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# Computer-Mediated Communication and Its Influence on Psychological Functioning

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**Abstract:** This study applied online disinhibition effect [1] to examine perceived psychological benefits (PPB) derived from computer-mediated communication (CMC). The models examined the relationship between psychological health (loneliness, self-esteem and social anxiety) and CMC for social interaction (to seek romantic/sexual relationships and emotional/social support), compulsive internet use (CIU) and PPB derived from CMC. Group comparisons across sex were also examined. The sample included 167 (47 men and 120 women) university students from Malaysia. Results suggest loneliness, low self-esteem and social anxiety in men can help explain CIU. For women, only social anxiety explains CIU. However, group comparison indicated that socially anxious men were less likely to be compulsive Internet users. Contrary to expectation, CMC for social interaction was perceived as a negative influence to psychological functioning by men and women. Results further suggest that women's PPB from using CMC to seek emotional/social support was significantly less compared to men's. Bidirectional relationship was indicated only in the men's model between self-esteem with CIU, and self-esteem and CMC for romantic/sexual relationship.

**Keywords:** Compulsive Internet Use, Online Disinhibition Effect, Computer-Mediated Communication, Psychological Well-Being, Loneliness, Social Anxiety, Self-Esteem

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## 1. Introduction

The advent of the Internet and its accessibility has permeated almost every society across the world. For emerging adults born in the digital age, computer-mediated communication (CMC) is very much a normal part of life. The extensive and often excessive CMC has garnered attention from researchers in varied disciplines -- communications, mental health and psychology. Studies on the whole suggest that Internet use can be harmful, with one study reporting pathological use in 18% of university students sampled [2]. In fact compulsive Internet use (CIU) that ensues with no particular purpose but a preoccupation with being online was once believed to have the potential to reach levels of distress equivalent to that of addiction [3].

Although use of the Internet is well-accepted, there is general consensus that excessive use of the Internet can be problematic especially if it is compulsive. The social skills model [4] is widely applied to understand the effects of the Internet. The model proposes that preference for online

interaction and CIU can produce negative outcomes for those who struggle with loneliness (e.g., [5] [6] [7]), social anxiety (e.g., [8] [9]) and self-esteem (e.g., [10] [11]). Although persons with the above dispositions, for whom developing meaningful real life relationships is challenging, tend to gravitate to the Internet to fulfill their social needs, the outcome is not necessarily positive.

On the surface, relationships in a virtual environment appear to benefit those who lack or fear face-to-face (FtF) social interaction or who seek group connection with like-minded people. The anonymity and privacy of the Internet provides a shield allowing disinhibition and freedom to be open and honest. This 'online disinhibition effect' [1] could pave the way to relationships – platonic and romantic – for those who are suppressed by anxiety and low self-esteem. CMC that reduces pressure for real-time spontaneous response and discomfort with being evaluated encourage disclosure [12]. Accordingly, being disinhibited and free to regulate one's self-presentation should improve the social life and overall well-being of those who would otherwise be isolated and alone. This benefit of the Internet is apparently

not shared by everyone [13]. Among high Internet users, compared to extraverts and those with more social support, introverts and those with less social support benefitted less from Internet use – reporting more loneliness and less community involvement.

In a similar vein, a study examining well-being and Internet usage suggest that frequent online social communication by socially anxious persons to replace FtF socialization is linked to lower quality of life and depression [14]. This was true despite the strong relationship between social interaction anxiety and comfort and online self-disclosure. The researcher concluded that social comfort and opportunities to self-disclose may not be sufficient to form satisfying relationships and that the anticipated rejection from self-disclosure may in fact be a hindrance for the highly anxious.

Other studies examining the relationship between psychological well-being and CIU appear to suggest a bidirectional relationship. In a recent study, components of psychological well-being -- autonomy, environmental mastery and positive relations with others were negatively related to CIU [15]. In essence, some features of psychological well-being can buffer CIU. In another study, CIU contributed to poor well-being that included both mental and physical symptoms [16]. The varied measurements of psychological well-being – as a health dimension vs. psychological functioning – appear to contribute to mixed results.

A study that examined users' perceived psychological functioning derived from CMC provides additional insight [17]. The study revealed that chat users perceived the Internet as psychologically beneficial to their functioning and at the same time believe frequent users are lonely and are possibly addicted to the Internet. This dissonance is said to resemble motivated behaviors such as alcohol consumption [18].

