Original Research Article

Development and Initial Validation of the Positive and Negative Co-Rumination Scale

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Abstract

This article presents two studies with data from 750 college students (58.67% females, *M*age = 20.79 years) and 1035 school students (52.1% girls, *M*age = 14.44 years) respectively, describing the development and initial validation of the Positive and Negative Co-Rumination Scale (PANCRS). The PANCRS consists of 32 items with 3 second-order factors: Positive Co-Rumination consisting of 3 first-order factors (i.e., Affirmation, Problem-Solving and Enhancing Friendship), Negative Co-Rumination consisting of 4 first-order factors (i.e., Worry About Evaluation, Inhibiting Happiness, Worry About Impact and Slack) and Frequency consisting of 2 first-order factors (i.e., Frequencies of Co-Rumination on Positive and Negative Events). Results from exploratory and confirmatory factor analyses confirmed the measure's 9 first-order and 3 second-order factors structure. Moreover, correlation analyses provided first evidence for the subscales' differential validity: (1) Positive Co-Rumination showed positive correlations with positive indicators of psychological adjustment (i.e., friendship quality and life satisfaction) and negative correlations with negative

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indicators of psychological adjustment (i.e., anxiety and depression); (2) Negative Co-Rumination showed non-significant or negative correlations with positive indicators of psychological adjustment and positive correlations with negative indicators of psychological adjustment; (3) Frequency showed positive correlations with both positive and negative indicators of psychological adjustment. In addition, all PANCRS scores showed satisfactory composite reliability (omegas) and temporal stability (test-retest). Overall the findings suggest that the PANCRS is a reliable and valid instrument to assess positive and negative aspects of Co-rumination.

Keywords
Positive co-rumination, negative co-rumination, frequency, friendship quality, depression

Introduction

Since Rose (2002) initiated the research of co-rumination, over 100 studies have addressed co-rumination related topics, and considerable evidence has been found for the trade-offs of co-rumination in psychological adjustment (i.e., it heightens friendship quality, yet also leads to more anxiety and depressive symptoms; e.g., Rose, 2002, 2021; Haggard et al., 2011; DiGiovanni et al., 2021; Rose et al., 2022). Though co-rumination is an interpersonal manifestation of rumination, its conceptualization and the way to measure it need to be further investigated.

Rumination and Co-Rumination

Rumination refers to the process of repetitive thinking, pondering or meditating on information (Cann et al., 2011). Though many researchers studied negative rumination on negative affect (e.g., Eisma et al., 2014; Nolen-Hoeksema & Morrow, 1991), some researchers studied both positive and negative rumination on negative affect (e.g., Cann et al., 2011; Watkins, 2008). Moreover, Feldman et al. (2008) studied positive and negative rumination on positive affect. To integrate these previous studies, we proposed that rumination refers to repetitive thinking about positive and negative affect which may play either positive or negative role in psychological adjustment. Accordingly, we proposed a 2 (positive and negative emotions) × 2 (positive and negative rumination) theoretical model for rumination and developed the Positive and Negative Rumination Scale (Yang, et al., 2020).

When rumination appears in interpersonal communications, especially between close friends, co-rumination occurs. In line with the conceptualization of rumination focusing on negative thinking about negative affect, Rose (2002) proposed that "co-rumination refers to excessively discussing personal problems within a dyadic relationship and is characterized by frequently discussing problems, discussing the same

problem repeatedly, mutual encouragement of discussing problems, speculating about problems, and focusing on negative feelings". To measure co-rumination, she developed the Co-Rumination Questionnaire (CRQ) among American adolescents. The CRQ consists of 27 items assessing nine content areas such as frequency of discussing problems and discussing problems instead of engaging in other activities, etc. Though Rose thought that the nine content areas might represent different sub-scales, factor analyses in her own work have consistently showed a uni-dimensional structure (Rose, 2021). However, in some others' research, a 3-factor structure of CRQ has been revealed. First, the three factors found by Dam et al. (2013) in a Dutch adolescent sample were Comprehension, Frequency and Detailed Information. Second, the three factors found by Davidson, et al. (2014) in an American college student sample were Rehashing, Mulling and Encouraging Problem Talk. Third, the three factors found by Yu et al. (2018) in a Chinese adolescent sample were Comprehension, Encouraging Problem Talk and Dwelling on Negative Affect. In these studies some dimensions (e.g., Encouraging Problem Talk) were found more adaptive than others (e.g., Dwelling on Negative Affect).

Importantly, Bastin et al. (2014, 2017) selected 6 items of co-brooding and 5 items of co-reflection from CRQ. Co-brooding is maladaptive for it refers to a passive, repetitive and catastrophizing form of co-rumination, whereas co-reflection is adaptive for it refers to active, analyzing, and reflective form. Moreover, in line with Feldmen's et al. (2008) work on response to positive affect, Bastin et al. (2018) studied co-rumination on positive affect and developed the Co-dampening and Co-enhancing Questionnaire (CoDEQ). Co-enhancing is adaptive for it refers to elaborating on the positive aspects of positive emotions, whereas co-dampening is maladaptive for it refers to talking about positive emotions in a downgrading manner.

Overall, the conceptualizations and measures in previous studies capture either co-rumination on negative affect or co-rumination on positive affect but not both. However, they have demonstrated the adaptive and maladaptive features of co-rumination on both positive and negative affect.

The Present Study

In accordance with our integrative work on rumination, we tried to do similar work on co-rumination in the present study by developing a new theoretical model and a measure based on it. For this, we defined co-rumination as repetitive discussion about both positive and negative events and they function either positively or negatively regarding psychological adjustment.[1] Of note, we noticed that frequency and other contents of co-rumination were mixed in some items of the CRQ such as Item 19, i.e., "we talk for a long time trying to figure out all of the different reasons why the problem might have happened." In this item, the main clause "we talk for a long time" taps frequency of discussion while the subordinate clause "trying to …" taps discussion of causes. We also noticed that frequency is not tapped by the CoDEQ. Considering that talking for long time is helpful if it focuses on positive aspects of co-rumination such as

co-reflection and co-enhancing, whereas it is unhelpful or even harmful if it focuses on negative aspects of co-rumination such as co-brooding and co-dampening, we would like to use "frequency" as an independent neutral factor. Consequently, we proposed a 2 (positive and negative events) × 3 (positive and negative co-rumination, and frequency) theoretical model for co-rumination (see Table 1). As the Table shows, there are six categories of co-rumination: positive co-rumination on positive and negative events (PCR-PE and PCR-NE), negative co-rumination on positive and negative events (NCR-PE and NCR-NE), frequency of co-rumination on positive and negative events (F-PE and F-NE).[2]

Consequently, the present study aims to develop a self-report measure taping these six categories: the Positive and Negative Co-rumination Scale (PANCRS). Overall, two studies are presented to describe the development and preliminary validation of the PANCRS. In Study 1, college student samples were used. First, to develop a pool of items, we conducted an open-ended survey, an interview study, a brain-storming study, and related scale items screening. We then constructed the first version of the PANCRS and refined it. To investigate the structure of the measure, we conducted exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). To investigate the stability of PANCRS, we retested some students after 4 weeks. To investigate the validity of the PANCRS, we examined relations with friendship quality, life satisfaction, anxiety, depression, positive and negative rumination, co-brooding and co-reflection, co-enhancing and co-dampening.

