Probing the Coping Processes Between Social Media (WhatsApp) Addiction and Mental Health During Social Distancing

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This study examines the coping processes between social media addiction and mental health among college students during the COVID-19 pandemic. Following the problematic Internet use framework, structural equation modeling (SEM) results support the hypothesized positive associations between social media addiction and psychological distress outcomes. However, latent interaction analysis shows that not all individuals are impacted similarly because the intensity and significance of the mentioned associations changed as a function of computer-medicated communication (CMC) competence. In some cases, communication effectiveness attenuated the relationship between social media addiction and social anxiety symptoms. Together, the findings from this study and previous research support calls for CMC skills training, advocacy, and social support campaigns, particularly for and among subgroups of college students with social and relational skills deficits that put them at a greater risk of mental health prognosis.

Keywords: depression, social media addiction, communication competence, social capital, COVID-19

The impact of social media platforms such as Facebook, WhatsApp, Twitter, Instagram, and other social networking sites (SNS) on the creation of social capital is well documented (Page-Tan, 2021). Although mediated communication has been a valuable resource for work-related activities and maintaining social connections, research shows that it has also increased mental health and problematic Internet use (PIU; Király et al., 2020). Previous research found that Facebook social support satisfaction helps to reduce levels of depression (Meshi & Ellithorpe, 2021), but the buffering role of CMC toward psychological distress remains uncertain. This study extends previous research by examining the attenuating effect of CMC competence in the relationship between social media addiction and

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psychological distress such as social anxiety and depressive symptoms among college students during the COVID-19 pandemic. Although the construct of social media addiction has been used inconsistently in the literature (e.g., compulsive, problematic, excessive use), researchers' shared understanding revolves around maladaptive use and lack of self-regulation (Sun & Zhang, 2021). Controversy still exists in the term "addiction" and whether problematic or excessive social media use might be considered nonclinical addictive behavior or a psychiatric disorder for its pathological connotation (Sun & Zhang, 2021). Some researchers (e.g., Caplan, 2003) prefer the term "problematic" instead of "addiction" to avoid the confusion. In the current study, we use "social media addiction" for two reasons. First, the construct of social media addiction is most common in the literature (Sun & Zhang, 2021). Second, unlike "addiction," the term "disorder" refers to a clinical diagnosis. For example, the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders (DSM–5)* (American Psychiatric Association, 2013) and the 11th edition of the *International Classification of Diseases (ICD-11)* added "Internet gaming" as a disorder and not a mere addiction (World Health Organization, 2018). For these reasons, we use "social media addiction" not as a clinical disorder but as having an individual "being overly concerned about social media" (Andreassen & Pallesen, 2014, p. 4054).

Literature Review

Theory of Problematic Internet Use

A PIU theory posits that individuals suffering from psychological health such as depression, social anxiety, and loneliness prefer CMC interaction over face-to-face. The former offers less threatening space (Caplan, 2003). The developed preference for CMC, in turn, results in excessive and PIU. Because of excessive Internet use, psychosocial health is worsening, and more negative outcomes are triggered (Caplan, 2003; Davis, 2001). PIU refers to maladaptive and compulsive behaviors with Internet use that cause negative effects socially, professionally, and academically (Caplan, 2003). One of the current limitations of the theory of PIU and psychological well-being is that "the model does not currently consider the role that individuals' actual social skill or communicative competence plays in the development of PIU" (Caplan, 2003, p. 642). To further our understanding of how communication skills play an imperative role concerning psychological well-being and Internet use, Caplan (2003) called to integrate communication competence when studying psychological health and PIU. Caplan (2005) addressed this limitation by incorporating social skills in his model, where he found social skills deficit resulted in PIU. Although the role of general social skills toward PIU is well established, very little is known about the moderating effect of CMC competencies on the relationship between PIU and psychological outcomes. To address this gap, we propose the inclusion of CMC competence to understand its role in buffering the effect of problematic social media use and psychological health outcomes. The positive effect of CMC skills in buffering the negative impact of social media addiction might also be explained in light of media naturalness (Riedl, 2022) and social information process theories (Walther, 1992). Both theories assume that communication cues such as mood and facial expressions are suppressed while using CMC (Marolt, Zimmermann, Žnidaršič, & Pucihar, 2020). When using social media, individuals employ impression management strategies to enhance their CMC skills through projecting an idealized concept of self, Goffman's front stage concept (Hogan, 2010). The benefit of CMC is that even if individuals lack nonverbal cues while interacting online, they adapt other available

typographic and linguistic cues (Walther, 1992). Lack of nonverbal cues and high levels of anonymity make users feel comfortable disclosing private information, enhancing the quality of interpersonal relationships (Luo & Hancock, 2020). This fact might explain the positive association between online self-disclosures and well-being (Chan, 2021). Similarly, previous studies found that Facebook disclosure buffers stressful life events' impact on mental health (Liu, Guo, Zhang, & Gao, 2022; Zhang, 2017). Knowing that online self-disclosure is a form of CMC and can be practiced through achieving one's values, goals, or rewards (communication effectiveness) or through suitable and polite disclosures (communication appropriateness), we also expect to see a buffering effect of CMC on the relationship between social media addiction and psychological distress.

Psychological Health Outcomes

This research focuses on two psychological distress outcomes: social anxiety symptoms and depressive symptoms. Depressive symptoms are identified by loneliness, sadness, lack of joy, and a sense of unworthiness (Huang, 2022; Salokangas, Poutanen, & Stengård, 1995). Social anxiety is defined in terms of fear of negative evaluation (FNE) and refers to "fears, concerns, or worries regarding negative evaluations from peers" (La Greca & Lopez, 1998, p. 86). The link between social media addiction and psychological distress (e.g., depression, social anxiety) is well established (Hattingh, Dhir, Ractham, Ferraris, & Yahiaoui, 2022). Recent work reported a positive association between social media use (e.g., frequency of posting, sharing, consuming content) and health-related variables (e.g., inability to perform normal functions, stress, mood management; Asibong et al., 2020). The current study attempts to understand social media addiction outcomes in light of a theory of PIU (Caplan, 2003), explained next.

Hattingh et al. (2022) reported a correlation between compulsive media use and media fatigue that causes elevated levels of social anxiety and depression. Based on the earlier review, we expect a positive relationship between social media addiction and psychological distress variables. We also believe that this relationship changes as a function of communication competence. Before exploring CMC competence's moderation effect, we first investigate the main effect between social media addiction and health-related outcomes and propose the following hypothesis.