What is unclear from the extant literature is how benefits derived from CMC is related to the intent of social interaction, i.e., for emotional/social support and romantic/sexual relationships. Applying the online disinhibition effect [1], the self-monitoring environment of the Internet would allow persons who are lonely, socially anxious, and with low self-esteem and for whom FtF interactions are challenging, use CMC to meet their social needs that in turn may benefit them psychologically. Given this, Figure 1 will examine the influence of psychological health -- on CMC for social interaction and CIU, as well as the relationship between the latter two variables on perceived psychological benefits (PPB) derived from CMC.

### **1.1. Psychological Health and the Internet Use**

Previous research suggests that CMC may be preferred by persons struggling with loneliness, depression, social anxiety and self-esteem (e.g., [5] [8] [3] [19] [20]). However, only loneliness and not depression had a significant relationship with problematic Internet use (e.g., [5] [20] [21]). Another study found that although lonely persons who used the Internet to seek emotional support expressed increased satisfaction with online friends, they also reported

disturbances in their daily functioning from Internet use [22].

Despite the strong relationships between loneliness and preference for online interaction noted above, this relationship was found to be spurious in a follow-up study by [8]. Instead, social anxiety was a better predictor of online social interaction and that preference of online social interaction negatively impacted school and social engagements. He concluded that the ability to control self-presentation online may appeal to anxious persons who tend to seek low-risk communicative encounters [23].

The appeal of the Internet extends beyond persons who are lonely and anxious to those with low self-esteem as found in a study of adolescents [19]. The study further found CIU related to low self-esteem and that CIU mediated the relationship between daily Internet use and low self-esteem. This relationship between pathological the Internet use and low self-esteem is supported in other studies (e.g., [3]). These findings not only indicate that a relationship exists between CIU and self-esteem, there is also a possible bidirectional relationship. Given the literature, it is hypothesized that psychological health, namely, loneliness, social anxiety and low self-esteem will be positively related to CIU.

*H1: Loneliness, social anxiety and low self-esteem will be positively related to CIU.*

It is further hypothesized that psychological health is related to online social interaction. Of interest in this study are CMC with the intent to seek emotional/social support and CMC to elicit romantic/sexual relationships. Extrapolating from [5] [8], it is hypothesized that both loneliness and social anxiety will be related to seeking emotional and social support online.

*H2: Loneliness and social anxiety will be positively related to CMC for emotional/social support.*

Given the findings that persons with low self-esteem are more likely to be compulsive Internet users (e.g., [3]), it is anticipated that such persons will be less likely to seek romantic/sexual relationship online due to the increased disclosure forethought required for such interactions. It is expected that loneliness would be the driving force for this form of CMC.

*H3: Loneliness will be positively related to CMC for romantic/sexual relationships and low self-esteem will be negatively related to CMC for romantic/sexual relationships.*

### **1.2. Psychological Benefits Derived from Computer - Mediated Communication**

Studies examining the psychological benefits/detriments of CMC including CIU abound and differ. More studies report the detriments of CMC than benefits. A longitudinal study [24] trying to discredit the negative impact of CMC on users' psychological health reported in an earlier study [13] had participants engage in five chat sessions with an anonymous partner while measuring self-esteem at three different intervals. They found CMC had a positive psychological effect on users. Online chats with anonymous partners led to decreased loneliness and depressions and increased perceived social support and self-esteem.

Another study examining the effect of CMC on psychological well-being found that those who chat online are more likely to report psychologically benefiting from the Internet compared to 'non-chatters' [17]. In contrast, CMC was found to have negative effect on depression and loneliness [25]. Similarly, the amount of Internet use was found to reduce well-being – a measurement of satisfaction with life [26]. The different ways of conceptualizing well-being is partly responsible for the mixed results.

Studies have further examined the effects of Internet use on psychological well-being depending on the intent of the Internet user [27]. Results suggested that non-communicative use of the Internet was negatively correlated with psychological well-being whereas Internet used for communicative purposes related positively to psychological well-being. The social connectivity that communicative use afforded was attributed to increased well-being.

In this study, users' perceived psychological benefits (PPB) derived from CMC [17] will be used to indicate levels of psychological well-being. Given the extant literature, it is hypothesized that CIU will not be perceived as psychologically benefiting but CMC for social interaction will.