Considering that co-rumination is usually studied among children and adolescents (see Spendelow, et al., 2017, a comprehensive review), it would be beneficial for academic studies in future if the PANCRS can be validated among them. We then conducted Study 2 with school student samples. In this study, we performed CFA for the PANCRS and examined relations of co-rumination with friendship quality, life satisfaction, anxiety, depression, positive and negative rumination. We also examined 4-week interval test-retest reliability among some junior high school students.

Study 1: Development and Validation Among College Students

Method

Participants and Procedure. Sample 1 has 160 students (65 male, 95 female) with an average age of 19.97 years (SD = 1.51; range = 17–26 years). Sample 2 has 9 student (4 males, 5 females) with average age of 20.68 years (SD = 1.90; range = 18–24 years).

Table 1. The 2 × 3 Theoretical Model of Co-Rumination.

	Positive Event	Negative Event
Positive Co-rumination	PCR-PE	PCR-NE
Negative Co-rumination	NCR-PE	NCR-NE
Frequency	F-PE	F-NE

Sample 3 has 239 students (61 male, 178 female) with an average age of 20.03 years (SD = 1.27; range = 18–24 years). Sample 4 has 750 students (310 males, 440 females) with an average age of 20.79 years (SD = 1.76; range = 17–34 years). In Sample 4, participants were randomly split into two subsamples (ns = 378 and 372) for EFA and CFA. The sizes of Sample 3 and 4 fit the criteria proposed by Kline (2005) that a sample size of over 200 is considered sufficient for reliable factors. All students were recruited from one of the top universities in the eastern coastal region of the People's Republic of China, and another average university in the same city after class. They volunteered to participate in the study without compensation. Students in Sample 1 completed paper-and-pencil version of the open-ended questionnaire. Students in Sample 2 accepted an interview. Students in Sample 3 and 4 completed online version of the questionnaire.

The Development Process of the PANCRS. As a first step, we tried to obtain a pool of items from which to construct a multidimensional scale measuring positive and negative co-rumination on positive and negative events. For this purpose, we distributed an open-ended questionnaire to the students of Sample 1 with two parts of questions which were designed to study co-rumination on positive and negative events respectively. In Part I, the questions are: "Please recall a good thing you experienced before and write it down in one sentence. When you share it with close friends, what ideas, feelings and behaviors you share the most? What ideas, feelings and behaviors your friends share the most?" In Part II, the questions are: "Please recall a bad thing you experienced before and write it down in one sentence. When you share it with close friends, what ideas, feelings and behaviors you share the most? What ideas, feelings and behaviors your friends share the most?" Following the methodology of qualitative study proposed by Ritchie & Spencer (1994), we analyzed the responses thematically by coding them to find different "meaning units". Overall, in Part I, students like to share happiness, confirmation, admiration, suggestions, learning attitude and so on. In Part II, students like to share suggestions, sadness, comforting, sympathy, analyzing the courses, providing help directly and so on.

Next, we conducted a 15-minute semi-structured interview study with Sample 2 to probe more details about their feelings, thoughts and behaviors in sharing good and bad events with close friends. We also discussed with them about positive and negative aspects in their discussion with close friends. First, we asked them the following questions: "Would you please recall a recent or impressive talk with your friend about a good thing of yours? What was the good thing? How did you talk about it? What feelings, thoughts and behaviors you and your friend had in talking?" Afterwords, we asked them similar questions by replacing "a good thing of yours" with "a good thing of your friend", "a bad thing of yours" and "a bad thing of your friend" respectively. We recorded the interviews and analyzed the responses with the same methodology of qualitative study mentioned above. As a result, happiness was reported most frequently in sharing positive events followed by admiration/envy, making jokes and praising successively. Empathy was reported most frequently in sharing negative events

followed by pouring out, making suggestions/comforting/feeling down together and making jokes successively.

We then held two discussion meetings in a study group (one teacher and six graduate students) to screen the students' responses to the open-ended questionnaire, interviews and other materials such as Co-Rumination Questionnaire (Rose, 2002) and Co-dampening and Co-enhancing Questionnaire (CoDEQ, Bastin et al., 2018) looking for items of co-rumination. We also generate further items by brain-storming with the aim to cover positive and negative co-rumination on positive and negative events. Moreover, we selected only items that would equally apply to males and females. This procedure resulted in a first, 88-item version of the PANCRS with 25, 18 and 4 items capturing positive and negative co-rumination on positive events and frequency (Part I), and 18, 19 and 4 items capturing positive and negative co-rumination on negative events and frequency (Part II) respectively. General instructions stated "*We encounter good and bad things in our lives and talk about them with our close friends. Please select the appropriate option to describe a situation in which you talk about good and bad things with your close friends."* Sub-instructions for Part I and II stated *"When you talk about the good things that have happened to you, you" and "When you talk about the bad things that have happened to you, you"* respectively. Participants were asked to rate their responses on a scale of 1 (*Not at all*) to 5 (*Fully*). This version was administered to the students of Sample 3, after which 51 items were discarded (see the item analyses and EFA of the results section for details). A second, modified 37 item-version of the PANCRS was then administered to the students of Sample 4.

In addition, the following variables for validity test were administered to Sample 4.

First, friendship quality was measured by the Friendship Quality Questionnaire (FQQ, Parker & Asher, 1993; Chinese version, Zhou et al., 1998). The FQQ includes 18 items measuring Validation and Caring (e.g., "Tells me I am good at things"), Conflict Resolution (e.g., "Make up easily when we have a fight"), Conflict and Betrayal (e.g., "Argue a lot"), Help and Guidance (e.g., "Helps me so I can get done quicker"), Companionship and Recreation (e.g., "Always play together at recess"), Intimate Exchange (e.g., "Always tell each other our problems"). Item 2, 5 and 10 are reverse coded before scoring. The rating scale ranges from 1 (totally not) to 5 (totally). In this study, the total score was used and the omega was .87.[3]

Second, life satisfaction was measured by the Satisfaction with Life Scale (SWLS; Diener et al., 1985; Chinese version, Yang, 2006). The SWLS is a 5-item measure of global life satisfaction (e.g., "I am satisfied with my life"), or a person's satisfaction with life as a whole, rather than any specific domain. The rating scale ranges from 1 (strongly disagree) to 7 (strongly agree). In this study, the total score was used and the omega was .88.

Third, anxiety and depression were measured by the Anxiety and Depression subscales of Symptom Checklist −14 (SCL-14, see Prinz et al., 2013; Chinese version, Wang, 1984). The Anxiety subscale consists of 6 items (e.g., "Nervousness or shakiness inside"). The Depression subscale consists of 6 items (e.g., "Thoughts of death or dying"). The rating scale ranges from 1 (none at all) to 5 (very severe). In this

study, the total score was used for each subscale and the omegas were .89 and .91 respectively.

