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Digital Natives' Coping with Loneliness: Facebook or Face-to-Face?

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ABSTRACT

This study compares online self-disclosure through Facebook with offline self-disclosure through face-to-face interactions to understand when and why digital natives may prefer to resolve perceived loneliness by turning to the Internet. Survey data from adolescents indicate that digital natives who employ passive coping favor self-disclosure through Facebook, but natives who engage in active coping prefer face-to-face self-disclosures. Both routes, through active and passive coping, appear to mediate the relationship between loneliness and online/offline self-disclosures. Moreover, the relationship between loneliness and self-disclosure exhibits gender differences. This study extends insights into digital natives, sheds light on self-disclosures, and contributes to coping research.

Keywords: *Digital Natives, Loneliness, Online Self-Disclosure, Offline Self-Disclosure, Coping Strategies, Gender*

1. INTRODUCTION

Information technology (IT) has transformed society, affecting populations of all ages. Prensky [1] dubs modern adolescents, aged between 12 and 18 years, “digital natives” who have grown up in a digital, technology-saturated world. A survey by Project Tomorrow (tomorrow.org) reveals that digital natives (or Gen Z) are digitally literate, connected, experiential, social, and demanding of instant gratification. According to a 2015 Pew Research Center report (pewinternet.org), 92% of all teens go online daily, and 91% of them are connected to the Internet through mobile devices. By age 20, these young adults will have spent approximately 20,000 hours online, exploring their place and identity in the world.

Because digital natives' lives are under such substantial Internet influence, they represent an ideal sample for testing the effects of technology. Information system (IS) researchers, thus, pay increasing attention to digital natives, with respect to their online privacy attitudes [2], online trust [3], digital piracy [4], computer technology use [5, 6, 7], and online self-disclosure [28].

In addition, adolescence is a crucial period, during which children construct their social identities by seeking social belonging with peer groups. As they emerge from the family setting, they pursue social status and dominance among their peers [8]. Moreover, the transition from secondary school to high school is challenging, as these adolescents struggle to preserve existing contacts, create new relationships, and restructure existing ones [9]. Adolescents may feel lonely if they can no longer rely on a previous social network of friends while simultaneously dealing with social changes such as being low-status first-year students in high school [9]. Loneliness accordingly is a prominent issue, and the developmental changes that occur during adolescence increase the risk of social isolation, as well as the probability that adolescents perceive these experiences as loneliness.

To compensate, they may engage in self-disclosure in an attempt to build social connections [10]. Self-disclosure refers to "any message about the self that a person communicates to others" [11]. Many modern adolescents use digital media to engage in such self-disclosure, and prior IS studies discuss online self-disclosure [12, 13, 14], yet without considering the parallel influence of offline self-disclosure. Also missing from extant literature is a holistic examination of the possible tension between these two disclosure methods [15, 16]: Do digital natives prefer one type of disclosure to the other, and why? To date, existing IS

literature is silent about the mechanisms that might explain the disclosure preferences of digital natives.

We attempt to address this gap by proposing that the relation between digital natives' perceived loneliness and self-disclosure, online or offline, depends on the strategies they use to cope with perceived loneliness, which function as mediators. Specifically, we test an integrative model in which perceived loneliness affects the use of loneliness coping strategies (active or passive), which drive online or offline self-disclosure. As we detail, our consideration of coping strategies potentially explains the tension between online and offline self-disclosure. Notably, active coping strategies encourage the person to pursue effective (often effortful) solutions to reduce loneliness, whereas passive coping strategies involve largely effortless, often less effective solutions. In turn, these different coping strategies might affect self-disclosure on two pertinent channels: Facebook and face-to-face. As the Pew Internet study (pewinternet.org) reports, social networking sites (SNSs) appeal strongly to adolescents, attracting an estimated 81% of teenagers to use them. As a dominant force in adolescents' social media ecosystem, Facebook provides a means to contact friends, maintain friendships, and share thoughts or experiences with others.

With a large-scale study ($n = 409$) of digital natives (ages 13–18 years), we test for links between feelings of loneliness and online/offline self-disclosure. The empirical results affirm that the use of passive coping strategies, seeking to distract the person from the problem of loneliness, is strongly associated with self-disclosure on Facebook. In contrast, active coping strategies designed to address the problem of loneliness directly are linked to face-to-face disclosures. Both coping strategies, thus, mediate the relationship between perceived loneliness and self-disclosure behavior. Furthermore, these mediation effects are moderated

by gender. For boys, perceived loneliness drives them to use passive coping strategies such that they disclose through Facebook. For girls, loneliness evokes active coping strategies, which give rise to face-to-face self-disclosure efforts.

With these findings, this research makes three main theoretical contributions. First, among digital natives, we identify intricate mechanisms spanning perceived loneliness and online/offline self-disclosure. Second, we identify the influence of coping strategies on digital natives' uses of online or offline disclosure in response to perceived loneliness, which helps reconcile some seemingly conflicting prior findings [17, 18]. That is, extant studies of self-disclosure on SNSs often rely on theoretical frameworks, such as uses and gratification theory [19], social exchange theory [13], audience representations theory [20], or the privacy calculus framework [21]. These theories focus on the consequences of self-disclosure (e.g., costs and benefits); we instead leverage coping strategy theory to address loneliness as a major cause of self-disclosure. In this sense, we regard self-disclosure as a deliberate response to loneliness, as a stressor. This unique perspective advances self-disclosure studies, specifically in an SNS context. Third, this study offers an initial investigation of gender differences in digital natives' responses to perceived loneliness, as manifested in active and passive coping strategies. Overall, it contributes to research into digital natives, online/offline self-disclosure, and coping theories; we uncover specific conditions in which digital natives purposefully employ IT tools, such as social media, to mitigate personal problems. Thus, this research highlights the centrality and vitality of IT that characterizes IS research [22].

2. CONCEPTUAL OVERVIEW

2.1. Self-Disclosure Online vs. Offline

Adolescents may compensate for loneliness by self-disclosing, in an attempt to (re)build social connections [10]. In accordance with social penetration theory (SPT), self-disclosure is an important means to improve social relationships [23] because the development of personal relationships relies on relational communications. Relationships evolve as a direct result of information exchanges and improve when the exchange expands. According to SPT, close relationships develop when a person opens up and becomes vulnerable to another. Lonely people who are not adept at maintaining intimacy with peers might improve their peer relationships by engaging in more self-disclosure.