H1:   Students with high social media addiction levels will report high levels of social anxiety symptoms (H1a) and high levels of depressive symptoms (H1b).

The Role of Communication Effectiveness and Appropriateness

Our study used CMC competencies conceptualized by Spitzberg (2006) with the two most relevant competencies to our research: appropriateness and effectiveness. Effectiveness can be understood as achieving one's goals in interaction. Appropriateness is the perception of what type of behavior is suitable and legitimate in interaction. In other words, suitable behavior is characterized as free of violation of expected rules and norms Spitzberg (2006). The lack of literature exploring the CMC construct with the corresponding submeasures prompted the researchers to focus on two submeasures— effectiveness and appropriateness—to find their potential moderating effect in the relationship between social media addiction and psychological health. The decision to choose the submeasures

(communication effectiveness and appropriateness) is based on their wide usage to measure CMC competence (Bouchillon, 2020; Thompson & Romo, 2016) and as moderating variables in the relationship between SNS use and alcohol consumption (Thompson & Romo, 2016).

Studies offer mixed results on the association between social media use and psychological distress (Shin, Juventin, Chu, Manor, & Kemps, 2022). Systematic reviews of the literature point out that the relationship between social media usage and health-related variables is conditioned with confounding variables such as age, gender, and other moderating variables, including cultural background, self-esteem, rumination, and insomnia (Keles, McCrae, & Grealish, 2020). For example, Muflih and Amestiasih (2018) attributed social media's effect on adolescents' anxiety and health risk to external factors. Some studies reported moderating effects (e.g., age, quality, quantity of SNS use, SNS type, and extraversion) in the relationship between social media use and mental health variables (Cheng, Wang, Sigerson, & Chau, 2019). Given the moderating effects of social media addiction on the users' psychological health, this study has focused on the processes that can reduce the detrimental effect of problematic social media use. We suggest CMC competencies as moderating variables (moderators) that can impact the intensity of the relationship between social media addiction and psychological distress, considering the effect of other relational variables (e.g., social capital). Other studies found a correlation between CMC competencies and the levels of social anxiety and depression in SNS users. Chen and Huo (2022) reported that CMC significantly affects social anxiety in SNS users. CMC competencies (e.g., communication effectiveness, appropriateness) have been previously used as moderating variables in the relationship between SNS usage and health outcomes such as alcohol-related negative outcomes (Thompson & Romo, 2016). However, previous work did not use CMC competencies as moderating variables in the relationship between social media addiction and other health outcomes (e.g., anxiety, depressive symptoms). The current study extends our understanding of the moderating effect of CMC competence by investigating other health outcomes such as anxious and depressive symptoms, and we propose the following hypotheses:

H2:   *The positive association between social media addiction and social anxiety symptoms will be higher for those with lower communication effectiveness (H2a), and the positive association between social media addiction and depressive symptoms will be higher for those with lower communication effectiveness (H2b).*

H3:   *The positive association between social media addiction and social anxiety symptoms will be higher for those with lower communication appropriateness (H3a), and the positive association between social media addiction and depressive symptoms will be higher for those with lower communication appropriateness (H3b).*

The Role of Bonding and Bridging Social Capital

From the literature available on the factors weakening social anxiety and depression, it has become apparent that the social capital variable might impact psychological health and the use of social media (e.g., Della Vedova et al., 2022). Putnam (2000) defined social capital as a multifaceted construct characterized by bridging and bonding networks constructed by an individual. He suggested that bridging

capital represents weak ties typically formed and maintained between people interested in tentative relationships with many others. Bridging capital is normally driven by the interest in informational support that can be obtained more effectively through naturally loose but more diverse networks of users. Hence, the value of the bridging capital is the diversification of the network. Whereas bonding social capital is sustained between individuals in intimate, regular relationships are characterized by emotional attachment to a few. Its value is in psychological support. Putnam (2000) claims that bridging and bonding capitals are tightly coupled in a way that people with strong bridging capital tend to have as strong bonding capital.

Some studies found a positive effect produced by social capital on the users' psychological health in relation to social media addiction. For example, Mao and Chen (2021) found a positive association between bonding social capital and self-reported health outcome and a negative relationship with stress.

Munzel, Galan, and Meyer-Waarden (2018) also supported the claim that online social capital positively impacts the users' psychological well-being. Building on this line of reasoning, we hypothesize that:

H4:   *Increased bridging social capital levels will reduce social anxiety symptoms (H4a) and depressive symptoms (H4b).*

H5:   *Increased bonding social capital levels will reduce social anxiety symptoms (H5a) and depressive symptoms (H5b).*

The Role of Emotional Stability

In addition to the role that the social capital might be playing in predicting the psychological health state of the users, an extant body of literature also suggests a significant direct link between such psychological disorders as neuroticism and symptoms such as depression and anxiety (Smith, Reynolds, Orchard, Whalley, & Chan, 2018). A study by Pang (2022) links anxiety to personality types such as extraversion and neuroticism. Based on the existing literature, we added emotional stability as one of the variables that might offer valuable insights to our search for processes reducing social media addiction's negative effect.

H6:   *Students who reported high emotional stability levels will report fewer social anxiety symptoms (H6a) and fewer depressive symptoms (H6b).*

