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Cyber dating abuse perpetration and victimization among Chinese college students with a history of peer phubbing: psychological resilience moderates the indirect effect of rejection sensitivity

Wenwu Dai^{1†}, Jiaojiao Lv^{2†}, Hongxia Wang^{1*} and Xiuchao Wei^{3,4*}

Abstract

Background As emerging adults are increasingly reliant on instant messaging applications for communication with romantic partners, cyber dating abuse perpetration (CDAP) and victimization (CDAV) have proliferated. This has aroused the high attention of researchers. This study aimed to explore the mechanism of the influence of peer phubbing on CDAP and CDAV in Chinese context.

Methods 566 Chinese college students (average age of 19.31 years, 47.7% females) were investigated with the generic scale of being phubbed, rejection sensitivity questionnaire, Chinese version of resilience scale and cyber dating abuse questionnaire. The data were analyzed by using a moderated mediation model with SPSS and the PROCESS.

Results The results revealed that: (1) peer phubbing had a significant positive predictive effect on CDAP ($\beta = .32, p < .001$) and CDAV ($\beta = .43, p < .001$) respectively. (2) Rejection sensitivity played a partial mediating role both between peer phubbing and CDAP (indirect effect = .12, 95% CI = [.05, .18], accounting for 37.5%) and CDAV (indirect effect = .09, 95% CI = [.05, .14], accounting for 20.9%). (3) The first half ($\beta = -.27, p < .001$) of the indirect effect of peer phubbing on CDAP and CDAV are weakened by psychological resilience, and the direct paths were also weakened by psychological resilience ($\beta = -.13, p < .001; \beta = -.16, p < .001$).

Conclusion These findings highlight the importance of discerning the mechanisms moderating the mediated paths linking peer phubbing to CDAP and CDAV. The results also underline the importance of implementing measures and interventions to use the protective role of psychological resilience on college students' CDAP and CDAV.

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Keywords Cyber dating abuse perpetration, Cyber dating abuse victimization, Peer phubbing, Rejection sensitivity, Psychological resilience

Background

The number of instant messaging users in China has reached 1.047 billion, with emerging adults accounting for a large proportion. Starting a romantic relationship is one of the most important tasks of young people, with emerging adults are increasingly reliant on instant messaging applications for communication with romantic partners, a new form of interpersonal violence to perpetrate cyber dating abuse has proliferated [1]. Cyber dating abuse refers to the control, harassment, stalking and abuse of one's dating partner via technology and social media [2], which includes two behavioral dimensions: direct cyber aggression (e.g., perpetrators intimidate or harass their romantic partners by sending text messages containing threats of physical harm and/or insults) and cyber monitoring (e.g., perpetrators call or text their romantic partners repeatedly to monitor who they are around and restrict their communication with select individuals) [3].

In cyber dating abuse situation, there is both perpetration and victimization. As the deleterious consequences for the engagement in cyber dating abuse, which has attracted the widespread attention of researchers. Cyber dating abuse victimization (CDAV) is linked with many emotional problems and conduct problems like depressive symptoms, emotional/psychological distress, substance use and delinquency behaviors [2, 4–6]. Cyber dating abuse perpetration (CDAP) is also related to health risk behavior such as increased substance use [7]. As the cyber dating abuse has become increasingly widespread in Chinese young people, whereas the empirical research on the predictors of CDAP and CDAV is limited [8]. Therefore, it is of great significance to explore the antecedents of CDAP and CDAV, especially in Chinese context.

From adolescence to emerging adults, individuals are more connected to their peers than ever before. However, exclusion and neglect come from peers can increase young people's dating violence perpetration and victimization [9, 10]. Peer phubbing, a new phenomenon that peers use or were distracted by their smartphones when interacting. To date, to our knowledge, no study has investigated the relationships between peer phubbing and CDAP/CDAV, nor expounded its specific internal mechanism. The current study thus would investigate the possible links and its internal mechanism between peer phubbing and CDAP/CDAV among college students in China.

The direct associations of peer phubbing with CDAP and CDAV

Although the direct associations of peer phubbing with CDAP and CDAV have not been studied, some existing indirect evidence could give some support. For instance, previous studies have revealed a positive link between adverse peer experiences and CDAP [11] and traditional dating violence victimization [12], suggesting that the victimization experience in peer interaction context can be extended to future perpetration and victimization in romantic relationship.