Self-disclosure also is an important hallmark of adolescents' social identity development process [24]. They seek social feedback and are reactive to social stress, compared with adults [25] or younger children [26]. The various determinants of self-disclosure include demographic variables such as gender [27], personality (e.g., extraversion, agreeableness, and conscientiousness) [28], costs/benefits [29], and cultural factors [30]. Research also notes the impact of social variables that underlie online self-disclosure, such as a lack of public self-awareness online [17] or social anxiety [31].

When they encounter loneliness, digital natives may deem the Internet an appealing platform for self-disclosure; digital natives even are referred to as "screen addicts." The Internet has the capacity to protect anonymity and provides a vast pool of active users. Users can turn to it to develop new contacts, beyond their face-to-face lives, and thus potentially compensate for their lack of social connectivity. Online self-disclosure may entail comments, pictures, videos, or other forms of user-generated content. Disclosing private information enables the user to find contacts who share common interests and may even encourage friendship. Therefore, disclosure through the Internet attracts adolescents who are interested in

establishing new friendships to offset their lack of intimacy with peers (classmates). However, there is a potential downside of using online systems to make friends. Media richness theory notes that online communication provides a narrower bandwidth than face-to-face communication does [32], and social presence theory suggests that online communication deprives people of the sense that another human being is involved in social interactions, thus keeping the contacts impersonal [33].

Offline channels (e.g., face-to-face interactions at school) also should be instrumental for adolescents' self-disclosure purposes. School is where digital natives spend most of their time (e.g., 7 hours/day and 5 days/week) interacting with classmates and becoming exposed to a stable peer group. Through face-to-face disclosure, lonely adolescents can amend their troubled social relations in a relatively direct fashion. In addition, these interactions are effective for cultivating quality relationships and enable personalized communications, including gestures, facial expressions, body language, and eye contact—all of which cannot be transmitted through “screen-speak” [34]. It follows then that lonely adolescents may choose to disclose face-to-face, which then may support more meaningful interactions and explorations of common interests.

Among digital natives, the Internet seemingly could be the preferred self-disclosure channel for mitigating loneliness, considering that they seek constant connectivity to the Internet. Yet, it is unclear if digital natives are homogeneous in their disclosure patterns. Existing IS literature examines online disclosure [12, 13, 14] but has not offered a comprehensive, comparative assessment of online and offline disclosure behaviors. Early studies comparing the two types address only competitive disclosure actions between fixed dyads (e.g., whether a person substitutes offline disclosure for digital disclosure) (see [35] for a review). Other

early studies only investigate online disclosure, often with limited descriptive analyses, such as correlations [36, 37, 38]. A few studies consider whether the two forms might relate but do not seek to explain why certain users may prefer one disclosure format over the other [39, 27]. In contrast with these prior works, we reflect on current usage contexts and predict that digital natives disclose to a wide range of contacts (old friends and new acquaintances), instead of fixed dyads. Moreover, we do not assume a substitutive relationship between online and offline disclosures. By leveraging coping theory, we argue instead that digital natives purposefully employ online disclosure to empower themselves to combat loneliness. In line with social role theory (SRT), we also predict that boys exhibit agentic behaviors (independent and competitive), which discourage them from developing deep, friendly relationships, and thus participate in online interactions. In contrast, girls embrace communal behaviors, which encourage them to engage in self-disclosure offline to establish their relationships with peers. The selective uses of online or offline disclosure, thus, may be determined by the coping strategies the person adopts, with a notable gender-related pattern.

2.2 Coping Strategy Theory

Loneliness is a stressor that encourages digital natives to engage in coping, by adopting cognitive and behavioral strategies to mitigate the pressures, demands, and emotions that result from distressing situations [40]. Existing literature on loneliness encompasses two main perspectives on how people react to loneliness: reduction or perpetuation [41]. The loneliness reduction perspective suggests that an unfulfilled need prompts people to pursue solutions to resolve the problematic situation. The loneliness perpetuation perspective instead predicts that loneliness desensitizes the person to any anticipation of potential benefits from social inclusion, so the frustrating need to belong remains unsatisfied.

Vanhalst et al. [41], in turn, propose two main strategies for coping with loneliness: active and passive. People who use active coping engage in actions to alleviate or resolve their pending problem, so they attempt to tackle it immediately, regard the problem as a challenge, and stay calm in difficult situations. Adolescents who adopt active coping strategies tend to view loneliness in a positive way because they expect future inclusion and social exchanges. As a result, active coping adolescents make proactive efforts to strengthen weak relationships in their surrounding social environment and thus gain control over their social connections. In contrast, people who adopt passive coping strategies do not deal with the problem directly. Instead, they feel helpless and try to avoid the problem. Passive coping, thus, is maladaptive because it does not change the dissatisfying person–environment relation. Adolescents who use passive coping, in turn, are less interested in seeking social inclusion within immediate social systems, which also represent the source of their perceived loneliness. Rather, they overestimate the potential threats in their social surroundings and feel discouraged from reaching out or interacting with existing peers.

Accordingly, we propose that a digital native’s disclosure, online or offline, is shaped by the strategies he or she uses to cope with loneliness. Online disclosure may be associated with negative coping strategies (destructive); offline disclosure should be associated with the use of positive coping strategies (constructive). Self-disclosure constitutes a goal-oriented (loneliness mitigation) action that a digital native takes, as predicted by SPT. The use of coping strategies instead reflects the person’s motivation to search for an appropriate solution. Positive coping strategies lead people to seek effective solutions, even if it is effortful, whereas negative coping strategies drive people toward subpar solutions, without any impetus to invest substantial effort. Our use of coping strategy theory distinguishes this work from prior studies (see Appendix A) that explore people’s disclosure decisions by

reflecting on their evaluations of the likely consequences, such as perceived costs and benefits. In contrast, we define self-disclosure as a reaction to preexisting real-life challenges, such as perceived loneliness, that people confront. Coping strategy theory may be instrumental for explaining how people mitigate stressors like loneliness, making it an appropriate theoretical lens for our study.