Fourth, rumination was measured by the Positive and Negative Rumination Scale (PANRS, Chinese version, Yang et al., 2020) which is a 23-item scale with 2 s-order factors: Positive and Negative Rumination. Positive Rumination consists of 2 first-order factors, i.e., Enjoy Happiness (6 items, e.g., "Think 'How wonderful life is'") and Positive Coping (4 items, e.g., "Think 'What I can do for it'"). Negative Rumination consists of 3 first-order factors, i.e., Suppress Happiness (5 item, e.g., "Think 'Fall from the pinnacle of one's power'"), Self Deny (3 items, e.g., "Think 'I am a useless person'") and Negative Attribution (5 items. e.g., "Think 'Misfortunes never come singly'"). The rating scale ranges from 1 (not at all) to 4 (always). In this study, the 2 s-order factors were used as indicators and the total score was used for each factor. The omegas were .84 and .88 respectively.

Fifth, co-brooding and co-reflection were measured by 6 co-brooding items (e.g., "When we talk about a problem that one of us has, we try to figure out every one of the bad things that might happen because of the problem") and 5 co-reflection items (e.g., "When we talk about a problem that one of us has, we talk about all of the reasons why the problem might have happened") selected from the CRQ (Rose, 2002; Translated but not validated Chinese version). We translated it into Chinese following the cross-cultural translation guidelines of instruments established by Brislin (1970). In line with Bastin et al.'s (2014) method, six graduate students independently selected the items in the original CRQ they considered to be consistent with the definitions of brooding and reflection. The items were retained based on the frequency to be chosen. The rating scale ranges from 1 (completely not true) to 5 (completely true). In this study, the total score was used for each subscale and the omegas were .82 and .79 respectively.

Finally, co-dampening and co-enhancing were measured by The Co-Dampening and Co-Enhancing Questionnaire (CoDEQ, Bastin et al., 2018; Translated but not validated Chinese version). The CoDEQ consists of 18 items with 9 items for co-damping (e.g., "thinking Bit was just luck"), and 9 items for co-enhancing (e.g., "thinking about how energetic one feels"). The rating scale ranges from 1 (almost never) to 4 (almost always). We translated it into Chinese following the cross-cultural translation guidelines of instruments established by Brislin (1970). In this study, the total score was used for each subscale and the omega was .84 for both of them.

Results

Item Analyses. For item analyses, items were screened using the critical ratio method and correlation coefficient method in the Classical Test Theory (see Cappelleri et al., 2014). We calculated item discrimination according to the critical ratio "*t*" involving upper and lower groups of 27% for PANCRS in SPSS22.0. Items were removed if their "*t*" values were not significant at the $p < .05$ level. We also calculated item-total correlation, which is corrected by removing every item one by one. Items were removed if the correlation was smaller than .40 and the difference in correlation with the positive

and negative co-rumination dimensions was less than .30. This procedure discarded 7 items and resulted in a second, 81-item version with 23, 17 and 4 items capturing positive, negative co-rumination and frequency (Part I), and 18, 15 and 4 items capturing positive, negative co-rumination and frequency (Part II) respectively.

EFAs. To investigate the factor structure of the PANCRS, we conducted exploratory factor analysis (EFA) for Part I and II separately with the item responses obtained from the students of Sample 3 in SPSS 22.0. Because all items showed significant deviations from normality (Kolmogorov-Smirnov Z ranged from 2.51 to 4.35 for Part I and from 2.56 to 3.71 for Part II, all $p < .001$), we employed the principal components analysis, which is not relying on the multivariate normal distribution assumption. Following the EFA method used by previous studies in developing rumination measures consisting of positive and negative factors (e.g., Cann et al., 2011; Feldman et al., 2008; Yang et al., 2020), we used varimax rotation to identify factors as they did. Items were removed if they met one or more of the following criteria: The factor loading is smaller than .65, the difference of cross loadings was less than .30, the meaning of item is not in line with the factor. Past research on the cutoffs for factor loading is flexible though .35–.40 is generally regarded as minimal factor loadings (Worthington & Whittaker, 2006). For our goal was to retain the items with higher loadings, we used a more stringent cutoff. EFA was conducted after removing every item one by one from the item with the smallest loading to that with the largest loading.

This procedure discarded 5 items in Part I and 9 items in Part II, resulting in a third, 37-item version of the PANCRS. In this version, Part I consisted of 17 items with four factors. The four factors were labeled Affirmation (5 items, e.g., "Would praise what was done well"), Worry About Evaluation (5 items, e.g., "Would be afraid that the other person would get bored"), Inhibiting Happiness (3 items, e.g., "3. Would talk about that good things don't last forever") and Frequency P (4 items, e.g., "Would spend a lot of time talking about the good things"). Part II consisted of 20 items with five factors. The five factors were labeled as Problem-Solving (5 items, e.g., "Would talk about how to solve problems"), Enhancing Friendship (4 items, e.g., Would feel close to the other person"), Worry About Impact (3 items, e.g., "Would be afraid to annoy the other person"), Slack (4 items, e.g., "Would feel worse if you talk more") and Frequency N (4 items, e.g., "Would spend a lot of time talking about the bad things").

The second-order EFA conducted for these nine factors resulted in a 3-factor second order model. The three factors were labeled as Positive Co-rumination, Negative Co-rumination and Frequency. Positive co-rumination consisted of 3 first-order factors, i.e., Affirmation, Problem-Solving and Enhancing Friendship. Negative co-rumination consisted of 4 first-order factors, i.e., Worry About Evaluation, Inhibiting Happiness, Worry About Impact and Slack. Frequency consisted of 2 first-order factors, i.e., Frequency P and Frequency N.

To develop the final version of PANCRS, the 37-item version of PANCRS was presented to the students of the first subsample of Sample 4. When the item responses were analyzed, they showed a KMO of .85 for both Part I and II indicating suitability

for factor analysis. Using the same procedure as before,[4] one item of Part I (i.e., as long as we meet good thing, we would talk about it") and four items of Part II (e.g., "would talk about if it is possible to have better result) were removed one by one and the fourth, 32-item version of the PANCRS with nine factors was reached. Part I consisted 16 items with four factors: Affirmation (5 items), Worry About Evaluation (5 items), Inhibiting Happiness (3items) and Frequency P (3 items). Part II consisted of 16 items with five factors: Problem-Solving (3 items), Enhancing Friendship (4 items), Worry About Impact (3 items), Slack (3 items) and Frequency N (3 items) (see Table 2). We also conducted a scree plot analyses. The result supported the four and five factor models for Part I and II. The second-order EFA conducted for the nine factors duplicated the 3-factor second order model. Affirmation, Problem-solving and Enhancing Friendship loaded on Positive Co-Rumination (loadings were .85, .82 and .73 respectively). Worry About Evaluation, Inhibiting Happiness, Worry About Impact and Slack leaded on Negative Co-Rumination (loadings were .89, .61, .88 and .73 respectively). Frequency P and N loaded on Frequency (loadings were .67 and .84 respectively).