*H4: CIU will be negatively related to PPB*

*H5: CMC for romantic/sexual relationships and emotional/social support will be positively related to PPB.*

## 2. Method

### 2.1. Participants and Procedures

Participants included 167 university students (47 men and 120 women) aged between 18 and 25 years from Malaysia. Most participants identified as ethnic Chinese ( $n = 155$ , 93.4%), 3 as Malay, 3 as South Indian, 1 as Eurasian, 2 as mixed race and 3 did not reveal their race. Majority of the participants reported being in a relationship with a romantic other ( $n = 103$ , 61.4%) while 64 reported being single.

An online survey was administered by the first author to undergraduate students at a local university college in Malaysia. Students were asked to volunteer their participation. No incentives were provided. This study was approved by the research offices of both authors' institutions. The majority of students who participated were enrolled in a diploma program ( $n = 90$ , 53.9%), while 77 were pursuing degree program. Participants were enrolled in a variety of programs including advertising, broadcast communication, journalism, media studies, public relations, counseling, and psychology.

### 2.2. Measures

Rosenberg Self-esteem Scale [28] that included 10-items was used to measure self-esteem ( $M = 2.93$ ,  $SD = 0.59$ ). Example of an item: "On the whole, I am satisfied with myself." Participants responded to each item using a 5-point Likert scale from 1 (strongly agree) to 5 (strongly disagree). Higher scores indicated lower levels of self-esteem. The scale's reported Cronbach alpha was .88 [19]. Alpha for this study was .80.

The UCLA Loneliness scale [29] was used to assess subjective feelings of loneliness ( $M = 2.84$ ,  $SD = 0.96$ ). The 8 items scale included statements such as "There is no one I can turn to" that participants rated using a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Higher scores reflected higher levels of loneliness. The scale's reported Cronbach alpha was .84 [30]. Alpha for this study was .91.

Social Interaction Anxiety Scale [31] is a 20-item measure of social anxiety ( $M = 2.67$ ,  $SD = 0.70$ ). Sample item included: "I have difficulty making eye contact with others." Respondents rated the items on a 5-point Likert scale from 1 (not true of me at all) to 5 (extremely true of me). Higher scores reflected higher levels of social interaction anxiety. Cronbach alpha scores ranged from .85 to .90 [32]. Alpha for this study was .90.

The CIU Scale [33] that measures aspects of loss of control, preoccupation, withdrawal symptoms, coping, and conflict with regard to the Internet use was administered ( $M = 2.96$ ,  $SD = 0.68$ ). Sample item from the 14-item scale included: "I continue to find it difficult to stop using the Internet when I am online." Participants rated each item on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Higher scores reflected higher levels of compulsive use. Cronbach alpha was reported at .90 [19]. Alpha for this study was .87.

Five items from the original 14-item Internet Effects Questionnaire [17] was used to measure PPB of Internet use ( $M = 2.83$ ,  $SD = 0.73$ ). These items included: "I find that talking or writing to strangers online has helped me cope with everyday stress," "I have found that talking or writing to people online helps me cope with my personal problems," "When I use the Internet for a long period of time, I start to forget about problems that I may have," "Using the Internet has helped me to be more confident in everyday social settings," and "I have formed a relationship online, be it platonic or romantic in nature." Participants responded to each item using a 5-point Likert scale from 1 (Strongly disagree) to 5 (Strongly agree). Higher scores indicate higher levels of PPB from Internet use. Alpha for these 5-items was .70.

A modified Internet Attitudes Survey [34] was administered to identify the function of the Internet for participants. Two subscales were created from selected items to reflect CMC for emotional/social support and romantic/sexual relationship. Three items from the scale that reflected a need for affiliation: "to chat with other individuals online," "to meet and interact with new, exciting people," and "to meet and interact with others who share interests that are similar to mine," together with two new items: "to seek advice for personal problems," and "to give advice to friends for their personal problems" were used to reflect CMC for emotional/social support ( $M = 2.66$ ,  $SD = 0.73$ ). Alpha for these 5-items was .76. The subscale CMC for romantic or sexual relationships was created from three items ( $M = 3.86$ ,  $SD = 0.98$ ): "to look for others with whom I can develop a romantic relationship," "to look for others with whom I can have a sexual relationship," "to view things that some might consider pornographic." Alpha for these 3-items was .76. Participants responds to each item on the scale using a 5-point Likert scale from 1 (strongly

agree) to 5 (strongly disagree). The scoring was reversed coded so that higher scores reflected more frequent CMC for the purpose stated.