2.3 Coping Strategies as Key Mediators

In Figure 1, we present our research model, in which loneliness influences offline/online self-disclosure, in a relationship mediated by the coping strategy chosen to deal with loneliness. Specifically, we examine two mediation effects: loneliness → active coping strategies → offline self-disclosure and loneliness → passive coping strategies → online self-disclosure.

-----Insert Fig. 1 here-----

2.3.1 Active Coping Strategies as a Key Mediator

The use of active coping should drive digital natives to disclose offline. According to SPT [24], digital natives who feel lonely may attempt to improve their social relationships by disclosing their personal information, such as their hobbies and interests, to others. In so doing, teenagers can get to know each other better and transition from strangers to acquaintances or close friends. Thus, digital natives who prefer to resolve the stressful situation actively will take direct actions to confront the stressors. Loneliness implies a lack of strong relations with peers in the existing social surrounding (i.e., school). Active coping adolescents, therefore, target existing relationships with their acquaintances and weak ties who are readily accessible in this offline social setting [42]. Compared with indirect channels such as SNSs, face-to-face interactions are less costly, more manageable, and more direct, enabling lonely teenagers to improve their social acceptance through disclosure. The face-to-

face channel also offers superior effectiveness for building relations because it supports highly personalized communications and reveals facial expressions, body language, and eye contact. Thus, lonely teenagers who disclose offline can use disclosures of their personal information to fashion in-depth, meaningful interactions that produce quality relationships. Because active coping helps lonely digital natives manage their perceived loneliness and encourages offline disclosure, we contend that active coping mediates the relationship between perceived loneliness and offline self-disclosure.

H₁: The relationship between perceived loneliness and offline self-disclosure is mediated by adolescents' use of active coping strategies

2.3.2 Passive Coping Strategies as a Key Mediator

Folkman and Lazarus [43] find that people often (86% of time) use multiple coping strategies in response to stressful encounters. To mitigate stress, digital natives may employ both active and passive coping. This dual approach seeks greater perceived personal control over loneliness. For example, a teen might doubt that active coping will fully alleviate perceptions of loneliness and thus simultaneously engage in passive coping to address the residual loneliness that active coping cannot address. Passive coping entails effort-avoiding self-disclosure options; in particular, a lonely adolescent might use the Internet to acquire new contacts that fill the void in her or his personal relationships. Adolescents have limited alternative venues for building contacts and making friendships, and online connectedness might seem more attainable than offline connectedness. Therefore, the high efficacy and low cost of using the Internet to extend personal networks may propel adolescents to adopt passive coping. Lonely adolescents also are more likely to use online communication to maintain their relationships [15], by sending messages and posting on friends' walls [44]. The

Internet, thus, offers an ideal platform for teenagers who use passive coping to self-disclose and improve their social lives. The model of compensatory Internet use also predicts that when people experience problematic real-life situations, they feel motivated to use online social networks to alleviate their negative mood or fulfill unmet needs [45, 46, 47]. For example, lonely adolescents use Facebook when they experience social anxiety and loneliness [45, 48]. Passive coping offers a means for digital natives to mitigate loneliness and also promotes online self-disclosure, so we predict:

H₂: The relationship between perceived loneliness and online self-disclosure is mediated by adolescents' passive coping

2.4 Moderating Role of Gender

Gender differences arise in relation to many behavioral and emotional challenges during adolescence, including loneliness and the associated coping strategies (see [49]). SRT seeks to explain gender similarities and differences in social activities [46], with the prediction that individual beliefs about gender derive from observations of gender role performances, which, in turn, reflect gendered divisions of labor and gender hierarchies in a civilization. Gender role beliefs then shape different behaviors; each gender acquires specific skills and resources associated with successful role performance and adapts behaviors to corresponding role requirements. According to SRT, gender-differentiated behavior is communal for women but agentic for men. Women engage in communal behavior that is interpersonally facilitative, nurturing, cooperative, and friendly. To fill this role, they acquire interpersonal skills and improve their nonverbal communication. Therefore, women tend to be other-oriented and compassionate. In contrast, men develop agentic behavior, which features independent, assertive, dominant, and competitive traits that also tend to discourage men from developing

friendly, unselfish, or sensitive behaviors [45]. These gender differences, in turn, affect social relationships; in general, men seek to multiply their social contacts and create formal relationships, whereas women seek heightened interconnectedness through relationships [42].

In line with SRT, we expect that gender moderates the preceding relationships (Figure 2). When they perceive loneliness, girls may be more likely to use active coping, whereas boys express a greater tendency to use passive coping. The mediating effect of active coping then may be stronger among girls, whereas the mediating effect of passive coping should be stronger among boys, compared with their opposite genders.

-----Insert Fig. 2 here-----

2.4.1 Active Coping Strategies by Girls

Girls report using more and better coping strategies than boys [46], seemingly because they reflect gender roles and grow up to be relationship oriented. In the face of unsuccessful social relationships, lonely girls feel motivated to resolve the social problem (active coping) rather than avoid the issue (passive coping). Moreover, girls are better attuned to the benefits of coping strategies [50]. Finally, girls tend to have a larger collection of coping strategies than boys [51]. Thus, they engage in more “mature” coping than boys, incorporating emotional and dynamic response styles, and thus value and exhibit active responses when they suffer from loneliness.

According to SRT [45], girls also are communal and committed to improving problematic social relations in the world. They, thus, should tend to engage in self-disclosure offline to alter their relationships with peers. Compared with online interactions, offline interactions are

more conducive to fostering high-quality relationships. When people gather offline, they have more opportunities to exchange information, form groups, and participate in joint events. In addition, they are more likely to grow close to one another when they interact offline [52]. In addition, girls opt to communicate face-to-face offline to take advantage of their nonverbal communication skills. For these reasons, we expect girls prefer to disclose offline rather than online. If active coping and offline self-disclosure are more likely among girls than boys, we also would expect the mediating effect of active coping on the relationship between perceived loneliness and offline self-disclosure to be stronger for girls than for boys.