CFA. To examine the factor structure of the PANCRS, we conducted a CFA using the second subsample of Sample 4 in Amos22.0 on the item responses testing for a 3-factor second-order confirmatory model in which Affirmation, Problem-solving and Enhancing Friendship were specified to load only on Positive Co-Rumination, Worry About Evaluation, Inhibiting Happiness, Worry About Impact and Slack only on Negative Co-Rumination, and Frequency P and N only on Frequency. The three second-order factors were allowed to correlate whereas the nine first-order factors were not. Because of the significant deviations of all items from normality, we employed robust maximum likelihood (RML) estimation to provide robust parameter and model fit estimates (Brown, 2006).[5] To evaluate model fit, it is necessary to use multiple measures that tap different aspects of fit (Hoyle & Panter, 1995). Considering that fit evaluations solely based on stringent goodness-of-fit (GOF) indices appear problematic in developing new personality measures (Hopwood & Donnellan, 2010), we adopted a new methodology to evaluate model adequacy initiated by Schneider et al. (2022). In their method, two types of criteria were included: (1) all indicators show significant path coefficients in the hypothesized direction and (2) GOF indices suggest acceptable model fit. With respect (2), the following robust measures of fit were used: the comparative fit index (CFI), the root mean square error of approximation (RMSEA) and the confidence interval (90% CI), and the standardized root mean square residual (SRMR) were used. The acceptable values were: CFI > .90, RMSEA < .08, SRMR < .08. To prevent index picking, the RMSEA is used as the most important criterion to determine whether a given model fits well enough to yield interpretable parameters.

When the specified 3-factor second order model was estimated, results showed that the model provided an overall acceptable fit to the data with two of the three GOF indices meeting the a priori set criteria, CFI = .89, RMSEA = .058 (.054–.063), SRMR = .078. All facet-to-item path coefficients were significantly greater than zero (standardized: $.54 \leq \lambda \leq .90$, all $p < .001$).

Table 2. Results of Exploratory Factor Analysis on the Positive and Negative Co-Rumination Scale (PANCRS) Among College Students.

Part I

	Factor				
Items	1	2	3	4	h^2
16. Would be afraid that the other person doesn't want to listen	**.85**	−.06	.11	.10	.75
14. Would be afraid to put pressure on the other person	**.79**	−.09	.15	.08	.65
8. Would be afraid that the other person would get bored	**.76**	−.04	.27	−.07	.65
4. Would be afraid that the other person does not think the good things are worth mentioning	**.72**	−.10	.11	.08	.55
11. Would feel not modest enough	**.64**	.12	.27	−.09	.50
12. Would both feel a boost in confidence	−.04	**.81**	.12	.02	.68
2. Would praise what was done well	.03	**.71**	−.16	.16	.56
5. Would find this memory beautiful	−.02	**.68**	−.23	.18	.55
10. Would encourage each other to share	−.01	**.67**	.03	.22	.50
15. Would have fun together	−.22	**.66**	.03	.23	.54
7. Would talk about how good things could turn bad	.24	−.05	**.79**	.15	.71
13.Would talk about how extreme joy begets sorrow	.33	−.04	**.75**	−.01	.67
3. Would talk about that good things don't last forever	.31	−.09	**.59**	.29	.54
6. Would spend a lot of time talking about the good things	.03	.30	.13	**.79**	.73
17.Would mention the good things many times	.03	.16	.30	**.73**	.65
1. Would talk about the good things every time you meet	.05	.36	−.10	**.67**	.59
Eigenvalues	3.16	2.80	1.94	1.91	
%Variance	19.76	17.52	12.11	11.96	
Cumulative %	19.76	37.28	49.39	61.35	

Part II

	Factor					
Items	F1	F2	F3	F4	F5	h^2
5. Would feel close to each other	**.82**	.04	.00	.34	−.04	.72
13. Would enhance friendship	**.81**	.08	−.01	.35	−.08	.72
19. Would feel warm, happy and supported	**.73**	−.04	.20	.01	.08	.63
2. Would feel understood	**.71**	.16	.03	.28	−.07	.57
6. Would not want to say much for we are afraid to affect the other person's mood	.05	**.84**	.09	−.06	.11	.71
20. Would be afraid to annoy the other person	.09	**.80**	.00	.11	.29	.72
9. Would be afraid to make a bad impression on the other person	.05	**.79**	.06	.07	.23	.72

(continued)

Table 2. (continued)

Part II

Items	Factor					
	F1	F2	F3	F4	F5	h^2
18. Would feel worse if we talk more	−.08	.34	**.75**	.13	.01	.66
12. Would talk about how it feels bad	−.15	.19	**.72**	.15	.16	.67
3. Would feel like giving up	.11	.15	**.71**	.08	−.15	.63
15. Would talk about it every time you meet	.09	−.04	−.01	**.88**	.35	.81
17. Would talk about the bad things many times	.04	.07	.07	**.78**	.05	.75
11. Would spend a lot of time talking about the bad things	.08	.12	.10	**.54**	.03	.61
4. Would talk about how to prevent bad things from happening again	.28	−.02	.00	.16	**.81**	.71
16. Would talk about the lessons we can learn from our experience	.37	.28	.00	−.09	**.77**	.70
10. Would talk about how to solve problems	.25	−.05	.17	−.07	**.69**	.63
Eigenvalues	2.72	2.18	2.16	2.00	1.90	
%Variance	16.99	13.63	13.47	12.50	11.90	
Cumulative %	16.99	30.61	44.09	56.59	68.49	

(The English translation was achieved following established guidelines for cross-cultural translation of instruments (Brislin, 1970): First, three graduate students translated the original measure from Chinese into English; then three other graduate students, independently from the first three, translated it back to Chinese; afterwords, discrepancies were discussed in a conference (involving the six students and the first author). Finally, the third author, a psychology professor of Sydney University, made modification and the final translation was agreed).

Descriptive Statistics, Reliability, and Construct Validity. Correlations for the PANCRS scales are presented in Table 4. As the table shows, scores for three positive co-rumination subscales (i.e., Affirmation, Problem-Solving and Enhancing Friendship) were found to be positively associated with each other and so were the scores for four negative rumination subscales (i.e., Worry About Evaluation, Inhibiting Happiness, Worry About Impact and Slack), and for two frequency subscales (i.e., Frequency P and N) as well. The positive co-rumination subscales were found to be negatively and significantly or non-significantly associated with the negative co-rumination subscales except for the correlation of Enhancing Friendship with Inhibiting Happiness. The two frequency subscales were found to be positively associated with all subscales of co-rumination. However, the correlation of Frequency P with Positive Co-Rumination was stronger than that with Negative Co-Rumination. The correlations of Frequency N with Positive and Negative Co-Rumination were at the same medium level. As the table also

shows, the nine first-order subscales and the three second-order subscales were found to have satisfactory internal consistency (omegas = .70 – .90). We examined the test-retest stability of the PANCRS by examining scores of 81 students across a 4-week time period. Results of this analysis indicated medium to high test-retest associations for all the subscales (r = .51–.76, all $p < .001$, see Table 4). Taken together, these results offer adequate support for the internal consistency and test-retest reliability of the PANRCS scales.