In a phubbing situation, the performing it becomes the phubber, whilst the one receiving it is the phubbee [13]. In social interaction, individuals expect others to pay attention to them, but phubbing makes them feel ostracized. Phubbing has been shown to have a negative effect on social life and to induce dissatisfaction in a phubbee [14]. For example, in a romantic relationship, phubbees feel depressed, and are dissatisfied with the quality of the relationship, leading to conflict [15, 16]. According to frustration-aggression theory, the frustration would present when the actual situation does not attain the psychological expectations, and then leads to aggression [17]. Similarly, social information-processing model suggests that biases in processing (e.g., hypervigilance to threat) may provoke dysregulated emotions and behaviors (e.g., emotion dysregulation, aggression) in response to any provocation interpreted as hostile, resulting in increased risk for adverse peer experience [18]. Aggression may not be directed at the person causing the frustration but be directed at innocent others. Besides, being phubbed by peers is positively associated with social networking site addiction [19], concurrently, electronic equipment enables perpetrators more likely to commit deviant acts and reduce the emotional response, which may lead to less empathy and more aggression. Therefore, frustrated phubbee may perpetrate more CDAP behavior in romantic relationship.

Additionally, peer phubbing sends the signal of disrespectful, which can create loss of face and further trigger negative affective and cognitive state, such as hostility, anxiety, depression, internet addiction and negative self-evaluation [20, 21]. According to the poly-victimization theory, victimization often does not occur in isolation but is frequently followed by other forms of abuse [22]. Victimization in one context can make youth vulnerable to other types of victimization and thus extend their victim status over time [23]. Cognitive-behavioral model emphasizes that if individuals' beliefs about themselves or others are distorted, which is especially likely to occur in

distressing situations, emotional and behavioral reactions can become dysfunctional. Others' responses to these dysfunctional reactions can create a negative feedback loop in which the distorted beliefs are confirmed and give rise to greater dysfunctional reactions, with implications for clinical outcomes. Research has shown that individuals with high psychological distress, low friends support, self-esteem, self-control are more likely to report more CDAV [6, 24]. Therefore, individuals who are ignored and excluded in peer phubbing are more likely to report more CDAV.

The mediating role of rejection sensitivity

Rejection sensitivity refers to overreacting and being sensitive to rejection signals in interpersonal relationships [25]. Individuals high in rejection sensitivity are extremely concerned about being rejected by others and tend to overinterpret vague rejection sensitivity model [26, 27], rejection sensitivity stems from previous rejection experiences, such as childhood maltreatment, rejecting, coercive, or psychologically controlling parenting [28, 29]. People whose co-present peers concentrating on their mobile screens feeling excluded and their needs for acceptance are unmet [30], as mentioned above, peer phubbing is also considered as an ostracized behavior [19]. Longitudinal research has shown that peer rejection experiences significantly increase individuals' rejection sensitivity [27, 31], thus individuals experience more peer phubbing are more likely to have a lower threshold for reacting to social rejection cues, namely higher rejection sensitivity.

Individuals with high rejection sensitivity are more likely to involve in CDAP and CDAV. In the field of traditional intimate partner violence and peer violence, researchers have found rejection sensitivity positively predicted perpetration and victimization [32, 33]. As a negative schema related to anger in the anticipation of rejection [34, 35], people high in rejection sensitivity are likely to react with increased hostile feelings toward others and trigger more aggression [34], such as traditional intimate partner violence [33]. Besides, anxious rejection sensitivity is a significant predictor both for victims and perpetrators of dating violence, including CDAP [36, 37]. Peer rejection during social interaction conveys explicit rejection feedback, individuals with high rejection sensitivity are supposed to anxiously expect, readily perceive, and overreact to the threat of rejection and thereby getting into a vicious cycle with repeated experiences of rejection, negative interpersonal consequences and negative well-being [32]. Rejection sensitivity has been reported to link with various psychological disorders and lower mental well-being [38], in turn may increase the risk of experiencing dating violence victimization [39]. Previous research has verified the mediation of rejection

sensitivity in the association of adverse interpersonal experiences with aggression and victimization [36, 40]. To test above view, we supposed that rejection sensitivity would play a mediating role in the relationship between peer phubbing and CDAP and CDAV.