H₃: The sequential mediation effect (perceived loneliness → active coping → offline self-disclosure) is stronger for girls than for boys

2.4.2 Passive Coping Strategies by Boys

Existing literature on adolescent loneliness suggests that boys who suffer from loneliness tend to prefer passive coping to address their poor social lives [46]. They are not likely to seek resolution with their existing acquaintances because altering these relationships would require lonely boys to take highly pro-social actions characterized by empathy and sympathy, which contradict their aggressive, assertive, and dominant gender roles. Prior studies show that men are more Machiavellian than women [53], such that boys tend to display emotional nonchalance and are poorly prepared for tasks such as fixing relationships, which require caring, sensitivity, and compassion. Lonely boys instead prefer passive coping more than girls do. Adolescents who employ passive coping tend to turn to the Internet, which allows socially isolated adolescents to avoid working on problematic relationships with existing contacts—the source of the relationship problems. Boys often prefer passive coping, so we

anticipate that the relationship between passive coping and online self-disclosure is particularly strong among lonely boys.

Moreover, according to SRT [45], boys develop agentic, independent, assertive, dominant, and competitive behaviors but avoid friendly, unselfish, or sensitive behaviors. Lonely boys then may be reluctant to interact with offline contacts because social, friendly actions (e.g., cooperative and compassionate) conflict with their competitiveness and pursuit of dominance. They prefer to participate in online interactions to cope with loneliness; it is relatively easier to acquire new friends in cyberspace. Online interactions also prevent lonely boys from direct interactions with others, which suits them, because boys often suffer from socialization anxiety. Therefore, lonely boys tend to disclose on the Internet and build on these disclosures to make new friends. In contrast with girls who use SNSs to *maintain* friendships, boys tend to use SNSs to seek out *new* friendships [54]. Therefore, we expect boys to prefer online, over offline, self-disclosure platforms in their efforts to compensate for loneliness. Because passive coping and online self-disclosure are more probable among boys than girls, we expect the mediation effect to be more salient for boys too:

H₄: The sequential mediation effect (perceived loneliness → passive coping → online self-disclosure) is stronger for boys than for girls

3. METHODOLOGY

3.1. Participants and Procedure

Fosse-Gomez [55] explains that “an adolescent is an individual between 12- and 18-years-old who lives in a family and is a member of the school.” A total of 409 French adolescents participated in our research. The data were collected in 16 school classes over a three-month period (March–June 2015), distributed over three public and private schools. The 409 students included 65 participants who were 13–14 years of age, 200 participants who were 15–16 years of age, and 144 participants who were 17–18 years of age; the average age was 16.2 years. The sample was composed of 223 girls and 186 boys (see Appendix B).

We collected survey data from these adolescents in the classroom, during regular class hours, in the presence of a teacher (who kept order in the classroom) and one researcher. All participants provided assent and parental consent. Students were ensured confidentiality. We informed the participants that the purpose of the study was to “learn what adolescents think about their social behaviors online and offline.” Participants first completed items to measure their self-disclosure, online and offline, followed by perceived loneliness, coping strategies, and relevant socio-demographic data, such as age, grade, and gender.

3.2 Measures

We translated the English language survey into the participants’ native language using a multistage translation/back-translation procedure. Loneliness was measured with the 8-item short version [56] of the revised UCLA Loneliness Scale [58] (e.g., “I lack companionship” and “I feel isolated from others”).

The active (adaptive) and passive (maladaptive) subscales of the Utrecht Coping List [58] serve to measure the coping strategies. Consistent with prior research [41], we transformed the general instructions into specific loneliness instructions; that is, we asked participants

how they behaved or what they thought when feeling “lonely.” The active problem-solving coping scale contains seven items (e.g., “remain calm in difficult situations”); the passive emotion-focused coping scale also contains seven items (e.g., “worry about the past”). Both subscales used five-point Likert-type scales ranging from 1 (“never”) to 5 (“always”), so a higher score indicates more use of that specific coping style.

Online self-disclosure was measured using proven scales [59]. Facebook is the most popular SNSs among digital natives (85% of Internet adult users have a Facebook account, and 95% of young people between 16 and 24 years of age do); it remains the most relevant online SNSs, despite some increasing competition from newer networks and apps for Internet users looking to join social media [60]. We asked the teen participants “How much do you talk on Facebook to others about: (1) your personal feelings, (2) the things you are worried about, (3) your secrets.” For the offline self-disclosure measure, we adjusted the online self-disclosure measures to offline settings and asked the adolescent respondents: “We would also like to know how much you tell about yourself at school with others. How much do you talk face-to-face with others at school about (1) your personal feelings, (2) the things you are worried about, and (3) your secrets.” Both measures used the same five-point scale (1 = “I tell nothing about this” to 5 = “I tell everything about this”).

4. ANALYSIS AND RESULTS

4.1 Descriptive Statistics

Loneliness correlated positively with both active and passive coping strategies. The relationships between active/passive coping strategies and offline/online self-disclosure were positive. The results of a multivariate analysis of variance ($F(2, 357) = 6.966, p < .001$, Wilks' Lambda = .966) indicated significant gender differences: Girls reported higher levels

of both offline (2.254 vs. 2.009, $F(2, 357) = 4.49, p < .05$) and online (2.689 vs. 2.555, $F(2, 357) = 5.43, p < .05$) self-disclosure than boys.

4.2 Confirmatory Factor Analysis

The first stage involved statistical refinement, using principle component factor analyses with oblique rotation, because of the presumed correlations among the construct's dimensions. Items whose communalities were below .40 were eliminated, as were cross-loadings greater than .30 [61]. This process suggested a five-factor structure with the remaining 16 items: four items for loneliness, three for active coping strategies, three for passive coping strategies, three items for online self-disclosure, and three items for offline self-disclosure. Appendix C provides a summary of the retained measurements after this process, along with the means, standard deviations, and reliabilities.

Gerbing and Anderson [62] provide guidelines for confirming scales' factor structures and assessing reliabilities and convergent/discriminant validities. Estimations of the purified scales took place simultaneously in a multiple-measurement model. The confirmatory factor analysis (CFA, using AMOS) replicated the five-scale structure: loneliness, active coping, passive coping, offline self-disclosure, and online self-disclosure. The five-factor model also fits the data reasonably well ($\chi^2 = 217.917, df = 94, p = .00$, root mean square error of approximation [RMSEA] = .061, goodness-of-fit index [GFI] = .934, comparative fit index [CFI] = .900, adjusted $\chi^2 = 2.318$; and standardized root mean residual [SRMR] = .061). The composite reliability coefficients (Jöreskog's ρ) and the convergent/discriminant validities were satisfactory for the whole sample and for each gender (Appendix D).