The current study aims to understand the relationship between social media addiction, relational and personality variables, and psychological distress outcomes controlling for sex and age. A summary of the hypothesized model is depicted in Figure 1.
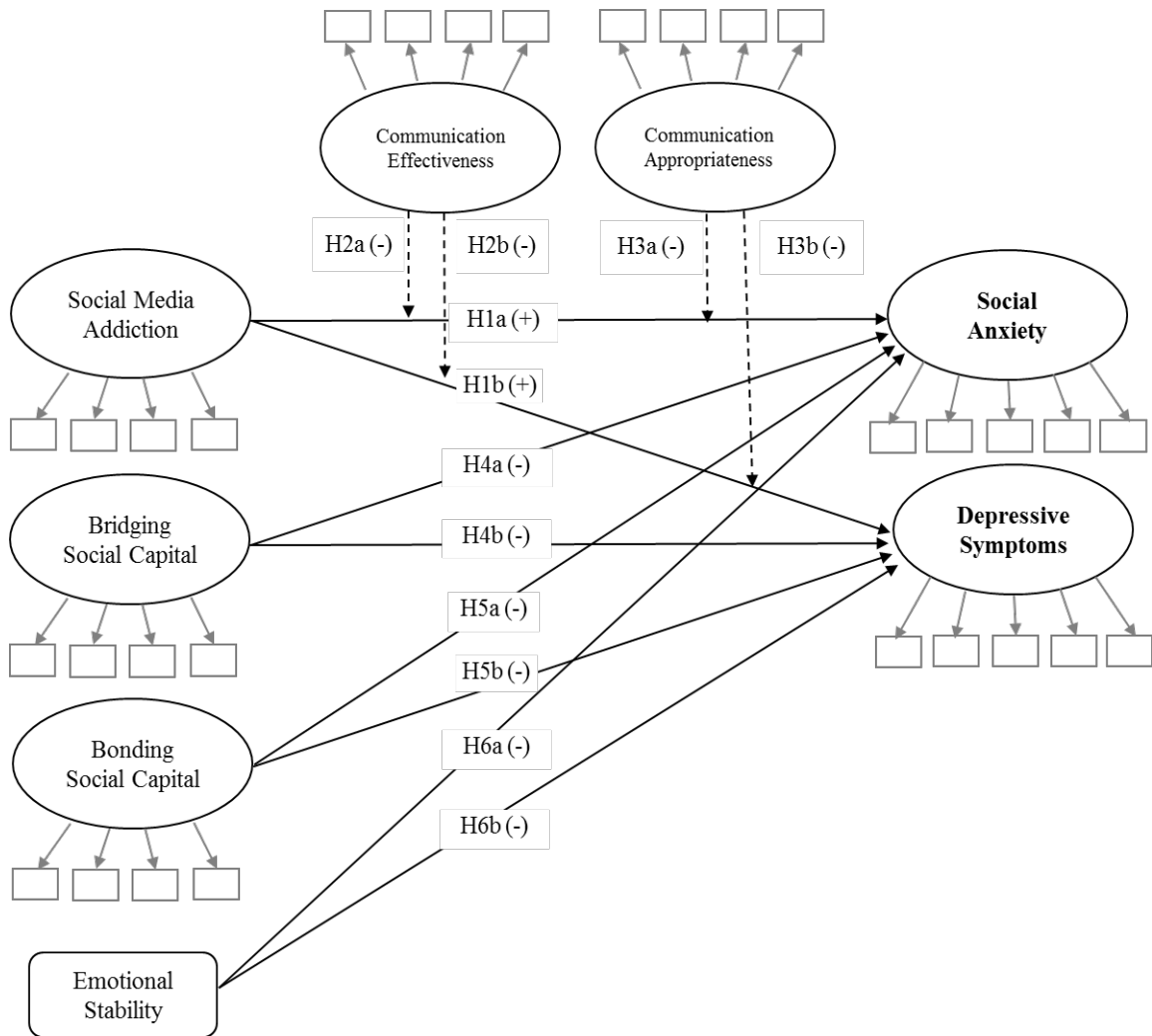
Figure 1. Hypothesized model.

Method

Participants and Procedures

We recruited N = 269 undergraduate students in a large public university in Oman during the spring of 2020. The convenient sample consisted of 170 (63%) female and 99 (37%) male students. The average age of 21.67 was reported with an age range between 19 and 24 (SD = 1.0). We followed proper research ethics for this study. Students were informed that participation is voluntary, and an informed consent form was presented on the online survey.

Measures

Social Media Addiction

We used six items from the Bergen Facebook Addiction Scale by Andreassen, Torsheim, Brunborg, and Pallesen (2012) to measure social media addiction. We replaced the word "Facebook" with WhatsApp. It is worth noting that the scope of this study is limited to WhatsApp because it is the most widely used platform by 93% of Oman's adult population. According to a recent nationally representative study, Facebook is used by only 14% of the population (National Center for Statistics & Information, 2019). Previous work supports the use of WhatsApp as an example of social media (Sha, Sariyska, Riedl, Lachmann, & Montag, 2019). All items were measured using a 5-point Likert scale where 1 indicated "very rarely" and 5 indicated "very often." As for the reliability of all measures, we reported both McDonald's omega (ω) and Cronbach's alpha (a) following recent studies that have recommended using ω over a (Hayes & Coutts, 2020). This study found strong evidence of internal consistency ($a = .74$; $\omega = .69$; $M = 2.67$; $SD = 1.19$).

Depressive Symptoms and Social Anxiety Symptoms

The Social Anxiety Scale for Adolescents (SAS-A) by La Greca and Lopez (1998) was used to measure social anxiety symptoms. We used the SAS-A scale because it has been widely used (Dhir, Yossatorn, Kaur, & Chen, 2018; Tandon, Kaur, Dhir, & Mäntymäki, 2020). Consistent with Dhir et al. (2018), and Wang, Jackson, Gaskin, and Wang (2014), we used the FNE subscale of SAS-A to measure social anxiety symptoms. Participants were asked to express their level of agreement with five statements in the past month. We used items to measure FNE, such as "I worry about what others say about me" and "I worry that others don't like me." Our sample showed strong evidence of reliability ($a = .87$; $\omega = .78$; $M = 2.15$; $SD = .88$). Depressive symptoms were measured using Salokangas et al.'s (1995) Depression Scale (DEPS). The scale has been used in several other SNS and depressive symptoms-related studies (Dhir et al., 2018; Puukko, Hietajärvi, Maksniemi, Alho, & Salmela-Aro, 2020; Salmela-Aro, Upadyaya, Hakkarainen, Lonka, & Alho, 2017; Tandon et al., 2020). DEPS scale has been applied inconsistently in the literature. For example, some researchers used 10 items (Puukko et al., 2020), seven items (Salmela-Aro et al., 2017), six items (Tandon et al., 2020), and five items (Dhir et al., 2018). Consistent with Dhir et al. (2018), we used the following five items: "I have felt all the joy had disappeared from my life"; "I have felt my sadness was not relieved even with help of family/friends"; "I have felt lonely"; "I did not enjoy my life"; "I have felt myself unworthy." A strong support of internal consistency was found ($a = .82$; $\omega = .72$; $M = 2.12$; $SD = .88$). Both anxious and depressive symptoms were measured using a 5-point response scale ranging from 1 (not at all) to 5 (extremely a lot).