To evaluate the convergent validity of the PANCRS, we examined the associations between the PANCRS subscales with psychological outcome variables (i.e., friendship quality, life satisfaction, anxiety, depression, positive and negative rumination, co-brooding and co-reflection, co-enhancing and co-dampening). Results of computing correlations between these measures are presented in Table 3. As the table shows, we found evidence for convergent validity. That is, scores on the positive co-rumination subscales of the PANCRS were found to be positively and significantly associated with scores on the positive outcome variables (i.e., friendship quality, life satisfaction, positive rumination, co-reflection and co-enhancing), and negatively and significantly or non-significantly associated with scores on the three of five negative outcome variables (i.e., anxiety, depression and negative rumination). Though they were found to be positively and significantly associated with other two negative outcome variables (i.e., co-brooding and co-damping), the correlations were weaker than those with two positive outcome variables (i.e., co-reflection and co-enhancing). Furthermore, scores on the negative co-rumination subscales of the PANCRS were found to be negatively and significantly or non-significantly associated with scores on the positive measures except for their positive correlations with Co-Reflection, which were also weaker than their positive correlation with co-brooding. And they were found positively and significantly associated with scores on the negative outcome variables.

Incremental Validity. To analyze the predictive utility of the PANCRS subscales in accounting for psychological adjustment, we conducted a series of hierarchical regression analyses with friendship quality, life satisfaction, anxiety and depression as our outcome. For these analyses, however, we included co-brooding and co-reflection in Step 1and co-dampening and co-enhancing in Step 2. We did this to provide a more rigorous test for the usefulness of the PANCRS subscales in predicting psychological adjustment. If the PANCRS subscales are getting at dimensions of co-rumination that are not redundant with CRQ and CoDEQ subscales, then we should find evidence for the utility of the PANCRS. Accordingly, scores on three of the PANCRS subscales were entered as a set in Step 3. To compare the effect sizes of the predictors that accounted for the variance in functioning, we used Cohen's (1988) suggestions of small ($f^2 \geq .02$), medium ($f^2 \geq .15$), and large effects ($f^2 \geq .35$) as a general guide. Results of conducting these regression analyses are presented in Table 5.

As the table shows, three key patterns emerged. First, the CRQ set was consistently found to account for small to medium (f^2 = .06 – .18), significant 5.4 – 15% variances in the outcome measures examined. Second, the CoDEQ set was consistently found to

Table 3. Correlations Between Positive and Negative Co-Rumination Scale (PANCRS) Subscales and Study Measures among College Students.

	Friendship Quality	Life Satisfaction	Anxiety	Depression	Positive Rumination	Negative Rumination	Co-Brooding	Co-Reflection	Co-Dampening	Co-Enhancing
1. Affirmation	.62***	.25***	−.10**	−.14***	.42***	−.05	.19***	.35***	.15***	.55***
2. Problem-solving	.52***	.21***	−.06	−.11**	.40***	−.01	.24***	.42***	.16***	.40***
3. Enhancing friendship	.54***	.21***	−.01	−.07	.29***	.01	.24***	.34***	.17***	.38***
4. Worry about evaluation	−.15***	−.16***	.32***	.32***	−.13***	.47***	.30***	.08*	.33***	−.03
5. Inhibiting happiness	−.07	−.01	.24***	.22***	−.09*	.40***	.36***	.20***	.44***	.06
6. Worry about impact	−.08*	−.16***	.27***	.29***	−.07	.43***	.27***	.09*	.27***	.00
7. Slack	−.16***	−.25***	.42***	.45***	−.23***	.51***	.32***	.09*	.28***	−.07
8. Frequency P	.33***	.26***	.03	.01	.25***	.08*	.34***	.34***	.28***	.43***
9. Frequency N	.10**	.13***	.17***	.17***	.09*	.25***	.48***	.34***	.46***	.25***
10.PositiveCo-Rumination	.67***	.27***	−.06	−.12***	.43***	−.02	.27***	.44***	.19***	.53***
11. Negative Co-Rumination	−.14***	−.17***	.37***	.39***	−.15***	.56***	.38***	.15***	.41***	−.01
12. Frequency	.24***	.21***	.13***	.11**	.20***	.19***	.48***	.40***	.43***	.41***
13. Total PANCRS score	.45***	.07*	.27***	.24***	.16***	.43***	.53***	.42***	.50***	.36***

Note. $N = 750$. *$p < .05$. **$p < .01$, ***$p < .001$.

account for small to large (f^2 = .03 – .35), significant additional 9.9 – 21.9% variances in the outcome measures examined. Third, the PANCRS set was consistently found to account for small to large (f^2 = .06 – .34), significant additional 5.0 – 16.5% variances in the outcome measures examined, above and beyond what was accounted for by the CRQ and CoDEQ sets. Within the predictor sets, Co-reflection consistently showed stronger prediction to positive indicators of outcome (i.e., friendship quality and life satisfaction) than Co-brooding whereas Co-brooding consistently showed stronger prediction to negative indicators of outcome (i.e., anxiety and depression) than Co-reflection. Similarly, Co-enhancing consistently showed stronger prediction to positive indicators of outcome than Co-dampening. But they did not show consistent differences in prediction of negative outcome. Interestingly, Positive and Negative Co-rumination, and Frequency did not show consistent differences in prediction to the positive indicators of outcome. But Negative Co-rumination consistently showed the stronger prediction to negative indicators of outcome than Positive Co-rumination while Frequency did not show prediction to them.

Brief Discussion

After item collection, initial and secondary tests, we arrived at the final version of the PANCRS that comprised 32 items and showed a clear 3-factor second-order structure differentiating positive and negative co-rumination, and frequency. Positive co-rumination comprised of three first-order factors: Affirmation, Problem-Solving, Enhancing Friendship, negative co-rumination comprised of four first-order factors: Worry About Evaluation, Inhibiting Happiness, Worry About Impact and Slack, while frequency comprised of two first-order factors: Frequency P and N. Whereas the PANCRS total scores—combining all 32 items—would blur the distinction among positive and negative co-rumination and frequency, the PANCRS subscales scores showed promise and first evidence of differential validity. This was demonstrated in the correlations with study measures. Whereas the PANCRS total score showed positive correlations with all outcome variables, positive co-rumination subscales showed positive correlations only with the positive outcome variables (i.e., friendship quality and life satisfaction), and negative co-rumination subscales only with the negative outcome variables (i.e., anxiety and depression). Furthermore, the frequency of co-rumination on positive event showed positive correlations only with the positive outcome variables whereas the frequency of co-rumination on negative event showed positive correlations with all outcome variables. This indicates that talking about positive event will naturally lead to stronger positive effect and weaker negative effect on psychological adjustment than talking about negative event. These findings provide differential validity for PANCRS.