Because we compare the models across genders, we verified configural (factor structure) and metric (factor loading) invariance for all the measurement scales. We used four criteria for configural invariance: chi-square and degrees of freedom ($\chi^2/df < 5$), CFI $> .90$, RMSEA $< .10$, and SRMR $< .10$. Metric invariance exists when the differences between unconstrained and constrained multigroup analyses are not significant ($\Delta CFI/\Delta RMSEA < .01$).

Thus, we first tested the theoretical model using CFA and the whole sample (Appendix E). We compared Model 1 (16-item, one-factor model) with Model 2 (16-item, five-factor model) on loneliness and self-disclosure; Model 2 fits significantly better than Model 1 ($\Delta\chi^2 = 992.73$, $\Delta df = 25$, $p < .001$; $\Delta CFI = .715$; $\Delta RMSEA = .093$). Model 2 also revealed good configural invariance. Next, we applied the same theoretical model of loneliness and self-disclosure to check for measurement invariance across genders, using a multigroup confirmatory factor analysis (MGCFA), which produced Model 3. Finally, we set all the factor loadings to be equal across genders (Model 4) in a constrained MGCFA. We obtain measurement invariance across genders ($\Delta CFI/\Delta RMSEA < .01$).

4.3 Common Method Variance

With our cross-sectional data, we must test for the potential threat of common method variance (CMV) [63], so we add a CMV factor to determine if it significantly improves the fit compared with a measurement model without this factor. Podsakoff et al. [63] explain that with a latent CMV factor, the variance of responses to a measure contains three components: (1) trait, (2) method, and (3) random error. We compared Models 5 and 6 (Appendix E); the differences were non-significant ($\Delta CFI = .005$; $\Delta RMSEA = .002$). Having demonstrated measurement invariance across genders and no concern for CMV, we can test our model.

4.4 Mediation Effects

We used structural equation modeling based on maximum likelihood estimation to estimate the conceptual models in Figures 1 and 2. The fits of the full model were good for the whole sample (Appendix E, Model 7) and for each gender (Appendix E, Model 8).

Recent studies question the use of Baron and Kenny's [64] approach and the Sobel test [65, 66, 67, 68] to analyze mediation because (1) there need not be a significant predictor-predicted variable link in a proper mediation analysis; (2) there need not be partial effects of the mediator in the predictor-predicted variable by the predictor or mediator; (3) an outcome of partial rather than full mediation can be a positive rather than a negative; and (4) the power of the Sobel test is much lower than that of new bootstrap tests by Preacher and Hayes (2004). Therefore, we used Preacher et al.'s [65] procedure and computed bias-corrected bootstrap confidence intervals. In Hayes's [68] SPSS macro, we ran regression equations and estimated the mediating variable models. The use of coping strategies to deal with loneliness, as a simple mediator, enables us to estimate the indirect effects with bootstrapping (1000 bootstraps). If the bootstrapped confidence interval of the indirect effects does not include 0, the indirect effect is significant, and the mediation is supported. The results of this analysis are in Table 1. The mediation effects for the whole sample and each gender offer consistent results.

-----Insert Table 1 here -----

Specifically, for each of the hypothesized mediations, the confidence interval does not include 0, indicating two total mediations in the whole sample, in line with H1 and H2 (indirect effects H1 $\gamma = .103$, [.026; .238], $p < .05$; H2 $\gamma = .135$, [.011; .324], $p < .05$). Moreover, the mediation (loneliness \rightarrow active coping strategy \rightarrow offline self-disclosure) is

significant for girls but not boys, in support of H3 (girls $\gamma = .105$, $[.003; .039]$, $p < .05$; boys $\gamma = -.003$, $[-.041; .042]$, $p = .760$). Then, the mediation (loneliness \rightarrow passive coping strategy \rightarrow online self-disclosure) is significant for boys but not for girls, in support of H4 (boys $\gamma = .382$, $[.052; .756]$, $p < .05$; girls $\gamma = .025$, $[-.015; .152]$, $p = .227$).

4.5 Post Hoc Analyses

We performed post hoc analyses to examine whether one coping strategy may be associated with more than one type of self-disclosure. For example, is it possible that a passive coping teenager also employs offline self-disclosure, or that a teenager who engages in active coping also opts for online self-disclosure? The empirical results are insignificant for active coping strategies and online self-disclosure in the whole sample ($\gamma = .022$, $t = .276$, $p = .783$) and both genders (girls $\gamma = .084$, $t = .711$, $p = .477$; boys $\gamma = .137$, $t = 1.693$, $p = .090$). Similarly, and as expected, relationships between passive coping strategies and offline self-disclosure are not significant for the whole sample ($\gamma = .093$, $t = 1.278$, $p = .201$) or either gender (girls $\gamma = .120$, $t = .991$, $p = .322$; boys $\gamma = -.138$, $t = -1.705$, $p = .088$). Finally, we find insignificant results for both the first mediation (loneliness \rightarrow active coping strategy \rightarrow online self-disclosure; $\gamma = .004$, $[-.017; .061]$, $p = .518$) and the second mediation (loneliness \rightarrow passive coping strategy \rightarrow offline self-disclosure; $\gamma = .067$, $[-.016; .167]$, $p = .101$).

5. DISCUSSION

5.1 Theoretical Contributions

This study makes several contributions to extant literature. First, it extends research on self-disclosure and uncovers an “invisible hand” of coping strategy in directing people’s self-disclosure choices. Among digital natives, online self-disclosure is associated with passive coping, whereas offline self-disclosure implies active coping. We find two distinctive

mechanisms through which digital natives choose SNSs or face-to-face self-disclosure, through passive coping and through active coping, each of which mediates the relationship between perceived loneliness and SNSs disclosure or face-to-face disclosure, respectively. This distinction between two routes reveals the complex, underlying mechanisms that digital natives employ when revealing personal information about themselves to others. Prior IS studies have not explored the combination of online and offline self-disclosure [12, 13, 14, 69], so the findings of this study fill an important research gap.