The moderating role of psychological resilience

Positive psychological resource can protect people against adversity, and expand themselves from such experiences [41]. Psychological resilience is considered a crucial internal resource, which refers to "individual's good adaptation to adversity, trauma, tragedy, threat, or other major life stressors" [42]. Individuals with high psychological resilience possess more resources to cope with stressful encounters and are likely to reframe adversity as an opportunity for growth [43]. According to the protective mechanism of psychological resilience, psychological resilience could protect individuals against the impact of adversity on psychological and behavioral development [44]. Therefore, psychological resilience may relieve the negative influence of adverse experiences on individuals internal-schema and behavioral health. That is, psychological resilience would buffer the links between peer phubbing and its negative consequences, such as rejection sensitivity and CDAP and CDAV.

As far as we know, there are no studies explored whether psychological resilience could weaken the relationships between peer phubbing and CDAP and CDAV. However, researchers found that rejection experience increases health-risk behaviors (e.g., aggressive behavior, drug and alcohol use) [45], and emotional problems (e.g., emotion dysregulation, anxiety) for adults who reported lower psychological resilience than those high in psychological resilience [46]. In turn, these emotional problems and risky behaviors are significantly linked with traditional and cyber dating abuse perpetration and victimization [11, 12, 47, 48]. Besides, the direct evidence verifies the buffer role of psychological resilience in the association of early negative interpersonal interaction and later aggression [49, 50]. Therefore, psychological resilience may serve as a protective role to alleviate the effects of peer phubbing on CDAP and CDAV.

We also expected that psychological resilience may weaken the association of peer phubbing with rejection sensitivity, and further weaken the relationship between peer phubbing and CDAP and CDAV through the mediation of rejection sensitivity. An increasing number of scholars have demonstrated that psychological resilience moderates the link between stressful interpersonal events and negative cognitive-affective schema. For instance, psychological resilience alleviates individuals' psychological reactance and materialism after exposing to parental psychological control [49]. Psychological resilience was found to have a protective function between

cyberbullying victimization and fatalism (e.g., a belief in powerlessness) [51], which is closely linked with rejection concerns [52]. Moreover, depression is a salient outcome of rejection sensitivity [38, 53], extensive evidence has supported the protective role of psychological resilience on depression induced by interpersonal exclusion [54, 55]. Thus, we supposed that the relationship between peer phubbing and rejection sensitivity would be strengthened among college students who reported lower psychological resilience.

The current study

In the present study, we provide a preliminary understanding of Chinese college students' CDAP and CDAV from the perspective of peer phubbing. Through the lens of rejection sensitivity model and protective mechanism of psychological resilience, we would investigate how and when peer phubbing is related to CDAP and CDAV by considering rejection sensitivity as a mediator and psychological resilience as a moderator. Therefore, a moderated mediating model was built to test the following hypotheses (Fig. 1):

H₁ Peer phubbing would be positively associated with CDAP and CDAV.

H₂ Rejection sensitivity would mediate the relationship between peer phubbing and CDAP and CDAV.

H₃ Psychological resilience would weaken the direct association of peer phubbing with CDAP and CDAV.

H₄ Psychological resilience would weaken the direct association of peer phubbing with rejection sensitivity and further weaken the associations of peer phubbing with CDAP and CDAV through the mediation of rejection sensitivity.

Methods

Participants

Initially, a sample of 741 college students from two universities in China was recruited to complete anonymous online questionnaires. Participants were required to have a romantic partner in the last year or being in a current romantic relationship. After removing participants who did not meet the requirement, the final sample ($N=566$) consisted of 270 females and 296 males. They came from 13 provinces and cities across the country, and with an average age of 19.31 years ($SD=.74$). There were 344 participants from Cities and towns and 222 from rural areas. The proportion of only-child among participants was 52.65%.

Measures

Peer phubbing

The Generic Scale of Being Phubbed was slightly modified to measure the peer phubbing behavior perceived by college students [56]. There were 22 items (e.g., "My friends/classmates shift their attention from me to their phones"), which were rated on a 7-point Likert scale from 1 (never) to 7 (always). The higher the average score, the more peer phubbing behavior perceived by college students. This scale has been validated and successfully used among Chinese college students [19]. In this study, Cronbach's α coefficient of the questionnaire was .86.