**2.3. Data Analysis**

The path model (Figure 1) was examined using MPlus v. 6.1 [35]. Four model fit indices were used: (a) Chi-square values, which were not significant when model fit is good; (b) Comparative Fit Index (CFI), with values above .90 indicating a reasonably good fit [36]; (c) Tucker-Lewis index (TLI), with values above .90 indicating a reasonably good fit [36]; and (d) Root Mean Square Error of Approximation (RMSEA), with values less than .08 indicating adequate fit [37].

In addition to the overall model that combined men and women in this sample, group comparisons across sex were performed. Prior to group comparisons, group invariance was

determined using configural and metric invariance to ensure that the measurement properties were similar across groups [38]. Change in CFI values between configural and metric invariance of less than or equal .01 indicate trivial measurement invariance [39]. Group invariance was less than .01 indicating that measurement properties were similar for men and women in this sample. Group comparisons were then determined by the Wald  $\chi^2$  test. A significant Wald test would suggest group differences.

**3. Results**

Descriptive statistics and summary of bivariate correlations are reported in Table 1. For both men and women, loneliness, self-esteem and social anxiety were strongly related, and PPB and CMC for social interaction were strongly related.

*Table 1. Summary of Intercorrelations and Descriptive Statistics for Psychological Health, Internet Use and Psychological Benefits.*

Variables	1	2	3	4	5	6	7
Low Self-esteem	-	.31**	.45***	.10	-.04	-.01	.14
Loneliness	.29*	-	.31***	.11	.08	-.20*	-.21*
Social Anxiety	.52***	.56***	-	-.07	-.02	.05	.04
Compulsive Internet Use	.26	.15	-.03	-	-.07	.04	.11
Psychological Benefits	.09	-.30*	-.14	-.40**	-	-.56***	-.37***
Emotional/Social	.10	.24	-.02	.56***	-.49***	-	.04
Romantic/Sexual	-.30*	-.04	-.23	.29*	-.37**	.30*	-
Male: Mean (SD)	2.92 (.69)	2.94 (.96)	2.74 (.65)	3.04 (.66)	3.01 (.76)	2.55 (.82)	3.40 (.98)
Female: Mean (SD)	2.94 (.54)	2.80 (.96)	2.64 (.73)	2.92 (.69)	2.75 (.70)	2.70 (.68)	4.06 (.91)

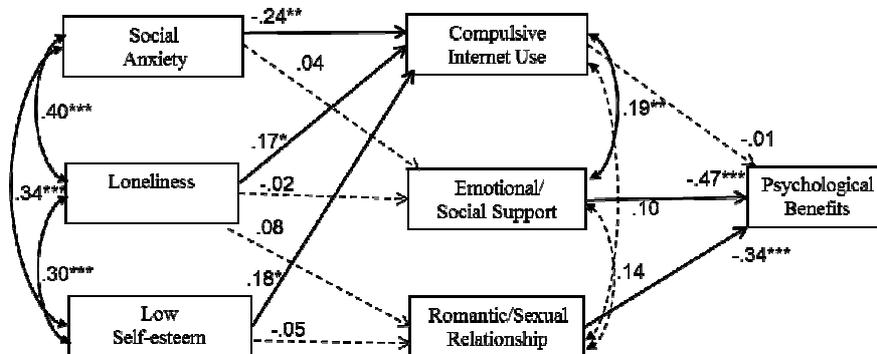
\*p < .05. \*\*p < .01. \*\*\*p ≤ .001.

Results for the path analysis are presented in Figures 1 (combined), 2a (men) and 2b (women). Values of fit indices (reported below Figures 1 and 2) suggested that the models were acceptable and fit the current data well. For all models, Chi-square was not significant, RMSEA < .08, CFI > .90 and TLI > .90. Subsequent to establishing an acceptable measurement model, the model was tested using the maximum likelihood method.

H1: Loneliness, social anxiety and low self-esteem will be positively related to CIU. H1 was supported in the combined model for loneliness ( $\beta = .17, p = .03$ ) and low self-esteem ( $\beta = .18, p = .02$ ). H1 was further supported in the men’s model

for loneliness ( $\beta = .50, p = .001$ ) and low self-esteem ( $\beta = .35, p = .008$ ). H1 was not supported in the women’s model. Contrary to the hypothesis, social anxiety was negatively related to CIU in all 3 models (Combined,  $\beta = -.24, p = .004$ ; men,  $\beta = -.60, p < .001$ ; women,  $\beta = -.19, p = .04$ ).