Second, this research provides initial insights into gender differences in digital natives' responses to loneliness. Extending prior studies on gender differences [5], we theorize and find unique patterns by which digital natives use SNSs to manage their loneliness. The empirical results confirm that the mediation effect (loneliness → active coping → offline self-disclosure) is significant among girls, but not among boys, and the mediation effect (loneliness → passive coping → online self-disclosure) is significant among boys, but not among girls. By revealing these distinctions between boys and girls, the current study creates new knowledge for gender studies; prior work has not addressed gender differences with regard to how adolescents cope with loneliness [70].

Third, this research extends IS literature on digital natives, who represent the future of society; it is imperative we understand how their growth and development might be facilitated or impeded by Internet technologies [71]. Such knowledge can help parents, educators, and policy makers conceive of strategies to promote constructive uses of the Internet while discouraging its destructive effects. Prior studies address important issues such as online privacy, online trust, and digital piracy for digital natives [2, 3, 4]; we investigate another key concern, related to teenagers' loneliness and use of the Internet, to manage it.

Tech-savvy teenagers may view the Internet as a natural choice for dealing with personal issues, but they do not always opt for it; even with their easy access to SNSs, digital natives also turn to traditional, face-to-face interactions as an important alternative response method when they feel lonely. This finding is promising because using SNSs to manage loneliness is not ideal. Our empirical results show that digital natives who employ SNSs to manage their perceived loneliness are engaged in passive coping, which is inferior to active coping.

5.2 Practical Implications

Adolescent loneliness has been identified as a significant social problem since the 1970s. It continues to grow and affect the current digital native generation; almost 80% of digital natives constantly feel lonely [72]. Loneliness predisposes them to both immediate and long-term adversity and must be addressed properly. In this setting, our study provides some key insights for practice. The use of SNSs for self-disclosure is associated with passive coping strategies, so family members, school staff, and educators need to recognize the downsides of such uses. Considering the deep penetration of the Internet in digital natives' lives, adults should conceive tactics to discourage young adults from solely or habitually falling back to the Internet to address their loneliness. Online self-disclosure creates an illusion for digital natives and promotes their avoidance of troubled person–environment relationships. When teenagers seek advice about coping with loneliness, they should be encouraged to take constructive actions, with the assistance of teachers and parents, to ensure long-reaching positive impacts on their social skills and relationships. In addition, our findings suggest that loneliness interventions for digital natives should recognize the role of gender. For example, lonely boys engage in passive coping, but girls do not, partly because of their social role expectations. It is, therefore, important for caregivers and educators to take specific actions to try to prevent boys from engaging solely in passive coping. They tend to avoid amending

relationships within their immediate social systems though, so lonely boys may be reluctant to follow suggestions and likely need additional help to change their behavior. For example, parents might take the lead by coaching and modeling social skills to lonely boys.

For managers supervising the upcoming generation of digital native workers, our research also signals some of the new perspectives and expectations they will bring to the job. The stereotype of digital natives is that they depend totally on their smartphones and online applications—they are so-called screen addicts. In turn, SNS vendors have invested heavily in making communication apps de facto tools for businesses, such as Facebook's Messenger for Business. Our study suggests that managers of digital natives should also promote face-to-face relationships, especially among lonely employees. Technology may be efficient and convenient, but digital natives need interactions with co-workers to feel integrated. Thus, managers should explore options to prevent digital natives from resorting to SNSs or instant messaging systems to manage their sense of loneliness. As businesses increasingly move away from co-working spaces and toward teleworking, they might need to consider keeping digital natives in the corporate office, to mitigate their loneliness and help ensure the collective well-being of workers. Recent findings similarly support the use of face-to-face communication with digital native employees; a 2017 "Gen Z management" study conducted with 2,345 French young people [73, 74] indicates that 60% of these digital natives identify face-to-face meetings as their preferred form of communication, as opposed to emailing (16%) or instant messaging (11%).

5.3 Limitations and Further Research

We test our research model with cross-sectional data, so we cannot confirm causality. Although longitudinal analyses would be preferable, cross-sectional models must be

established first, before further research can check their viability over time. Additional studies, thus, should employ a longitudinal design to validate our proposed research model. In addition, we rely on self-reported data to measure online self-disclosure. Prior studies confirm significant correlations between self-reported and actual data about Facebook self-disclosure activities [75], but it still might be helpful to gather objective measures of self-disclosure. Such objective data collection methods would be difficult though; self-disclosure takes various forms and may occur at any time.

To extend beyond Facebook, continued studies could investigate SNS mobile apps such as Instagram and Snapchat that are very popular among digital natives and differ from Facebook on several key features. Our findings suggest that the overall use of social media is associated with passive coping, but it might be informative to break down social media technology according to their distinctive features. Perhaps, certain individual social media features (e.g., video calls) provide constructive value, in parallel with offline communications.

Finally, we note some sample considerations. This research took place in France, a relatively independent culture. Interdependent cultures might provide additional, interesting insights, considering that cross-cultural dimensions are significant predictors of attitudes toward, intentions to use, and actual use of instant messaging. These uses are more prevalent in individualistic cultures (e.g., France and United States) than in collectivist cultures (e.g., China) [76]. Gender differences at the feature level could be explored, and age might determine the self-disclosure behavior of digital natives too. Drawing on SRT, Neugarten [77] suggests that age-related norms define age-based expectations about the timing at which people adopt certain roles. Children generally learn to describe themselves as either boys or girls by the age of 3 years, then continue to maintain their gender labels, which suggests that

age might not affect the direction of the SRT effect in our research model (i.e., negative or positive moderating effect of gender on coping). However, age could have other impacts; an 18-year-old user likely does not have the same Facebook experience as a 13-year-old, and these differences may have been heightened by the timing of Facebook's penetration in France. These potential impacts require further consideration.