However, further study was needed to examine if the PANCRS can be applied to people other than college students. Consequently, we conducted one further study to confirm the factor structure of the PANCRS by means of EFA and CFA and to further establish the PANCRS subscales' differential validity by investigating their convergent

and discriminant correlations with positive and negative psychological outcomes among school students.

Study 2: Validating the PANRS Among School Students

Method

Participants and Procedure. For Study2, 1035 school students (496 male, 539 female) with an average age of 14.4 years (SD = 2.5; range = 9–19 years) were recruited from elementary and high schools in mainland China. All of them completed paper-and-pencil versions of all measures in Chinese. Among them, 75 students (31 males, 44 females) from 8th grade completed a retest of the PANCRS after 4 weeks. Classes represented in this study consisted of 4th grade 105 (10.1%), 5th grade 102 (9.9%), 6t^{h} grade 106 (10.2%), 7thgrade 91 (8.8%), 8th grade 81(7.8%), 9th grade 128 (12.4%), 10th 136 (11.1%), 11thgrade 142 (13.7%) and 12th grade 144 (13.9%) students.

To recruit the participants, the fourth to sixth authors each contacted the principal of schools (i.e., 2 elementary school, 1 junior high schools and 1 senior high schools) and got approved for this study (parental permission is not required for this study in China). Finally, they told the class tutors how to do the survey and went to the classes one by one with class tutors, asking students to finish the paper-pencil questionnaire.

Measures. To measure co-rumination, we used the PANCRS. We used friendship quality, life satisfaction, anxiety and depression, and rumination as outcome variables. Friendship quality was measured by the Friendship Quality Questionnaire (FQQ, Parker & Asher, 1993). In this study, the omega was .83. Life satisfaction was measured by the Satisfaction with Life Scale (SWLS; Diener et al., 1985). In this study, the omega was .79. Anxiety and depression were measured by the Anxiety and Depression subscales of Symptom Checklist −14 (SCL-14, see Prinz et al., 2013). In this study, the omegas were .86 and .89. Rumination was measured by the Positive and Negative Rumination Scale (PANRS, Yang et al., 2020). In this study, the omegas were .80 and .88. All these outcome measures have been validated among school students in previous studies (e.g., Yang et al., 2020).

Results

CFA. Following the method for validation of a scale among other individuals used by Yang and Stoeber (2012), we only conducted a confirmatory factor analysis using Amos 22.0 to examine whether the 3-factor second order model obtained for the original questionnaire would be validated among school students. Because all items showed significant deviations from normality (Kolmogorov-Smirnov Z ranged from 5.56 to 11.48, all *ps* < .001), we used robust maximum likelihood (RML) estimation which provides robust parameter and model fit estimates for data that deviate from normality (Brown, 2006).

Table 4. Means and Standards (M ± SD), Correlations and Reliabilities for the Positive and Negative Co-Rumination Scale (PANCRS) in College Students.

	M ± D	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Affirmation	3.94 ± .63	—												
2. Problem-solving	3.64 ± .78	.52***	—											
3. Enhancing friendship	3.61 ± .82	.53***	.50***	—										
4. Worry about evaluation	2.63 ± .92	−.10***	−.02	−.03	—									
5. Inhibiting happiness	2.33 ± .91	−.04	.05	.11**	.55***	—								
6. Worry about impact	2.84 ± .99	−.01	.05	−.07	.72***	.39***	—							
7. Slack	2.25 ± .87	−.11**	−.04	−.08*	.53***	.48***	.50***	—						
8. Frequency P	3.25 ± .82	.50***	.31***	.42***	.08*	.26***	.07*	.12**	—					
9. Frequency N	2.47 ± .97	.14***	.22***	.39***	.27***	.44***	.16***	.33***	.47***	—				
10. Positive Co-Rumination	3.73 ± .61	.82***	.76***	.87***	−.06	.06	−.02	−.10**	.50***	.32***	—			
11. Negative Co-Rumination	2.51 ± .74	−.07	.02	−.02	.88***	.75***	.83***	.74***	.16***	.36***	−.03	—		
12. Frequency	2.86 ± .77	.35***	.30***	.47***	.21***	.42***	.14***	.27***	.83***	.88***	.47***	.32***	—	
13. Total	3.05 ± .48	.45***	.46***	.52***	.66***	.64***	.59***	.54***	.59***	.77***	.60***	.65***	.86***	—
Composite reliability	—	.77	.74	.82	.86	.75	.81	.72	.70	.78	.87	.90	.79	.82
Test-retest correlation	—	.51***	.67***	.70***	.71***	.58***	.55***	.69***	.63***	.69***	.61***	.76***	.71***	.71***

Note. $N = 750$ for correlations and composite reliability. $N = 81$ for test-retest correlation. *$p < .05$. **$p < .01$. ***$p < .001$.

The results showed that the model provided an overall acceptable fit to the data with two of the three GOF indices meeting the a priori set criteria, CFI = .87, RMSEA = .052 (.049–.055), SRMR = .066. All facet-to-item path coefficients were significantly greater than zero (standardized: $.37 \leq \lambda \leq .80$, all $p < .001$). The results indicated that the original 32-item version of PANCRS was acceptable as a measure for school students.

Descriptive Statistics, Reliability, and Construct Validity. Correlations for the PANCRS scales are presented in Table 6. As the table shows, scores for three positive co-rumination subscales (i.e., Affirmation, Problem-Solving and Enhancing Friendship) were found to be positively associated with each other and so were the scores for four negative co-rumination subscales (i.e., Worry About Evaluation, Inhibiting Happiness, Worry About Impact and Slack) and the scores for two frequency subscales (i.e., Frequency P and N). The positive co-rumination subscales were found to be negatively and significantly or non-significantly associated with the negative co-rumination subscales. Interestingly, Frequency P and N were found to be positively and significantly associated with all three positive co-rumination subscales. However, Frequency P was found to be positively and significantly associated with Inhibiting Happiness whereas it was found to be negatively and significantly or non-significantly associated with other three negative co-rumination subscales. Frequency N was found to be negatively and significantly or non-significantly associated with four negative co-rumination subscales.

As the table also shows, the nine first-order subscales and the three second-order subscales were found to have satisfactory internal consistency (omegas = .60 – .95). We examined the test-retest stability of the PANRS by examining scores of 75 students across a 4-week time period. Results of this analysis indicated medium to high test-retest associations for all the subscales ($r = .54 – .72$, all $p < .001$, see Table 7). Taken together, these results offer adequate support for the internal consistency and test-retest reliability of the PANCRS scales for school students.

To evaluate the construct validity of the PANCRS, we examined the associations between the PANCRS subscales with psychological outcome variables (i.e., friendship quality, life satisfaction, anxiety, depression, positive and negative rumination). Results of computing correlations between these measures are presented in Table 7. As this table shows, we found evidence for convergent validity. That is, scores on the positive co-rumination subscales of the PANCRS were found to be positively and significantly associated with scores on the positive outcome variables (i.e., friendship quality, life satisfaction and positive rumination), and negatively and significantly associated with scores on the negative outcome variables (i.e., anxiety, depression and negative rumination). Furthermore, scores on the negative co-rumination subscales of the PANCRS were found to be negatively and significantly or non-significantly associated with scores on the positive outcome variables while they are positively and significantly associated with scores on the negative outcome variables.