Communication Competence

We used Spitzberg's (2006) effectiveness and appropriateness subscales of CMC competence measure. These two subscales have been previously used to measure SNS competence (Thompson & Romo, 2016) and are widely used to measure CMC competence (Bouchillon, 2020). Communication appropriateness and effectiveness were measured using four items each on a 5-point Likert scale where 1 indicated "not at all true of me" and 5 "very true of me." Sample items of communication appropriateness include "I avoid saying things through that might offend someone" and "I never say things that offend the

other person." Communication effectiveness included items such as "I generally get what I want out of interactions" and "My interactions are effective in accomplishing what I set out to accomplish." In this study, both communication appropriateness and communication effectiveness scales achieved high internal consistency (a = .84; ω = .81; M = 4.45; SD = .66) and (a = .82; ω = .79; M = 3.5; SD = .69) respectively.

Social Capital

We measured bonding social capital using six items from Williams's (2006) bonding social capital measure. Some of the items included "When I feel lonely, there are several people I can talk to" and "There is someone I can turn to for advice about making very important decisions." A strong evidence of internal consistency for bonding social capital was found (a = .78; ω = .72; M = 3.76; SD = .94). We used the modified version of Williams's (2006) bridging social capital scale tailored to the entire social network proposed by Ellison, Vitak, Gray, and Lampe (2014) to measure general bridging social capital. We asked participants eight items such as "Through my social network, I come in contact with new people all the time." Because we aimed to test the bridging social capital as an overall latent concept and not on individual items, we created four parcels from eight items by taking an average of the lowest and the highest items suggested by Little (2013). Parceling allowed us to use fewer items without losing variance and reduced the chance of covarying residuals (Little, 2013; Little, Rhemtulla, Gibson, & Schoemann, 2013). The reliability coefficients of four parcels for this study were a = .77; ω = .73; M = 3.83; SD = .54. Responses of both bridging and bonding social capital ranged from 1 (strongly disagree) to 5 (strongly agree).

Emotional Stability and Covariates

We used two emotional stability items from Gosling, Rentfrow, and Swann (2003) to measure emotional stability on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Previous studies found strong evidence of test-retest internal consistency (r = .8; Gosling et al., 2003). Biological sex was coded 0 (female) and 1 (male). As for age, students were asked to indicate their age by entering the representative answer. A complete list of measures is shown in Appendix A.

Data Analysis

We used structural equation modeling (SEM) to test proposed hypotheses using R Core Team (2021) software along with Rosseel's (2012) lavaan package. We used the marker variable approach by fixing the first item loading to 1.0 for each latent variable to identify confirmatory factor analysis (CFA) and SEM models. Model fit was determined by relying on commonly used cutoff points: minimum of .9 for CFI (Hu & Bentler, 1999) and TLI (Bentler, 1990); RMSEA less than .07 (Byrne, 2016; Hu & Bentler, 1999), and SRMR of .08 or less (Bollen, 1989). Before the analysis, we tested whether the sample of N = 269 had a sufficient minimum sample size with .8 power to have a good model fit. We used *findRMSEAsamplesize()* function from the semTools package (Jorgensen, Pornprasertmanit, Schoemann, & Rosseel, 2021) with the following input: RMSEA = .04; alternative RMSEA = .05; df = 717 of the hypothesized model along with the covariates. Based on the desired power of .8 at .05 as alpha level, the minimum sample size required yielded to N = 196, which is less than our sample of N = 269.

Latent Interaction

We used Marsh, Wen, and Hau's (2004) latent interaction strategy to examine latent variable interaction for hypotheses 2 and 3. Compared with commonly used interaction analysis (e.g., summative variables with OLS; dichotomization of moderating variable), latent interaction allows testing structural regressions at the measurement level with less unbiased estimates without losing information (Cheah, Memon, Richard, Ting, & Cham, 2020; Maslowsky, Jager, & Hemken, 2015). Because the independent variable (social media addiction) and moderating variables (communication appropriateness and effectiveness) had an equal number of indicators, we used a matching strategy as suggested by Marsh et al. (2004) to produce product indicators. We used *indProd()* function in the semTools package to mean-center the main effect indicators, perform match-paired strategy, and center the resulted product terms (double-mean-centering). We then used the resulting product terms as indicators for the latent moderating variables.

Normality Test

Before running the analysis, we tested whether the sample violated the normality assumption. We used Jorgensen et al.'s (2021) semTools package with *mardiaSkew()* and *mardiaKurtosis()* functions to estimate values (Mardia, 1970) to estimate multivariate skewness and kurtosis. As for multivariate skewness, the analysis showed a significant Mardia's normalized value of 166, $p < .01$, indicating a violation of multivariate normality. To overcome the nonnormality, we used robust standard error by applying Satorra-Bentler scaled statistic (S-$B\chi2$) with MLM estimator as suggested in the literature (Satorra, 2001; Satorra & Bentler, 2010)—a recommended approach when performing latent interaction (Foldnes & Hagtvet, 2014).

Results

Measurement Model

The CFA model consisted of the following variables: three independent latent variables (social media addiction, bridging, and bonding social capital), two latent moderators (communication appropriateness and effectiveness), and two latent dependent variables (social anxiety symptoms and depressive symptoms). To improve model fit and to avoid covarying error terms across different constructs, we deleted two indicators of social media addiction and two indicators of bonding social capital. CFA model showed a good fit S-$B\chi2$ (384, $N = 269$) = 514.986, $p < .001$, *Robust RMSEA* = .036 [90% CI = .028, .043], *Robust CFI* = .945, *Robust TLI* = .938, *Robust SRMR* = .055, *CMIN/df* = 1.34. All standardized factor loadings and construct internal consistency estimates are shown in Table 1. In the same CFA model, we ensured that variables such as social anxiety symptoms and depressive symptoms, bridging and bonding social capital, and communication appropriateness and effectiveness are not measuring the same concept. To test that these variables measure different constructs, we tested discriminant validity using heterotrait-monotrait ratio of correlations (HTMT; Henseler, Ringle, & Sarstedt, 2015). Table 2 shows strong evidence of discriminant validity among seven latent variables because all intercorrection ratios are below the cutoff value of .85 as recommended by Henseler et al. (2015) and Kline (2016). Table 3 shows mean, standard deviation, and interconstruct correlations based on averaged scaled.

Table 1. Standardized CFA Factor Loading and Construct Reliability.