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Figure 1: Conceptual Model

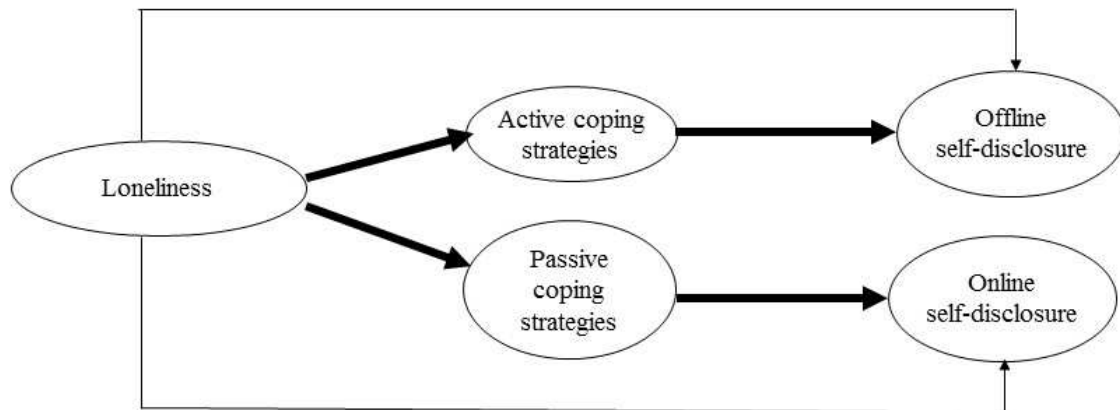


Figure 2: Conceptual Model with Gender Effects

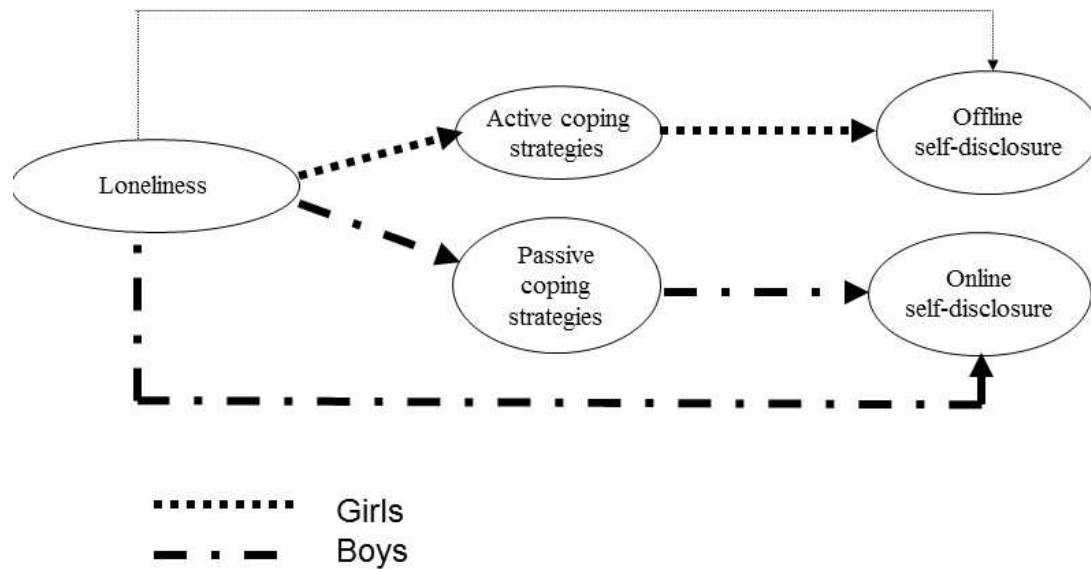


Table 1: Mediation Results

	Standardized parameter	Bootstrapped confidence	p-Value	Mediation	Results
<i>Whole sample (n = 409)</i>					
Indirect effect: Loneliness → Active coping → Offline self-disclosure	.103	[.026; .238]	< .05	Total	H1
Indirect effect: Loneliness → Passive coping → Online self-disclosure	.135	[.011; .324]	< .05	Total	H2
<i>Girls (n = 223), Loneliness → Active coping → Offline self-disclosure</i>					
Indirect effect: Loneliness → Active coping → Offline self-disclosure	.105	[.003; .039]	< .05	Partial	H3 Supported
<i>Boys (n = 186), Loneliness → Active coping → Offline self-disclosure</i>					
Indirect effect: Loneliness → Active coping → Offline self-disclosure	-.003	[-.041; .042]	= .760	No	
<i>Boys (n = 186), Loneliness → Passive coping → Online self-disclosure</i>					
Indirect effect: Loneliness → Passive coping → Online self-disclosure	.382	[.052; .756]	< .05	Partial	H4 Supported
Direct effect : Loneliness → Online self-disclosure	.438	[-.028; .654]	< .05		
<i>Girls (n = 223), Loneliness → Passive coping → Online self-disclosure</i>					
Indirect effect: Loneliness → Passive coping → Online self-disclosure	.025	[-.015; .161]	=.227	No	
Direct effect : Loneliness → Online self-disclosure	.020	[-.040; .168]	= .195		

Appendix A: Studies of Self-Disclosure on Social Media

Example Studies	Theoretical Foundation	Research Methodology
Bazarova and Choi 2014 [78]	Audience representations theory	Survey method and communication behavior
Chen 2013 [79]	Information disclosure behavior model	Survey method
Chen and Sharma 2015 [12]	Learning theories	Survey method
Cheung et al. 2015 [83]	Social exchange theory and privacy calculus theory	Survey method
Frye and Dornisch 2010 [80]	Privacy literature	Survey method
Hollenbaugh and Ferris 2014 [81]	Use and gratification theory	Survey method
Kisilevich et al. 2011 [82]	Age literature	Survey method
Krasnova et al. 2010 [21]	Privacy calculus framework	Focus group and survey method
Posey et al. 2010 [13]	Social exchange theory and social penetration theory	Survey method
Sheldon 2009 [84]	Uncertainty reduction theory	Survey method
Yu et al. 2015 [85]	Direct causation theory and affect heuristic theory	Survey method

Appendix B: Sample Socio demographics

Variable	N	Mean (Standard Deviation)
Age	409	16.322 (1.050)

	N	%
Gender		
Girls	223	54.5%
Boys	186	45.5%
Grade		
10	65	15.8%
11	200	48.8%
12	144	35.4%
Type of school		
Public	209	51.1%
Private	200	48.9%
Birth order		
Firstborn	171	41.8%
Middle-born	145	35.4%
Later-born	58	14.2%
Single child	35	8.6%
Pocket money		
Yes	175	42.8%
No	234	57.2%

Appendix C: Construct Measurements

		Mean	SD	Construct

				Reliability
Active Coping**	1. Act immediately 2. Consider the problem a challenge 3. Stay calm in this difficult situation	3.424	.950	.756
Passive Coping**	1. Look at matters pessimistically 2. Worry about the past 3. Feel unable to do anything	2.610	.818	.747
Loneliness*	1. I feel in tune with the people around me <i>(reversely coded)</i> 2. I lack companionship 3. I feel isolated from others 4. People are around me but not with me	2.131	.859	.821
Online Disclosure***	How much do you talk on Facebook to others about: 1. Your personal feelings 2. The things you are worried about 3. Your secrets	2.629	.618	.750
Offline Disclosure***	How much do you talk face-to-face with others at school about: 1. Your personal feelings 2. The things you are worried about 3. Your secrets	2.145	.719	.767
Notes: All items were measured using five-point scales with different scale anchors.				
*Scale ranges from “ <i>strongly disagree</i> ” (1) to “ <i>strongly agree</i> ” (5).				