Finally, Frequency P was found to be positively and significantly associated with all the positive outcome variables and some of the negative outcome variables

Table 5. Results of Hierarchical Regression Analyses Showing Amount of Variance in Psychological Adjustment Accounted for by Co-Rumination Questionnaire, Co-Enhancing and Co-Dampening Questionnaire, and Positive and Negative Co-Rumination Scale in College Students.

Outcome and Predictor	β	R^2	ΔR^2	SE	F	*p*	f^2
Friendship quality							
Step 1: CRQ		.150	—	8.89	65.93	<.001	.20
Co-brooding	−.12*						
Co-reflection	.46***						
Step 2: CoDEQ		.369	.219	7.50	108.85	<.001	.29
Co-dampening	−.25***						
Co-enhancing	.55***						
Step 3: PANCRS		.545	.175	6.35	126.93	<.001	.34
Positive Co-Rumination	.55***						
Negative Co-Rumination	−.05						
Frequency	.09*						
Life satisfaction							
Step 1: CRQ		.054	—	6.24	21.20	<.001	.06
Co-brooding	−.12**						
Co-reflection	.30***						
Step 2: CoDEQ		.153	.099	5.92	33.55	<.001	.12
Co-dampening	−.03						
Co-enhancing	.34***						
Step 3: PANCRS		.203	.050	5.76	27.02	<.001	.06
Positive Co-Rumination	.02						
Negative Co-Rumination	−.23***						
Frequency	.17***						

Outcome and Predictor	β	R^2	ΔR^2	SE	F	*p*	f^2
Anxiety							
Step 1: CRQ		.108	—	4.99	45.07	<.001	.12
Co-brooding	.40***						
Co-reflection	−.12*						
Step 2: CoDEQ		.134	.026	4.93	28.78	<.001	.03
Co-dampening	.17***						
Co-enhancing	−.15***						
Step 3: PANCRS		.197	.064	4.77	26.07	<.001	.08
Positive Co-Rumination	−.10*						
Negative Co-Rumination	.28***						
Frequency	−.05						

(continued)

Table 5. (continued)

Outcome and Predictor	β	R^2	ΔR^2	SE	F	*p*	f^2
Depression							
Step 1: CRQ		.114	—	5.22	48.11	<.001	.13
Co-brooding	.45***						
Co-reflection	−.22**						
Step 2: CoDEQ		.163	.049	5.08	36.29	<.001	.06
Co-dampening	.13**						
Co-enhancing	−.26***						
Step 3: PANCRS		.228	065	4.91	31.28	<.001	.08
Positive Co-Rumination	−.10*						
Negative Co-Rumination	.28***						
Frequency	−.01						

Note. $N = 750$. *$p < .05$, **$p < .01$, ***$p < .001$. β = standardized regression coefficient. R^2 *and* ΔR^2 = variance explained. *SE = standard error.* f^2 = Cohen's f^2.

(i.e., negative rumination, co-brooding and co-dampening) but non-significantly associated with the other negative outcome variables (i.e., anxiety and depression). Frequency N was found to be positively and significantly associated with all outcome variables.

To examine the age trends for positive and negative co-rumination and frequency, we combined the school sample with the college sample ($n = 1785$) and conducted regression analyses using grade as a predictor. The results showed that grade had marginally significant negative prediction on positive co-rumination ($\beta = -.05$, $t = 1.90$, $p = .056$) and significant positive predictions on negative co-rumination ($\beta = .20$, $t = 8.22$, $p < .001$) and on frequency ($\beta = .11$, $t = 4.60$, $p < .001$).

Brief Discussion

The results of Study 2 confirmed the three-factorial second-order structure of the PANCRS among school students by means of exploratory and confirmatory factor analysis. Furthermore they provided further support for the differential validity of the PANCRS's subscales. Positive Co-rumination showed positive correlations with positive psychological outcomes (friendship quality and life satisfaction) and negative correlations with negative psychological outcomes (anxiety and depression). In contrast, Negative Co-rumination showed negative correlations with positive psychological outcomes while showing positive correlations with negative psychological outcomes. Furthermore, Frequency showed positive correlations with positive psychological outcomes while showing no correlations with negative psychological outcomes. One exploration is that positive co-rumination is stronger than negative co-rumination and therefore frequency showed positive effect. These findings provide

Table 6. Means and Standards (M ± SD), Correlations and Reliabilities for the Positive and Negative Co-Rumination Scale (PANCRS) in School Students.

	M ± SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Affirmation	3.90 ± .76	—												
2. Problem-solving	3.61 ± .93	.56***	—											
3. Enhancing friendship	3.41 ± .97	.51***	.49***	—										
4. Worry about evaluation	2.49 ± .94	−.13***	−.05	−.06	—									
5. Inhibiting happiness	2.16 ± .88	−.06*	−.02	.02	.42***	—								
6. Worry about impact	2.68 ± 1.08	−.14***	−.01	−.09**	.66***	.31***	—							
7. Slack	1.98 ± .88	−.22***	−.16***	−.17***	.40***	.40***	.45***	—						
8. Frequency P	3.05 ± .94	.47***	.28***	.42***	−.04	.14***	−.07*	−.06	—					
9. Frequency N	2.09 ± .90	.16***	.20***	.39***	.07*	.25***	.06*	.16***	.44***	—				
10. Positive Co-Rumination	3.64 ± .73	.81***	.83***	.83***	−.09***	−.02	−.09**	−.22***	.47***	.31***	—			
11. Negative Co-Rumination	2.33 ± .72	−.18***	−.08*	−.10***	.82***	.68***	.82***	.72***	−.01	.18***	−.13***	—		
12. Frequency	2.57 ± .78	.38***	.29***	.48***	.02	.23***	−.01	.06	.86***	.84***	.46***	.09***	—	
13. Total PANCRS score	2.88 ± .47	.49***	.50***	.57***	.55***	.51***	.50***	.36***	.54***	.55***	.63***	.63***	.64***	—
Composite reliability	—	.73	.66	.75	.78	.60	.76	.66	.65	.66	.88	.91	.79	.95
Test-retest correlation	—	.62***	.54***	69***	.60***	.64***	.54***	.72***	.63***	.56***	.65***	.67***	.60***	.71***

Note. $N = 1035$ for correlations and composite reliability. $N = 75$ for test-retest correlation. *$p < .05$, **$p < .01$, ***$p < .001$.

Table 7. Correlations Between Positive and Negative Co-Rumination Scale (PANCRS) Subscales and Study Measures Among School Students.