Rejection sensitivity

Rejection sensitivity was assessed by the 18-item Rejection Sensitivity Questionnaire [25]. Every item describes a potential rejection scenarios (e.g., "You ask your boyfriend/girlfriend to come home to meet your parents") in which participants were required to rate their rejection anxiety (e.g. "How concerned would you be over whether or not your boyfriend/girlfriend would want to see your parents?") on a 6-point Likert scale from 1 (Very unconcerned) to 6 (Very concerned) and their expectations for the event (e.g. "I expect that my boyfriend/girlfriend

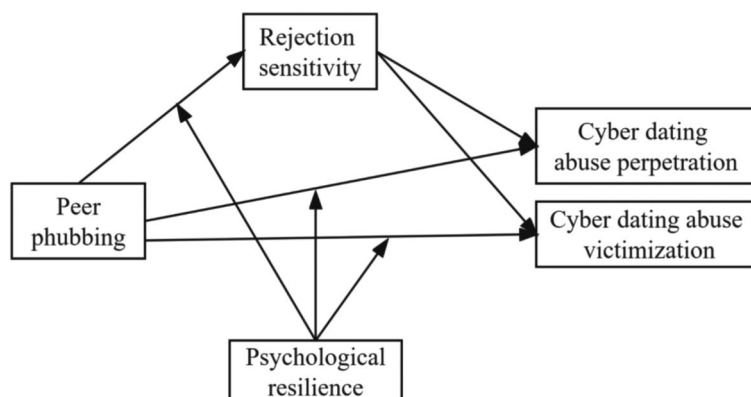


Fig. 1 The proposed moderated mediation model

would want to see my parents”) on a 6-point Likert scale from 1 (Very unlikely) to 6 (Very likely). The final score = (the score of rejection anxiety × the reverse score of expectations of acceptance)/18, the higher the score represented the phenomenon of rejection sensitivity more serious. In this study, Cronbach’s α coefficient of the questionnaire was .75.

Psychological resilience

Psychological resilience was assessed through the Chinese version of Resilience Scale [42]. This scale includes 27 items (e.g., “I think adversity has a motivating effect on people”), and each item was required to rate on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Higher average scores indicated higher levels of psychological resilience. In this research, Cronbach’s α coefficient of the questionnaire was .83.

Cyber dating abuse perpetration and victimization

CDAP and CDAV were assessed through 40-item Cyber Dating Abuse Questionnaire [3], in which 20 items for CDAP (e.g., “I sent insulting and/or humiliating messages to my partner or former partner using new technologies”) and 20 items for CDAV (e.g., “My partner or former partner has threatened to hurt me physically with new technologies”). Participants rated each item on a 6-point Likert scale from 1 (never) to 6 (Usually), and higher average scores indicated higher levels of CDAP and CDAV. In this research, Cronbach’s α coefficients for the CDAP and CDAV were .79 and .81, respectively.

Procedure

This research was approved by Ethics Committee of Beijing Forestry University. Informed consent was obtained by clicking on the hyperlink that took to the consent page, and only those who have fulfilled the consent process were allowed to access to questionnaires. Convenient sampling by sharing electronic links via WeChat was used to recruit participants. Participants were informed that their data would be confidential and anonymous before they responded to online questionnaires consisting of peer phubbing, rejection sensitivity, psychological resilience, CDAP and CDAV. Only all questions have

been completed, participants could submit successfully, and participants were assured that they could withdraw from the investigation at any time.

Data analysis

First, any data point that fell three or more SD from the mean was regarded as an outlier, which were taken as missing value (<0.1%) and further handled by multiple imputation approach. Second, descriptive statistics and Pearson correlations were computed to analyze the relationships among peer phubbing, rejection sensitivity, psychological resilience, CDAP, and CDAV. Third, to investigate how peer phubbing was associated with CDAP and CDAV, the mediation of rejection sensitivity was tested by model 4 of the PROCESS macro. Fourth, to further explore when peer phubbing predicted CDAP and CDAV, the moderating effect of psychological resilience was tested via model 8 of the PROCESS macro. All data was analyzed through the version of 23.0 of SPSS.