For men only was loneliness and low self-esteem related to CIU. Men and women with higher levels of social anxiety were less likely to be compulsive Internet users. Together, low self-esteem, loneliness, and social anxiety accounted for 7% ( $p = .05$ ) of the variance in CIU in the combined model and 26% ( $p = .013$ ) in the men’s model.



*Figure 1. Model Examine the Relationship Between Psychological Health, Internet Use and Psychological Benefits for Men and Women Combined. Goodness of fit indices:  $\chi^2(5) = 4.62, p = ns; RMSEA = .00; CFI = 1.00; TLI = 1.02$*

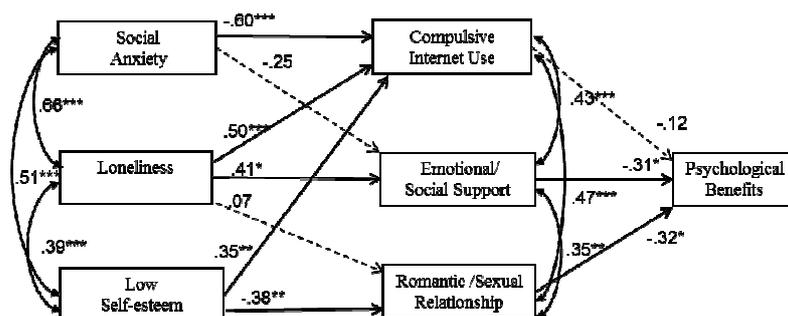


Figure 2a. Model Examine the Relationship Between Psychological Health, Internet Use and Psychological Benefits for Men.

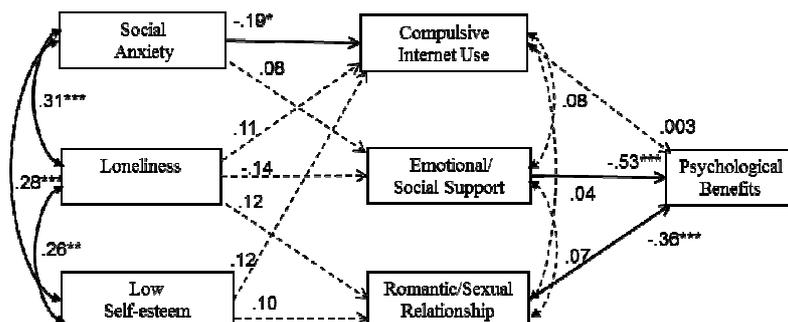


Figure 2b. Model Examine the Relationship Between Psychological Health, Internet Use and Psychological Benefits for Women. Goodness of fit indices:  $\chi^2 (10) = 12.27$  (Men = 8.81, Women = 3.46),  $p = ns$ ; RMSEA = .05; CFI = .98; TLI = .94; \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p \leq .001$ .

H2: Loneliness and social anxiety will be positively related to CMC for emotional/social support. H2 was supported in men’s model for loneliness ( $\beta = .41, p = .02$ ) but not social anxiety. H2 was not supported in the combined or women’s models. Higher levels of loneliness among men were related to seeking emotional/social support online.

H3: Loneliness will be positively related to CMC for romantic/sexual relationships and low self-esteem will be negatively related to CMC for romantic/sexual relationships. H3 was not supported for loneliness in all 3 models. H3 was supported only in the men’s model for low self-esteem. Low self-esteem was negatively related to CMC for romantic/sexual relationships ( $\beta = -.38, p = .004$ ). Men with lower self-esteem were less likely to use the Internet to seek romantic/sexual relationships compared to men with higher self-esteem.

H4: CIU will be negatively related to PPB. H4 was not supported in all 3 models. CIU is not significant related to PPB.

H5: CMC for romantic/sexual relationships and emotional/social support will be positively related to PPB. Contrary to the hypothesis, CMC for romantic/sexual relationships and emotional/social support were negatively related to PPB in all 3 models. CMC for romantic/sexual relationships was significant in the combined model ( $\beta = -.34, p < .001$ ), men’s model ( $\beta = -.32, p = .01$ ) and women’s model ( $\beta = -.36, p < .001$ ). CMC for emotional/social support was significant in the combined model ( $\beta = -.47, p < .001$ ), men’s model ( $\beta = -.31, p = .02$ ) and women’s model ( $\beta = -.53, p < .001$ ). The results suggest that CMC for social interaction is perceived as detrimental to psychological functioning by both

men and women in the sample.