Var	Dep	Anx	Add	Bri	Bon	App	Eff
dep1	.70						
dep2	.66						
dep3	.61						
dep4	.74						
dep5	.77						
anx1		.75					
anx2		.87					
anx3		.88					
anx4		.81					
anx5		.50					
addict1			.66				
addict2			.77				
addict3			.63				
addict5			.54				
bri_p1				.74			
bri_p2				.70			
bri_p3				.61			
bri_p4				.63			
bon1					.76		
bon3					.59		
bon5_R					.61		
bon6					.78		
app1						.84	
app2						.65	
app3						.76	
app4						.77	
eff1							.67
eff2							.75
eff3							.83
eff4							.68
α	.82	.87	.74	.77	.78	.84	.82
*ω	.72	.78	.69	.73	.72	.81	.79

Note. *Omega Hierarchical. All loadings are significant at $p < .001$. α = Cronbach's alpha. Dep = depression; Anx = anxiety; Add = addiction; Bri = bridging social capital; Bon = bonding social capital; APP = communication appropriateness; Eff = communication effectiveness.

Table 2. Discriminant Analysis Using HTMT of Correlations.

	1	2	3	4	5	6	7
1. Depression	—						
2. Anxiety	.46	—					
3. Addiction	.23	.3	—				
4. Bridging	.12	.06	.08	—			
5. Bonding	.29	.08	.11	.46	—		
6. Appropriateness	.08	.10	.08	.35	.3	—	
7. Effectiveness	.19	.13	.14	.42	.35	.31	—

Table 3. Correlational Table of Averaged Scales and Control Variables.

Var	M	SD	1	2	3	4	5	6	7	8
1. Age	21.67	.95								
2. Emo	3.32	.95	−.00							
3. Bri	3.83	.54	.14*	.06						
4. Bon	3.76	.94	.01	−.02	.37**					
5. App	4.45	.66	.02	.23**	.28**	.25**				
6. Eff	3.50	.69	.15*	.03	.34**	.29**	.26**			
7. Add	2.67	1.18	−.01	−.05	.04	.07	.04	.09		
8. Anx	2.15	.88	−.11	−.24**	−.04	−.04	.02	−.11	.24**	
9. Dep	2.12	.88	.04	−.12	−.09	−.24**	−.04	−.16**	.17**	.39**

Note. * significant at *p* < .05; ** significant at *p* < .01; *** significant at *p* < .001. Emo = emotional stability; Bri = bridging social capital; Bon = bonding social capital; APP = communication appropriateness; Eff = communication effectiveness; Add = social media addiction; Anx = anxiety; Dep = depression.

Structural Model

Independent Variables

SEM model consisted of the following independent variables: control variables (sex and age); social media addiction; social capital (bridging and bonding); emotional stability; four latent communication variables (two main effects: appropriateness and effectiveness, and two latent product variables: Addiction*Appropriateness and Addiction*Effectiveness).

Dependent Variables

Social anxiety symptoms and depressive symptoms were the latent outcome variables. SEM model indicated a strong model fit $S\text{-}B\chi2$ (717, N = 269) = 935.327, p < .001, *Robust RMSEA* = .034 [90% CI = .028,.039], *Robust CFI* = .92, *Robust TLI* = .91, *Robust SRMR* = .056, *CMIN/df* = 1.30. Hypothesis 1 sought to investigate whether social media addiction would be positively associated with anxiety symptoms (H1a) and depressive symptoms (H1b). The hypothesis was supported. Students with high levels of social media addiction reported high levels of anxiety symptoms (β = .27, p < .001) and high levels of depressive symptoms (β = .24, p < .01).

Moderation Analysis Results (H2 and H3)

        Table 4 shows standardized regression coefficients based on the structural framework, including latent interactions. We further validated latent interaction against Hayes's (2018) PROCESS macro in SPSS using Model 1. We found consistent results regarding the significance of parameters with minor differences in the estimates' values because PROCESS uses averaged scale (information is lost), and latent interaction is based on the measurement model without compromising variance. Because PROCESS macro allows estimating simple slope analysis, we complemented the findings with Hayes's (2018) approach. As for Hypothesis 2, without adjusting for the effect of independent variables (e.g., age, sex, emotional stability, bridging and bonding social capital, the main effect of appropriateness and effectiveness, the product term of addiction*appropriateness), we found that communication effectiveness buffers the relationship between social media addiction and anxiety symptoms (H2a), but not with depressive symptoms (H2b). A significant interaction product Addiction*Effectiveness with an unstandardized beta coefficient of $b = -.13$, $p < .05$ supported H2a but without controlling for the effect of the independent variables. We found significant simple slopes for low ($b = .29$, $p < .001$) and medium ($b = .20$, $p < .001$) levels of communication effectiveness; however, the relationship between social media addiction and anxiety was not significant for students who reported high levels of communication effectiveness ($b = .10$, $p = .072$; see Figure 2). However, when we adjusted for the independent variables' effect (see Table 4), communication effectiveness no longer moderated the relationship between social media addiction and its outcomes (anxiety and depressive symptoms). Interestingly, the main effect of communication effectiveness was negatively associated with social anxiety ($\beta = -.18$, $p < .05$) and depressive symptoms ($\beta = -20$, $p < .05$), controlling for the independent variables.

Table 4. SEM Regression Coefficients of the Determinants of Anxiety Symptoms and Depressive Symptoms.

	Anxiety Symptoms			Depressive Symptoms		
	β			β		
IV	β	95% CI	SE	β	95% CI	SE
Age	−.16**	[−.28, −.04]	.06	.01	[−.09, .12]	.05
Sex	.03	[−07, .14]	.05	.01	[−.10, .13]	.06
Emo	−.29***	[−.41, −.17]	.06	−.14*	[−.26,−.02]	.06
Bri	.10	[−.06, .27]	.08	.14	[−.04, .32]	.09
Bon	−.09	[−.27, .07]	.09	−.35***	[−.52,−.18]	.08
App	−.05	[−.25, .13]	.10	−.10	[−.29, .08]	.09
Eff	−.18*	[−.36,−.003]	.09	−.20*	[−.37,−.04]	.08
Add	.27***	[.13, .40]	.07	.24**	[.09, .38]	.07
Add*App	−.37***	[−.56, −.19]	.09	−.34**	[−.55,−.14]	.10
Add*Eff	−.02	[−.22, .17]	.10	.01	[−.09, .12]	.05
	$R^2 = .29$			$R^2 = .28$		