Common method bias

Restricted by objective conditions, this study only used the method of self-report by the subjects to collect data, and the results may be affected by common method bias. To reduce common-method-bias due to self-report, this study controlled for it procedurally and statistically. In terms of procedures, this study used anonymous surveys and reverse scoring of some items to carry out certain controls; in terms of statistics, we examined common method variance. Harman’s single factor test found that a total of 16 factors had eigenvalues greater than 1 and the first variance explanation rate was 14.75%, which is less than the critical value of 40%, indicating no significant common method bias in this study.

Results

Descriptive and correlation analyses

The results of Mean, SD, and Pearson correlations for various variables were showed separately for male and female in Table 1. For male, peer phubbing and rejection sensitivity were significantly and positively related to CDAP and CDAV. For female, the positive associations of peer phubbing and rejection sensitivity with CDAP

Table 1 Means, Standard Deviations, and zero-order correlations for various variables

Variables	Male	Female	1	2	3	4	5
	M(SD)	M(SD)					
1. PP	2.59(.89)	2.67(.97)	1	.36***	-.12*	.50***	.37***
2. RS	7.87(1.20)	8.02(1.57)	.34***	1	-.28***	.44***	.46***
3. PR	3.48(.77)	3.44(.73)	-.02	-.19***	1	-.18**	-.23***
4. CDAP	1.42(.73)	1.45(.79)	.35***	.30***	-.09	1	.46***
5. CDAV	1.73(.87)	1.85(1.01)	.26***	.33***	-.09	.35***	1

Note Correlations for male and female were displayed above and below the diagonal, respectively. PP:Peer phubbing; RS:Rejection sensitivity; PR:Psychological resilience; CDAP: Cyber dating abuse perpetration; CDAV: Cyber dating abuse victimization. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 2 Testing the moderating role of psychological resilience in the Mediation Model

Predictors	RS		CDAP		CDAV	
	β	<i>t</i>	β	<i>t</i>	β	<i>t</i>
PP	.31	8.38***	.21	5.19***	.34	8.86***
PR	-.17	-4.49***	-.06	-1.51	-.04	-.96
PP×PR	-.27	-7.88***	-.13	-3.59***	-.16	-4.40***
RS			.26	6.07***	.20	4.73***
<i>R</i>	.50		.47		.52	
<i>R</i> ²	.25		.22		.27	
<i>F</i>	63.11***		68.62***		53.15***	

Note PP:Peer phubbing; RS:Rejection sensitivity; PR:Psychological resilience; CDAP:Cyber dating abuse perpetration; CDAV:Cyber dating abuse victimization. ****p*<.001

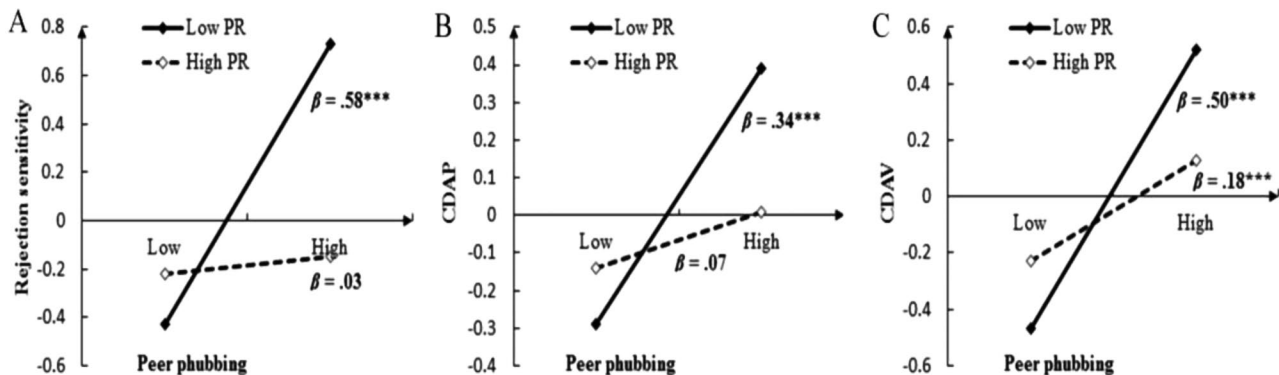


Fig. 2 The moderating role of psychological resilience. Note **A, B, C** indicate the moderating role of psychological resilience in the relationship between peer phubbing and rejection sensitivity, cyber dating abuse perpetration, and cyber dating abuse victimization, respectively. PR indicates psychological resilience, CDAP indicates cyber dating abuse perpetration, CDAV indicates cyber dating abuse victimization. ****p*<.001