Together, CIU, CMC for romantic/sexual relationships and CMC for emotional/social support accounted for 39% ( $p < .001$ ) of the variance in PPB in the combined model, 33% ( $p = .003$ ) in the men’s model and 42% ( $p < .001$ ) in the women’s model.

In the men’s model, in addition to direct effects on PPB, indirect effects of loneliness on PPB via CMC for emotional/social support and low self-esteem on PPB via CMC for romantic/sexual relationship were examined. Results revealed no indirect effects.

### 3.1. Group Comparison

Wald tests were performed to determine differences across sex only for paths that were significant in both the men and women’s model. Three paths were examined. From social anxiety to CIU – Wald test ( $\chi^2 = 5.38, p = .02$ ) indicated that there was a significant difference between men and women’s models. The strength of the relationship between social anxiety and CIU was significantly more for men ( $\beta = -.60, p < .001$ ) than for women ( $\beta = -.19, p = .04$ ) suggesting that compared to women, men who were socially anxious were less likely to be compulsive Internet users.

Second, the path from CMC for romantic/sexual relationships to PPB – Wald test was not significant indicating no difference between men and women. Third, the path from CMC for emotional/social support to PPB – Wald test ( $\chi^2 = 4.21, p = .04$ ) indicated that there was a significant difference between men and women’s models. The strength of the relationship between CMC for emotional/social support and PPB was significantly more for women ( $\beta = -.53, p < .001$ )

than for men ( $\beta = -.31, p = .02$ ) suggesting that compared to men, women were less likely to benefit psychologically from CMC when it is used to seek emotional/social support.

### 3.2. Secondary Analysis

Two alternative models were tested. The first model tested CIU, CMC for emotional/social support and CMC for romantic/sexual relationship to loneliness, self-esteem and social anxiety. This fully identified model resulted in only one significant path in the combined model. CIU was related to low self-esteem ( $\beta = .16, p = .04$ ). No significant paths were indicated in the women's model.

In the men's model, CIU ( $\beta = .40, p = .005$ ) and CMC for romantic/sexual relationship ( $\beta = -.48, p < .001$ ) were related to low self-esteem. Together, CIU and CMC for emotional/social support and romantic/sexual relationship accounted for 26% ( $p = .02$ ) of the variance in low self-esteem. *These results suggest a bidirectional relationship between CIU and self-esteem and CMC and self-esteem for men. CIU may reduce self-esteem whereas making romantic/sexual connections online may increase self-esteem for men.* These results warrant further testing.

The intent of the second model was to test if CIU alone (and not CMC) was related to PPB. The model tested loneliness, self-esteem and social anxiety to CIU and CIU to PPB. The combined model fit indices were RMSEA = .031, CFI = .91, and TFI = .87. The sex comparison model fit indices were: RMSEA = .08, CFI = .87, TFI = .70. CIU did not significantly relate to PPB in the combined and women's models.

In the men's model, CIU was related to PPB ( $\beta = -.39, p = .002$ ) with a non-significant  $\chi^2$ . In addition, self-esteem ( $\beta = .4, p = .003$ ), loneliness ( $\beta = .52, p = .001$ ) and social anxiety ( $\beta = -.66, p < .001$ ) were significantly related to CIU, explaining 30% ( $p = .007$ ) of the variance in CIU. Loneliness was also related to PPB via CIU ( $\beta = -.20, p = .05$ ) and social anxiety was related to PPB via CIU ( $\beta = .26, p = .02$ ).

Results indicate that although men perceive not benefitting psychologically from CIU, the strong correlation between CMC and CIU (refer to Figure 2a), appear to ameliorate CIU's effect on PPB. This suggests that men's CMC for social interaction may be compulsive. Results also suggest that only for men psychological health explained CIU that in turn reduced PPB. Conclusions are however tentative given the less than ideal fit indices of the alternative model.

## 4. Discussion

This study applied online disinhibition effect [1] to examine PPB derived from CMC. The models examined the relationship between psychological health (loneliness, self-esteem and social anxiety) and CMC for social interaction (to seek romantic/sexual relationships and emotional/social support), CIU and PPB derived from CMC. Group comparisons across sex were also examined.