*Note. β = standardized regression weights; CI = Lower and Upper 95% confidence intervals; * significant at $p < .05$; ** significant at $p < .01$; *** significant at $p < .001$; SE = standard error. All independent variables were entered in the same model. f = Female (0), m = Male (1).*
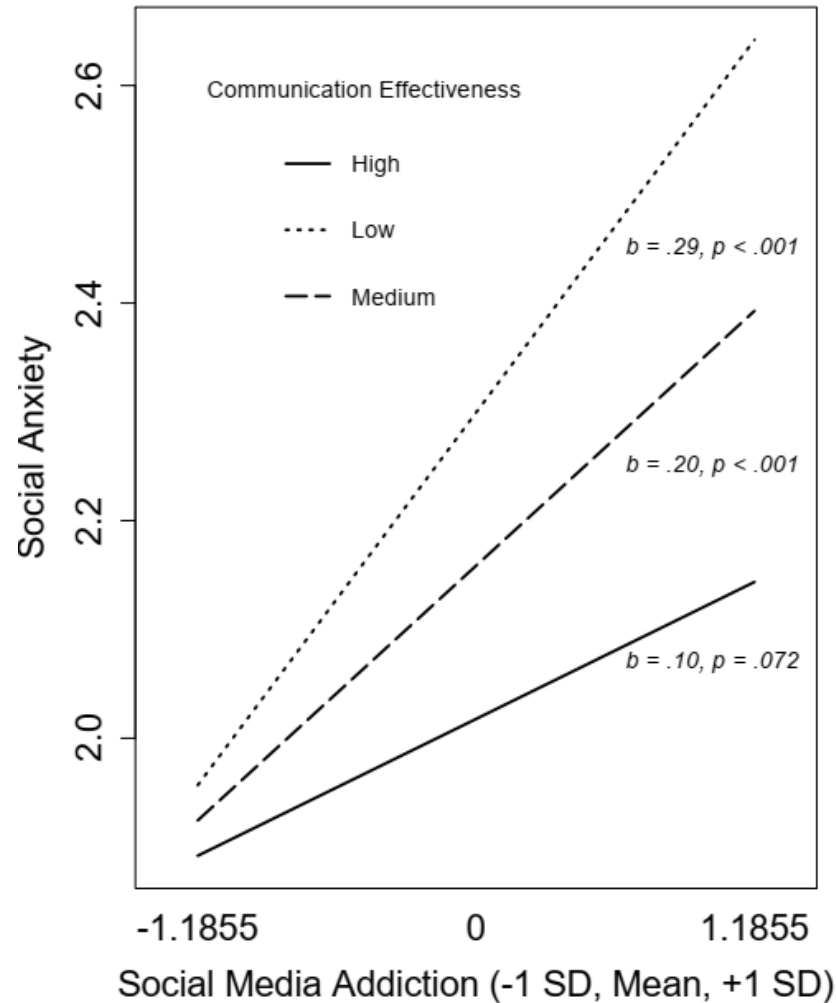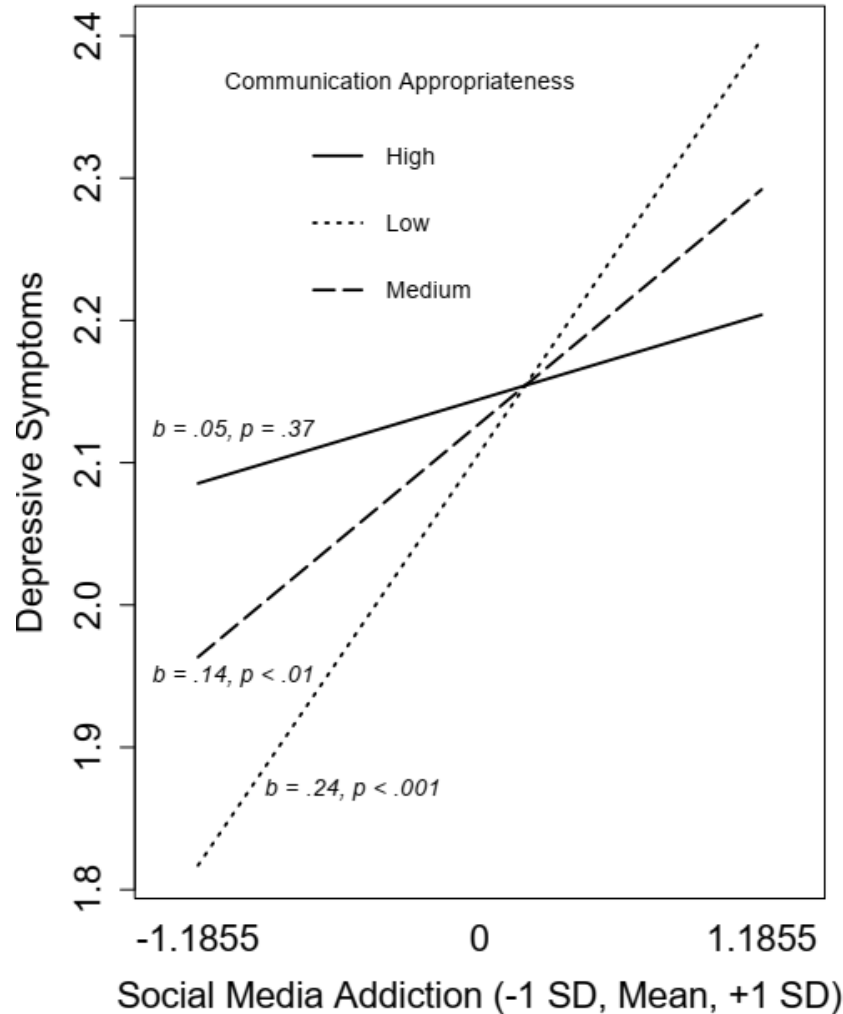
Figure 2. Moderation effect of communication effectiveness
on the relationship between social media addiction and social anxiety.