and CDAV were also significant. Additionally, CDAP was positively correlated with CDAV both for male and female.

Direct effect of peer phubbing

The total effects of peer phubbing on CDAP and CDAV were tested. The results indicated that peer phubbing predicted CDAP positively and significantly, total effect=.32, SE=.04, 95% CI = [.24, .40]. The positive prediction of peer phubbing on CDAV also was significant, total effect=.43, SE=.04, 95% CI = [.36, .50]. These results supported the H₁.

Mediating effect of rejection sensitivity

The Model 4 was run 2 times to test the mediating effect of rejection sensitivity, and the peer phubbing was taken as independent variable, while CDAP and CDAV were taken as dependent variables. When rejection sensitivity was taken into account as the mediating variable, peer phubbing was significantly and positively related to rejection sensitivity (β =.35, *p*<.001), in turn it was significantly and positively related to CDAP (β =.33, *p*<.001) and CDAV (β =.27, *p*<.001). In addition, the direct effects of peer phubbing on CDAP (β =.20, *p*<.001) and CDAV (β =.34, *p*<.001) were still significant. Bootstrap was used to test the indirect effect, the results showed

that the indirect effect of rejection sensitivity in the association of peer phubbing with CDAP was significant (β =.12, SE=.03, CI = [.05, .18]) and the ratio of indirect effect to total effect was 37.5%. There was also a significant indirect path from peer phubbing to CDAV through rejection sensitivity (β =.09, SE=.03, 95% CI = [.05, .14]) and the ratio of indirect effect to total effect was 20.9%. These results supported the H₂.

Moderating effect of psychological resilience

As shown in Table 2, peer phubbing significantly interacted with psychological resilience on CDAP (β = -.13, *p*<.001) and CDAV (β = -.16, *p*<.001), indicating that higher levels of psychological resilience buffered the positive direct associations of peer phubbing with CDAP and CDAV. The results of simple slope tests (see Fig. 2B and C) indicated that when psychological resilience=M-1SD, the direct effect of peer phubbing on CDAP was .07, SE=.05, *p*>.05, 95% CI = [-.03, .18] and on CDAV was .18, SE=.05, *p*<.001, 95% CI = [.08, .28], respectively; when psychological resilience=M+1SD, the direct effect of peer phubbing on CDAP was .34, SE=.06, *p*<.001, 95% CI = [.23, .45] and on CDAV was .50, SE=.05, *p*<.001, 95% CI = [.39, .60], respectively. These results supported the H₃.

Additionally, peer phubbing significantly interacted with psychological resilience on rejection sensitivity ($\beta = -.27, p < .001$), indicating that higher levels of psychological resilience buffered the positive association of peer phubbing with rejection sensitivity. The results of a simple slope test (see Fig. 2A) indicated that when psychological resilience = $M - 1SD$, the direct effect of peer phubbing on rejection sensitivity was .03 ($p > .05$); when psychological resilience = $M + 1SD$, the direct effect was .58 ($p < .001$). Moreover, increased levels of psychological resilience weakened the indirect effects of peer phubbing on CDAP and CDAV via the mediating effect of rejection sensitivity. For the former (see Fig. 2B), when psychological resilience = $M - 1SD$, the mediating effect = .15, $SE = .05$, 95% $CI = [.06, .25]$; when psychological resilience = $M + 1SD$, the mediating effect = .01, $SE = .02$, 95% $CI = [-.03, .05]$. For the latter (see Fig. 2C), when psychological resilience = $M - 1SD$, the mediating effect = .11, $SE = .04$, 95% $CI = [.05, .19]$; when psychological resilience = $M + 1SD$, the mediating effect = .01, $SE = .02$, 95% $CI = [-.02, .04]$. These results supported the H_4 and the moderated mediation model.

