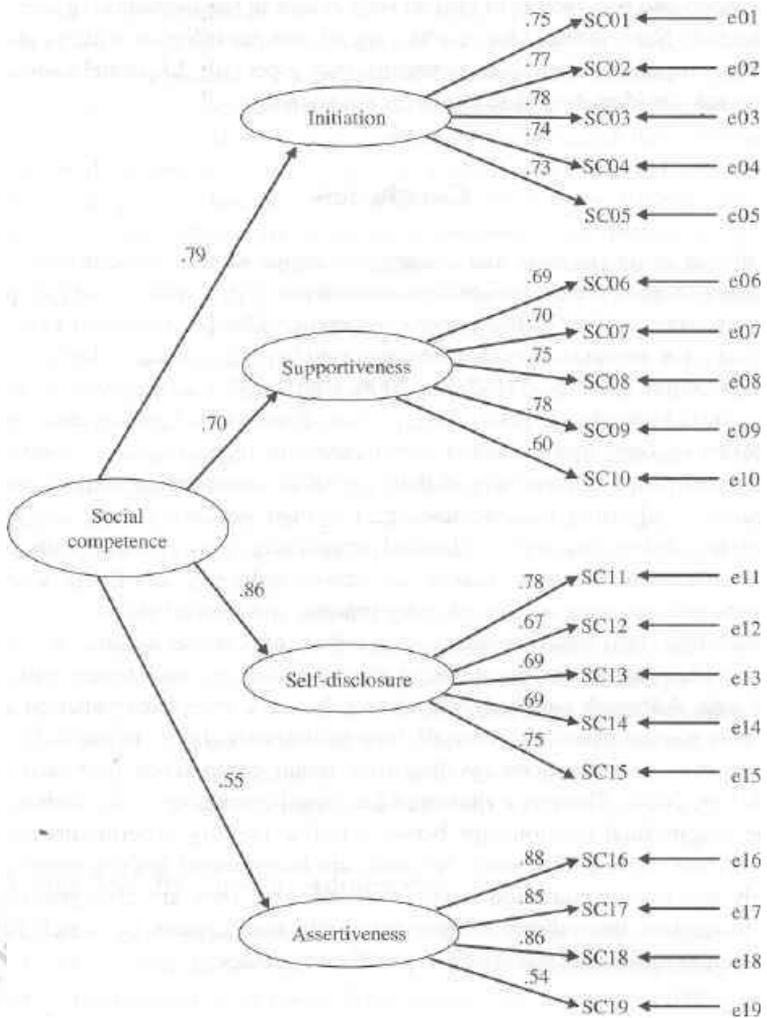
Conclusion

Overall, our study suggests that engaging in online identity experiments is positively related to adolescents' online communication with a wide variety of people, and, via this route, to their offline social competence. Our positive results are in line with several other recent studies that have reported beneficial social effects of the use of online communication (e.g., Huffaker, 2006; Huffaker & Calvert, 2005; Valkenburg & Peter, 2007; Valkenburg, Peter, & Schouten, 2006). Our findings also resonate with theories of computer-mediated communication (e.g., Walther, 1996), which emphasize that people are creative in their use of communication technologies and well capable of adjusting these technologies to their personal needs. The Internet may provide adolescents with additional opportunities to connect with people. Adolescents seem to use these people as extra sounding boards for their identity explorations and, in doing so, successfully practice their social skills.

Although this study pitted several causal effects hypotheses against one another, we acknowledge that the assumptions of these hypotheses were tested with cross-sectional data. Although our study was theory driven, a reverse explanation for our findings may also be plausible. After all, how adolescents choose to use online communication may be influenced by their trait social competence (see also Baym, Zhang, & Lin, 2004). There is a vital need for causal-correlational research to investigate the longitudinal relationships between online identity experiments and adolescents' offline social competence. Not only are longitudinal designs better able to adequately distinguish causation from covariance, but they are also preeminently suitable to explore the validity of the underlying mechanisms by which Internet communication influences adolescents' social competence.

Appendix

Confirmatory Second-Order Factor Analysis of Social Competence Items



Note: The exact item wording can be found in Table 1. The error terms of the observed items within the same subscales were allowed to correlate (see text for the coefficients).

Note

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