	Friendship Quality	Life Satisfaction	Anxiety	Depression	Positive Rumination	Negative Rumination
1. Affirmation	.51***	.39***	−.20***	−.27***	.44***	−.27***
2. Problem-solving	.40***	.28***	−.07*	−.18***	.40***	−.13***
3. Enhancing friendship	.42***	.29***	−.08***	−.15***	.29***	−.16***
4. Worry about evaluation	−.02	−.19***	.34***	.39***	−.12***	.42***
5. Inhibiting happiness	.01	−.18***	.30***	.32***	−.10***	.39***
6. Worry about impact	−.04	−.20***	.34***	.37***	−.11***	.40***
7. Slack	−.10***	−.39***	.45***	.53***	−.24***	.55***
8. Frequency P	.40***	.21***	−.06	−.09**	.24***	−.08*
9. Frequency N	.18***	.06*	.09**	.08**	.06	.10***
10. Positive Co-runmiantion	.53***	.38***	−.13***	−.24***	.45***	−.21***
11. Negative Co-Rumination	−.05	−.31***	.47***	.53***	−.18***	.57***
12. Frequency	.35***	.16***	.02	−.01	.18***	.01
13. Total PANCRS score	.39***	.08*	.24***	.21***	.20***	.26***

Note. $N = 1035$. *$p < .05$, **$p < .01$, ***$p < .001$.

further evidence that Positive Co-rumination captures adaptive aspects of co-rumination, Negative Co-rumination captures negative aspects of co-rumination, and Frequency captures neutral aspects of co-rumination.

General Discussion

The goal of the present study was to integrate recent theory and empirical findings into the 2 (positive and negative events) × 3 (positive and negative co-rumination, frequency) model and develop the Positive and Negative Co-Rumination Scale (PANCRS). Exploratory and confirmatory factor analyses indicated that the 32 items of PANCRS form nine factors, which form three distinct second-order subscales: Positive

Co-Rumination, Negative Co-Rumination, and Frequency. When the subscales' relations with measures of psychological outcomes and rumination were examined, results across studies showed a highly differential pattern of relations for the three second-order subscales. Positive Co-rumination showed positive correlations with friendship quality, life satisfaction and positive rumination. In addition, it showed negative correlations with anxiety, depression and negative rumination. In contrast, Negative Co-rumination showed negative correlations with life satisfaction and positive rumination. In addition, it showed positive correlations with anxiety, depression and negative rumination. However, it showed non-significant negative correlation with friendship quality, indicating that the well-known tradeoffs of co-rumination is the combination of different effects of positive and negative co-rumination on psychological adjustment. In other words, when positive co-rumination has stronger or weaker effect on both positive and negative aspects of psychological adjustment than negative co-rumination, the results will be the increase of only positive aspects or negative aspects of psychological adjustment but not both. In this way, individuals will only experience benefits or costs as reported by DiGiovanni et al. (2021). Thus, tradeoffs will not appear. However, when positive co-rumination has stronger effect on positive aspects but weaker effect on negative aspects of psychological adjustment than negative co-rumination, the results will be the simultaneous increase of positive and negative aspects of psychological adjustment. Consequently, tradeoffs will appear.

Finally, Frequency P showed positive correlations with positive outcome measures and negative correlations or non-significant correlations with negative outcomes. By contrast, Frequency N showed positive correlations with both positive and negative outcomes. This finding indicates that positive co-rumination on positive event has stronger effect on psychological adjustment than negative co-rumination on positive event in daily life. By contrast, both positive and negative co-ruminations on negative event have effect on psychological adjustment in daily life. Therefore, individuals tend to only experience benefits from co-rumination on positive event whereas they tend to experience both benefits and costs from co-rumination on negative event. Consequently, positive and negative co-rumination on negative event is the prerequisite of tradeoffs. It can be expected that to enhance positive co-rumination, especially on bad event, is an efficient way to deal with it. Thus, the present study provided a more detailed and practical explanation for the tradeoffs than Rose (2002, 2021) did. She proposed that self-disclosure in co-rumination is beneficial for it conveys trust and offers support whereas co-rumination itself is maladaptive. She ignored the role of positive co-rumination on negative event in psychological adjustment.

The PANCRS provides for a multidimensional assessment of co-rumination on the basis of previous research that has shown that co-rumination is best understood when both positive and negative aspects are considered. With this the PANCRS makes an important contribution to co-rumination measures for it captures the positive and negative interpersonal response to both positive and negative events. Of note, we used frequency as an independent dimension which is mixed with other dimensions in

previous studies (e.g., Bastin et al., 2018; Rose, 2002). Thus, it goes beyond the previously published studies using measures of co-rumination that did not differentiate positive and negative aspects and thus found co-rumination to be mainly maladaptive (see Rose, 2021, Rose et al., 2022). The same, however, holds for the PANCRS total score which also does not differentiate positive and negative aspects and showed positive correlations with both positive and negative outcomes. Consequently, we suggest researchers to use only the subscale scores, especially Positive and Negative Co-Rumination and Frequency, when using the PANCRS to investigate co-rumination.

Next steps in evaluating the utility of the PANCRS would include assessing it in a longitudinal design. The present study used only a cross-sectional design and was not able to show the predictivity of the PANCRS on psychological adjustment across time. Moreover, participants in the present studies were limited to school and university students. Future studies need to examine if the present findings can generalize to different samples such as older adults and clinical patients. Importantly, future studies need to find out if there are changes for positive and negative co-rumination from young adults to elders. Moreover, future studies need to investigate the utility of the PANCRS to differentiate mentally healthy and unhealthy individuals, thus providing evidence for the importance to improve positive co-rumination and decrease negative co-rumination.

In sum, the present study integrates recent theory and empirical findings into a new model and measurement of co-rumination. It provides substantial preliminary evidence for the adequacy of our conceptual model and the PANCRS as a useful measure of co-rumination. We hope that much needed research on co-rumination will be conducted to further our understanding of its antecedents, concomitants and consequences, and finally develop efficient strategies for intervention.

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Author Contributions

Hongfei Yang was in charge of the study design. Chenzhi Huang collected data in college. Carolyn Maccann modified the English version of the scale. Yujin He collected data in senior high school. Haixia Jiang collected data in junior high school. Guojing Yu collected data in elementary school.

Declaration of Conflicting Interests

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Ethical Approval

All procedures performed in studies involving human participants were approved by the Research Committee of Psychology and Behavioral Sciences at Zhejiang University.

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Notes

1. In co-rumination, close friends usually talk about some things which evoke their feelings. In the CRQ, "problems" was used in introduction and items. In the CoDEQ, "things" was used. Considering that "positive and negative events" is most frequently used in academic world, and "good and bad things" is more popular in daily life, we used "events" in the definition and "things" in the introduction and items.
2. For convenience, we used Frequency P and Frequency N to represent frequencies of co-rumination on positive and negative events respectively in the following context.
3. We used composite reliability (omega) in this study. The acceptable value is .60 (see Fornell & Larcker, 1981).
4. In this EFA, items were removed if they met one or more of the following criteria: The factor loading is smaller than .50, the difference of cross loadings was less than .30, the meaning of item is not in line with the factor.
5. RML is not relying on the multivariate normal distribution assumption and provide sufficient power to detect misspecified models. It improves the chi-square statistic and standard errors of parameter estimates using the Satorra-Bentler procedure (Satorra & Bentler, 1994).

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