Discussions

The current study was designed to clarify the associations of peer phubbing with CDAP and CDAV, elucidated how rejection sensitivity may link this relationship, and described the protective role of psychological resilience in this association. While previous research has investigated the association of being phubbed with dysfunctional emotions and behavior [19, 57], to our knowledge, this was the first research to specifically consider the impact of being phubbed by peers on online aggression and victimization in romantic relationship. As such, significant findings were discussed in detail.

The direct effect of peer phubbing on CDAP and CDAV

The results indicated that higher levels of peer phubbing were positively associated with the CDAP and CDAV. Peer phubbing, a form of smartphone-induced social exclusion [19], Those being phubbed report that they will also engage in phubbing when they are phubbed by someone else [20]. In other words, mobile phone addiction increased after being phubbed [58], which increases their chances of cyber dating. Meanwhile, being phubbed was associated positively with anxiety, depression, negative self, hostility [21], and these high psychological distress co-occurrences with CDAP and CDAV [6].

With regard to CDAP, these distorted emotion and cognition are likely to increase the deviate behaviors in romantic relationship, such as controlling or monitoring partners and sending humiliating text toward partners with the aid of technology [37, 59, 60]. With regard to CDAV, college students who experienced peer phubbing

are likely default to a passive role in social interactions, making them easy targets of CDAV [18]. Moreover, a history of peer exclusion predicts re-victimization later in dating relationship, which supports the notion of “cycle of victimization” [12].

Mediating effect of rejection sensitivity

First, with regard to link between peer phubbing and rejection sensitivity, which supported the notion that rejection sensitivity stems from previous rejection experiences [27, 31, 61]. Exposure to peer exclusion has widespread influence for negative consequences of psychosocial development, such as heightened sensitivity of others' evaluation and feedback, emotion dysregulation, and further adjustment difficulties [18]. It is worth noting that our finding innovatively extended this link into the use of mobile phone during peer interaction.

Second, rejection sensitivity is positively related to CDAP and CDAV, which is consistent with previous research [32, 33]. Rejection sensitivity model to provide an account of why experience rejection in peer relationships go on to show interpersonal difficulties (e.g., aggression and social anxiety/withdrawal) [25, 27].

Third, consistent with the notion of revised rejection sensitivity model [26], the present study demonstrated that rejection sensitivity mediated rejection experiences and certain dysfunctional behaviors [36, 40]. That is, negative interactions with peers may adversely impact college students' social information processing, with a hypervigilance to rejection, resulting in consequences for negative romantic relationships. Potential rejection scenarios may trigger the defensive motivational system of college students with high level of rejection sensitivity [35], and then rejection sensitivity in fostering a hostile and aggressive interpersonal style, which can promote violence in peer and romantic relationships, such as CDAP. Besides, rejection-sensitive individuals may also express anxiety response in rejection scenarios, which increases their possibility of accepting hostile behavior from a partner to stave off rejection [33], and leave them more vulnerable to CDAV.

This finding extended the revised rejection sensitivity theory by applying it into the peer exclusion induced by mobile phone, and further advanced our understanding of how peer phubbing was linked with CDAP and CDAV via rejection sensitivity.

Moderating effect of psychological resilience

Few studies have investigated factors that may weaken or intensify the link between peer phubbing and CDAP and CDAV. The protective role of psychological resilience was demonstrated in the current study, evidenced by both less rejection sensitivity and CDAP/CDAV after

experiencing peer phubbing in college students with high levels of psychological resilience.

First, psychological resilience ameliorated the cascading risk from peer phubbing and CDAP and CDAV, in that college students exposed to more peer phubbing are more likely to become the perpetrator and victims of cyber dating abuse when they have low levels of psychological resilience. This finding supported the protective mechanism of psychological resilience [45, 49, 62]. College students with high psychological resilience often possess high levels of self-efficacy and social support [63], flexible adaptation to changing environment, and propensity to bounce back and demonstrate positive functioning in adversity [64], which protect them from the negative influence of peer phubbing, less engaged in deviant behaviors such as CDAP, and less likely to be a victim.