Unlike communication effectiveness, communication appropriateness was found to be a significant moderator (Addiction*Appropriateness) in the relationship between social media addiction and anxiety (β = $-.37$, $p < .001$) at the latent interaction level in support of hypotheses H3a. Consistent results were found in the PROCESS macro controlling for the covariates. Simple slope analysis showed statistically significant regression lines of low appropriateness ($b = .28$, $p < .001$) and medium appropriateness ($b = .17$, $p < .001$), but the slope of students with high appropriate communication was not significant ($b = .08$, $p = .136$; illustrated in Figure 3).
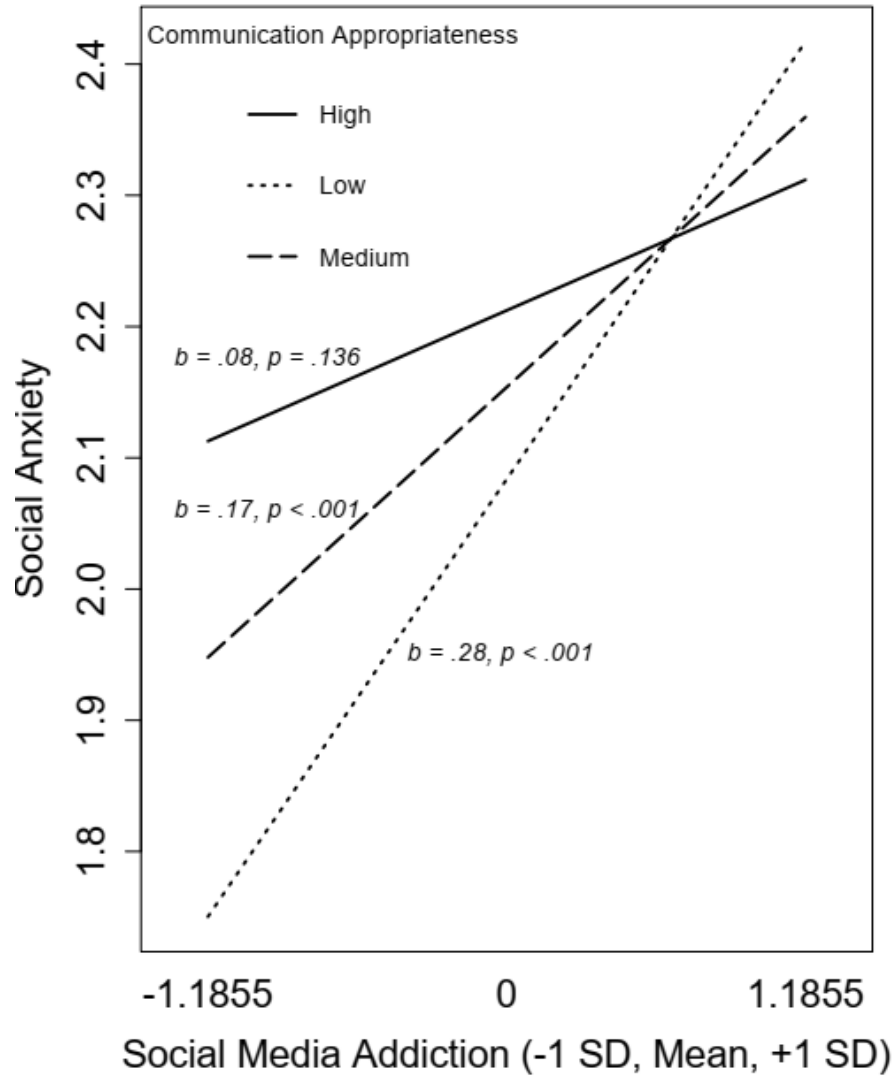
**Figure 3. Moderation effect of communication appropriateness
on the relationship between social media addiction and social anxiety.**

As expected, H3b was also supported. The relationship between social media addiction and depressive symptoms was moderated by communication appropriateness ($\beta = -34$, $p < .001$). Simple slopes, controlling for the effect of the independent variables, showed significant slopes for low ($b = .24$, $p < .001$) and medium levels ($b = .14$, $p < .01$) of communication appropriateness but not were significant with high levels of communication appropriateness ($b = .05$, $p = .37$), as illustrated in the moderation graph in Figure 4.

**Figure 4. Moderation effect of communication appropriateness
on the relationship between social media addiction and depressive symptoms.**

Contrary to our expectation, bridging social capital was not significantly associated with psychological distress outcomes; hence, H4a and H4b were not supported. Interestingly, bonding social capital had a strong negative effect on depressive symptoms ($\beta = -.35$, $p < .001$) but not on anxiety symptoms when controlling for the effect of independent variables. As shown in Table 4, Hypothesis 5 was partially supported. Finally, as expected, students who reported high levels of emotional stability also reported lower levels of anxiety symptoms ($\beta = -29$, $p < .001$) and lower levels of depressive symptoms ($\beta = -14$, $p < .05$), controlling for the effect of the independent variables, in support of H6a and H6b. Age and sex were entered into the model as covariates. Although biological sex did not impact psychological

distress outcomes, older students reported lower anxiety symptoms than younger students ($\beta = -.16$, $p <$ .01), controlling for independent variables. However, age did not impact depressive symptoms controlling for other independent variables.

Discussion

The premise we used as a starting point for our study (H1), stating that social media addiction harms users' psychological health, has been supported. Along with the studies that examined the correlation between problematic SNS use and mental health (Dhir et al., 2018), we found that students prone to excessive use of social media platforms reported elevated levels of both anxiety and depression. From there, we moved toward investigating possible solutions to buffer the negative impact of social media addiction. This led us to our main theoretical contribution—the inclusion of two sets of variables (relational variables and CMC competence variables) to test CMC competence's moderating role in the relationship between social media addiction and psychological health-related outcomes.

We posited in H2 that communication effectiveness would attenuate the effect of social media addiction on anxiety and depressive symptoms. Without controlling for the effect of the independent variables, the relationship between social media addiction and anxiety symptoms turned out to be moderated by communication effectiveness, but this was not the case when the independent variables were entered into the model.

Although communication effectiveness and appropriateness generally represent communication competence, they seem to have different effects in the context of this study. First, the study was conducted during COVID-19 measures in which participants in the sample relied heavily on mediated communication for work and relationship maintenance. Although the lack of support for interaction effects between communication effectiveness and alleviation of psychological distress is unexpected, it also makes sense, given the context of the study. Communication effectiveness is about achievements of instrumental interaction or decision-making goals (e.g., getting others to complete a course assignment), whereas communication appropriateness is about awareness of behaviors that may offend others in a given situation.

The distinction is particularly relevant in mental health skills training, in which communication effectiveness (such as assertiveness in decision making) may not necessarily enhance a person's interpersonal competence and mental health; see Spitzberg (1993, 2013). For example, Spitzberg (2013) reminds us that communication is perspective dependent. Although behaviors regarded as assertive may be effective, they may not be perceived as "likable or appropriate" (Spitzberg, 2013, p. 128). This study suggests that mental health interventions that aim to alleviate anxiety and depression and their relationships to social media use should take into account this context-dependent distinction between communication effectiveness and appropriateness (Spitzberg, 2013).