The negative relationship between CMC used to meet social needs whether emotional/social or for romantic/sexual relationships, and PPB derived from CMC was contrary to

previous studies [18] that found psychological benefits from online chats. For participants in this study, CMC may be antithesis to their expectations, i.e., reduced stress and personal problems, and more relationships and confidence in social settings. This finding supports previous studies that found online relationships may not be as satisfying as FtF relationships because the lack of visual and aural cues associated with CMC [40] can contribute to decreased sensitivity rendering CMC impersonal. Hence, features of online disinhibition effects such as privacy and anonymity, may not serve Internet users' social needs. It is possible that for this sample of university students who are seeking to develop intimate relationships (whether emotional or sexual), the unfulfilled expectations of online relationships evolving to FtF relationships may henceforth add stress and disappointment. This may be especially so if substantial time is invested in the relationship. Frequent instant messaging type conversations were found to correlate with the desire to meet FtF [41].

Gender difference is apparent in how CMC meets emotional/social support needs of participants. Women reported benefiting less from online emotional/social support compared to men. For women, who tend to seek privacy in the form of intimacy [42], the inability to connect sufficiently to share at a deep level and the limitations inherent in virtual environments such as the inability to include non-verbal cues, may hinder intimacy. Men on the other hand, who are more inclined to isolate for privacy [42] may find CMC provides the space they need/seek.

Furthermore, previous studies that found women tend to disclose more amount and breadth than men [43] may explain the higher level of discontent among women. Women who disclose more may also expect more from their online relationships than men. For women in this study, disinhibition did not explain the use of CMC for social interaction – psychological health did not relate to CMC. Being inhibited alone may not be sufficient to explain women's online social interaction.

The positive contribution of low self-esteem and loneliness to CIU is consistent with previous studies [5] in that persons with psychosocial problems are more likely to use CMC which can lead to problematic Internet use. People who have low self-esteem are generally less confident of themselves and may find FtF interactions difficult, hence, more driven to use the Internet as an escape or an alternative form of socializing. As a result, their frequent use of CMC could culminate in CIU. This appears to be particularly true for men who seem to be more at risk of developing CIU.

The present result showing loneliness as a significant contributor to CIU use is consistent with previous research that has identified loneliness as the most important predictor variable for problematic Internet use [20]. Lonely persons are also said to use the Internet to get emotional support, to enhance their virtual social interaction and interpersonal development [7]. Similar to low self-esteem, the frequent use of CMC to manage loneliness could culminate in CIU. This too appears to be particularly true for men who seem to be

more at risk of developing CIU.

The negative relationship between social anxiety and CIU is contrary to previous findings (e.g., [23]). In this study, social anxiety suppresses rather than promotes CIU. It appears that the effects of social anxiety may not be exclusive to FtF relationships but online relationships as well. The expectations to respond and reciprocate emotional/social content and for instant feedback on chatrooms and instant messaging platforms may be a deterrent to the socially anxious. This is consistent with the idea that the anxiety provoked in CMC users when expected to communicate thoughts, feelings or opinions in “real time” may avoid CMC [44]. This reverse relationship was true for men and women except that social anxiety was a stronger deterrent for CIU for men.

Only for men did loneliness increase use of CMC for emotional/social support and low self-esteem reduced use of CMC for romantic/sexual relationships. It appears that women’s use of CMC for social interaction is not motivated by poor psychological health.

Several limitations of this study warrant mention. The small sample that consists wholly of university students who are mostly Chinese Malaysians limits its generalizability even in multi-ethnic Malaysia. The inability to determine causal relationships from cross-sectional data is limiting. Further, the use of self-report assessments may not be a true reflection of the construct studied due to social desirability and level of subjectivity. Confounding factors such as the extent of anonymity in CMC for social interaction was not measured. The sharing of photos of self and the form of communication – written, verbal and/or video chat limit anonymity and privacy.

Future research on types of CMC should take into account the degree of self-disclosure including visual and verbal as these different forms of disclosures can affect anonymity and privacy. Studies should also extend beyond university samples, examine gender differences and include longitudinal studies that will allow investigating the bidirectionality variables, such as psychological health/well-being and CIU, and the influence of the type and intent of CMC on psychological functioning.

## 5. Conclusion

As demonstrated, the most notable findings of this study were the negative effect of CMC used to gain emotional/social support and elicit relationship/sexual relationships on perceived psychological benefits. Gender differences that found significant differences in the precursors for CIU were also notable although these results need to be replicated with larger samples.

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