Second, psychological resilience weakened the direct link between peer phubbing and rejection sensitivity, the result extended previous research that showed psychological resilience, a significant individual internal resource, could alleviate the effect of adverse interpersonal interaction on negative cognitive-affective schema [49, 51]. High psychological resilience enables individuals to flourish when faced with adversity, and less likely to develop negative self-schema and cognitive distortions [65]. Thus, when encounter with peer phubbing, high psychological resilience individuals may experience less rejection sensitivity, which further decrease the risk of psychological disorders, hostility, and social media addiction [33, 38, 66]. These factors reduce the likelihood of CDAP and CDAV [7, 39].

Limitations and future directions

Several weaknesses for the present study should be concerned. For instance, rejection sensitivity type (anxious vs. angry) may affect the association of rejection sensitivity with CDAP and CDAV [32]. Angry rejection sensitivity may be linked with more aggression, while anxious rejection sensitivity may be related to more compromising and less aggression [67]. Distinguishing the two forms of rejection sensitivity and investigating their unique roles in the association of peer phubbing with CDAP and CDAV are valuable. Besides, resilience should be embedded in an interactive and dynamic process rather than just trait-based measurement, and future research should focus on the association between adversity, resilience, and growth [68]. The most appropriate research strategy to limit these study gaps is the longitudinal designs. Finally, although self-report evaluations are reported to be reliable, which may induce recall and reporting bias. More importantly, abuse perpetration and victimization in romantic relationship are considered sensitive topics, thus the incidents of CDAP and CDAV may be

underreported due to the consideration of stigmatization and shame. Possible objective measures should be adopted in the future research.

Significance and contribution

The current results provided valuable theoretical and practical insights into the cyber dating abuse prevention and intervention. As an emerging but influential phenomenon in China, cyber dating abuse was preliminarily understood with the lens of rejection sensitivity model in the current study in which peer phubbing and rejection sensitivity were revealed to increase the risk of CDAP and CDAV, whereas psychological resilience was identified a protector for weakening these associations. Theoretically, our findings extended previous research by demonstrating that negative interpersonal interaction in peer relationships can overflow to the romantic relationships and contributing to the empirical evidence on the rejection sensitivity model to the cyberspace. Besides, drawing from positive psychological framework, meaningful ways through resilience are of potential to break the cycle of peer phubbing—rejection sensitivity—CDAP/CDAV. Practically, the present study highlighted rejection sensitivity and psychological resilience as two essential targets of intervention efforts aim at decreasing CDAP and CDAV associated with peer phubbing. Programs developed with the intention of reducing rejection sensitivity and increasing psychological resilience have seen some success. For instance, cognitive behavioral therapy-based interventions and mindfulness-based interventions has been showed as effective means to reduce interpersonal distress, rejection sensitivity and post-traumatic stress disorder and increasing psychological resilience [29].

Conclusions

As emerging adults are increasingly reliant on instant messaging applications for communication with romantic partners, cyber dating abuse perpetration (CDAP) and victimization (CDAV) have proliferated and the mechanisms behind these phenomena deserve attention. This study explores how peer phubbing predicts CDAP and CDAV by increasing rejection sensitivity, and also explores the protective role of psychological resilience in this process. Evidence based on a cross-sectional survey of college students in China showed that peer phubbing predicted higher levels of CDAP and CDAV. Consistent with hypotheses, rejection sensitivity mediated this relationship. Furthermore, the protective role of psychological resilience was demonstrated in the current study, evidenced by both less rejection sensitivity and CDAP/CDAV after experiencing peer phubbing in college students with high levels of psychological resilience. This study provides theoretical insights into the mechanisms that produce and reduce CDA.

Author contributions

W.D and J.L. was responsible for conceptualization, data collection and analysis, manuscript writing. H.W collected some data and performed the supervision. H.W and X.W contributed to review and editing. All authors read and approved the final manuscript.

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Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Declarations**Ethics approval and consent to participate**

Ethical approval was issued by the Institutional Review Board of Beijing Forestry University. The study was run consistent with the specifications of the Helsinki Declaration. All participants provided. Informed consent: Cyber dating abuse perpetration and victimization among Chinese college students with a history of peer phubbing. Psychological resilience moderates the indirect effect of rejection sensitivity.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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