In support of H3, the intensity of the association between social media addiction and psychological health (anxious and depressive symptoms) was attenuated by communication appropriateness. For example, a strong positive link between social media addiction and psychological

health was found for students who reported less CMC appropriateness competence, a moderate link was found for students with average appropriateness competence, and no association was found for students with high communication appropriateness levels. The buffering effect of communication variables in the association between SNSs and health-related outcomes was also found (Thompson & Romo, 2016).

H4 and H5 were applied to test whether social capital was associated with psychological health outcomes. Contrary to our expectations, bridging social capital proved ineffective in reducing anxiety and depressive symptoms; consequently, H4a and H4b were not supported. H5b was supported as bonding social capital significantly reduced depressive symptoms, but H5a did not receive substantial evidence to support bonding social capital's role in reducing social media users' anxiety symptoms, as reported in previous research (e.g., Della Vedova et al., 2022). The discrepancy between H5a and H5b should be interpreted tentatively because research clearly indicates that anxiety and depression symptoms are highly comorbid (Kalin, 2020), and their overlap may constitute a subtype known as anxious depression, defined "as Major Depressive Disorder (MDD) with high levels of anxiety symptoms" (Fava et al., 2004, p. 1300). Future research should examine whether our unexpected findings manifest anxiety depression, the uniqueness of this study's population or simply random variation in the data.

Similarly, the weak association between bridging social capital and the dependent variables may be understood in the unique context of WhatsApp and the specific goals of alleviating psychological distress during the COVID-19 lockdown period. Unlike bridging social capital, bonding is consistent with the hyperpersonal features (Spitzberg, 2006; Walther, 1996) that WhatsApp and cognate platforms afford users prone to mood disorders such as depression and are therefore attracted by the homogeneity of WhatsApp contacts and groups. Because bonding has to do with within groups relations characterized by higher levels of similarity and familiarity between users, WhatsApp is less likely to be perceived by users with mood disorders as a platform that is conducive to the development and maintenance of close relationships but that is inappropriate as a bridge between different/heterogenous social groups—that is, through bridging social capital. In particular, WhatsApp affords users the ability to communicate one-on-one and control who views one's status posts).

Consistent with Granovetter's (1973) hypothesis, WhatsApp promotes communication and belongingness for individuals and groups with the same interests; that is, WhatsApp promotes strong ties and is thus perceived as a more viable resource for finding emotional support and comfort. Conversely, users with mood disorders may find communication between different/heterogeneous social groups (i.e., weak ties) as an inappropriate emotional support system, as the latter's role is mostly limited to business needs (Granovetter, 1973).

A strong correlation between the level of emotional stability as a personality variable and the users' levels of anxiety and depression was found. As hypothesized (H6), anxiety symptoms and depression decreased among emotionally stable individuals. This finding agrees with the previous studies exploring the relationship between social media addiction, emotional stability, and mental health (Pang, 2022). Furthermore, it has been observed that the users' age, as one of the covariates, is closely linked to anxiety symptoms. Older users tend to demonstrate lower anxiety symptoms than younger ones (Andreassen,

Pallesen, & Griffiths, 2017). The level of depression did not seem to correlate with the users' age. The lack of such correlation might be due to the students' sample with a limited age variability (19–24).

In light of these observations, our findings should be interpreted within the limitations of this study's sample and design. This study examined WhatsApp's use to alleviate psychological distress among undergraduate students in one public university in Oman. More studies are recommended to explore further some of the tentative findings of the present study. In addition, this study has the following limitations: (1) The cross-sectional nature of the data in this study limits causal inference; (2) social anxiety was not studied using all three subdimension as conceptualized by (La Greca & Lopez, 1998); (3) the study was conducted during the first three months of the COVID-19 pandemic in 2020, and the results might not translate to different settings; (4) the study included more female than male participants and such gender imbalanced data might have resulted in biased estimates; (5) the study used convenience sampling, and this has limited its generalizability; and (6) social anxiety was measured using one dimension of SAS-A. Future studies should examine other CMC competencies to further our understanding of communication variables' role and their moderation effects on SNS use and health outcomes (Spitzberg, 2006).

Nevertheless, the study has demonstrated that the degree of social media use experienced compulsively by Internet users is associated with the user's psychological health. However, not all individuals are equally affected. As identified by this study, the game changer is the appropriateness of communication.

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Appendix A: Scale Items

Depression

1. I have felt lonely.
2. I did not enjoy my life.
3. I have felt myself unworthy.
4. I have felt all the joy had disappeared from my life.
5. I have felt my sadness was not relieved even with help of family/friends.

Anxiety (FNE)

1. I worry about what others say about me.
2. I worry that others do not like me.
3. I am afraid that others will not like me.
4. I worry about what others think of me.
5. I feel that others make fun of me.

Addiction

1. Spent a lot of time thinking about WhatsApp or planned use of WhatsApp?
2. Felt an urge to use WhatsApp more and more?
3. Used WhatsApp to forget about personal problems?
4. Become restless or troubled if you have been prohibited from using WhatsApp?

Bridging Social Capital

1. Interacting with people in my social network makes me interested in things that happen outside of my town.
2. Interacting with people in my social network makes me interested in what people unlike me are thinking.
3. Talking with people in my social network makes me curious about other places in the world.
4. Interacting with people in my social network makes me feel like part of a larger community.
5. Interacting with people in my social network makes me feel connected to the bigger picture.
6. Interacting with people in my social network reminds me that everyone in the world is connected.
7. Interacting with people in my social network gives me new people to talk to.
8. Through my social network, I come in contact with new people all the time.

Bonding Social Capital

1. There are several people I trust to help solve my problems.
2. There is someone I can turn to for advice about making very important decisions.
3. There is no one that I feel comfortable talking to about intimate personal problems. (R)*
4. When I feel lonely, there are several people I can talk to.

Appropriateness

1. I avoid saying things through that might offend someone.
2. I pay as much attention to the WAY I say things as WHAT I say.
3. I never say things that offend the other person.
4. I am careful to make my comments and behaviors appropriate to the situation.

Effectiveness

1. I generally get what I want out of interactions.
2. I consistently achieve my goals in interactions.
3. My interactions are effective in accomplishing what I set out to accomplish.
4. I am effective in my conversations with others.

Emotional Stability

1. I see myself as anxious, easily upset. (R)*
2. I see myself as calm, emotionally stable.

* A reverse coded item