**Scale ranges from “*never*” (1) to “*always*” (5).

*** Scale ranges from “*I tell nothing about this*” (1) to “*I tell everything about this*” (5).

Appendix D: Results of the Five-Factor CFA Model

a. Whole sample, n = 409

						Discriminant Validity					
Construct	Item	Std. Factor Loading	T-Value	Reliability (Jöreskog Rhô)	Convergent Validity (Rhô VC)	FS	NS	PC	AC	LL	
Loneliness (LL)	x1	.605	*	.821	.539					X	
	x2	.839	5.838								
	x3	.794	6.991								
	x4	.676	6.962								
Active Coping (AC)	x5	.750	*	.756	.509				X	.028** (.170)* **	
	x6	.684	10.043								
	x7	.705	10.059								
Passive Coping (PC)	x8	.789	*	.747	.501			X	.047 (.219)	.132 (.364)	
	x9	.723	4.563								
	x10	.595	2.657								
Online Self-Disc. (NS)	x11	.727	*	.750	.501		X		.069 (.264)	.002 (.048)	.006 (.083)
	x12	.726	5.493								
	x13	.669	5.486								
Offline Self-Disc. (FS)	x14	.545	*	.767	.539	X	.005** (.076)***		.041 (.204)	.420 (.641)	.013 (.115)
	x15	.633	5.107								
	x16	.959	6.127								
X ² (ddl)		GFI		RMSEA	CFI	TLI		SRMR	χ ² /ddl		
217.917 (94)		.934		.061	.900	.880		.061	2.318		

b. Girls, n = 223

						Discriminant Validity					
Construct	Item	Std. Factor	T-Value	Reliability (Jöreskog)	Convergent Validity	SE	FS	NS	PC	AC	LL

		Loading		Rhô)	(Rhô VC)								
Loneliness (LL)	x1	.610	*	.822	.547						X		
	x2	.869	5.364										
	x3	.885	5.366										
	x4	.528	3.937										
Active Coping (AC)	x5	.737	*	.758	.508					X	.148** (.386)* **		
	x6	.695	4.043										
	x7	.706	5.059										
Passive Coping (PC)	x8	.789	*	.747	.501				X		.028 (.168)	.009 (.099)	
	x9	.723	4.563										
	x10	.595	2.657										
Online Self-Disc. (NS)	x11	.727	*	.750	.501				X		.069 (.264)	.001 (.033)	.001 (.036)
	x12	.726	5.493										
	x13	.669	5.486										
Offline Self-Disc. (FS)	x14	.640	*	.757	.516		X			.017** (.165)***	.040 (.202)	.490 (.700)	161 (.402)
	x15	.633	5.107										
	x16	.859	6.127										
X ² (ddl)		GFI		RMSEA	CFI	TLI		SRMR		χ ² /ddl			
467.30 (105)		.900		.048	.900	.901		.074		2.133			

c. Boys, n = 186

						Discriminant Validity					
Construct	Item	Std.	T- Value	Reliability	Convergent	SE	FS	NS	PC	AC	LL
		Factor Loading		(Jöreskog Rhô)	Validity (Rhô VC)						
Loneliness	x1	.626	*	.799	.506						X

(LL)	x2	.811	7.874										
	x3	.839	8.004										
	x4	.538	3.784										
Active Coping (AC)	x5	.743	*	.755	.507						.038**		
	x6	.701	6.755							X	(.195)*		
	x7	.693	6.723								**		
Passive Coping (PC)	x8	.700	*	.750	.500								
	x9	.720	7.307							X	.103	.305	
	x10	.702	6.900								(.321)	(.553)	
Online Self-Disc. (NS)	x11	.684	*	.746	.502								
	x12	.560	5.493							X	.394	.121	.471
	x13	.852	8.486								(.628)	(.348)	(.687)
Offline Self-Disc. (FS)	x14	.602	*	.801	.581								
	x15	.733	7.507					X	.001**	.041	.207	.001	
	x16	.919	8.527						(.036)***	(.136)	(.456)	(.043)	
X ² (ddl)		GFI		RMSEA		CFI		TLI		SRMR		χ ² /ddl	
467.30 (105)		.900		.048		.900		.901		.074		2.133	

Appendix E: Main Results of Measurement Model, Invariance, and Common Method Variance

Loneliness and Self-Disclosure – Measurement Model												
	χ^2	<i>df</i>	<i>p</i>	χ^2/df	<i>CFI</i>	<i>RMSE</i>	<i>SRMR</i>	<i>Models</i>	$\Delta\chi^2$	Δdf	ΔCFI	$\Delta RMSEA$
						A						
1. Reflective one-factor (16-item)	1,210.64	119	.00	10.171	.185	.154	.149	1 vs 2	992.73*	25	.715	.093
2. Reflective five-factor (16-item)	217.91	94	.00	2.318	.900	.061	.061					
3. Reflective across gender (16-item, five-factor)	345.30	188	.00	1.837	.900	.048	.074	3 vs 4	122*	21	.000	.001
4. Reflective across gender (16-item, five-factor) + constraint (metric invariance)	467.30	219	.00	2.133	.900	.049	.076					
Common Method Variance												
4. Reflective five-factor (16-item)	217.91	94	.00	2.318	.900	.061	.061	5 vs 6	4.68	8	.005	.002
6. Reflective five-factor (16-item) + CMV	213.23	83	.00	2.569	.905	.059	.059					
Theoretical Model												

7. Theoretical model on the whole sample	224.298	98	.00	2.290	.900	.060	.062					
8. Theoretical model across gender	374.140	199	.00	1.880	.901	.050	.056					

* $p < .05$.