


Parental Phubbing and Child Social-Emotional Adjustment: A Meta-Analysis of Studies Conducted in China

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Introduction: Parental phubbing refers to the act of parents using mobile phones in the presence of their children instead of engaging with them. With increasing smartphone use in many households, parental phubbing is a potential threat to children's healthy development. This meta-analysis synthesized the existing evidence on the impact of parental phubbing on children's social-emotional development to examine the effect sizes and identify the moderators.

Methods: Following the PRISMA guidelines, we conducted a systematic search across multiple electronic databases (Web of Science, EBSCO, ProQuest, Springer, and China National Knowledge Infrastructure) from 2012 to May 2023. Our search included both English and Chinese literature, encompassing published journal articles as well as thesis. To assess the risk of bias, we utilized the Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies. Publication bias was evaluated using funnel plot interpretation and Egger's regression intercept.

Results: Our comprehensive search identified 42 studies with 56,275 children and 59 effect sizes. A random-effects meta-analysis revealed that parental phubbing was positively associated with children's internalizing problems ($r=0.270$; 95% CI [0.234, 0.304]) and externalizing problems ($r=0.210$; 95% CI [0.154, 0.264]), while negatively correlated with children's self-concept ($r=-0.206$; 95% CI [-0.244, -0.168]) and social-emotional competence ($r=-0.162$; 95% CI [-0.207, -0.120]). Furthermore, the parental phubbing group moderated the association between parental phubbing and internalizing problems, when both parents engage in phubbing, there is a stronger association with children's externalizing problems compared to when only one parent is engaging in phubbing.

Discussion: The findings of this meta-analysis provide strong evidence supporting the detrimental effects of parental phubbing on child social-emotional adjustment. Consequently, parents, researchers, and the government must collaborate to mitigate parental phubbing and promote the healthy development of children's social-emotional abilities.

Keywords: internalizing problems, externalizing problems, social-emotional competence, self-concept

Introduction

Social-emotional adjustment plays a vital role in children's current and future healthy development.^{1,2} However, a new phenomenon called "parental phubbing" has emerged in today's digital age. Parental phubbing refers to the act of parents using mobile phones in the presence of their children instead of engaging with them.^{3,4} This behavior can have a detrimental effect on children's social-emotional adjustment. When parents prioritize their digital devices over their children, it can lead to feelings of neglect, reduced emotional connection, and hindered social-emotional development in children.³ Although previous empirical studies have investigated the influence of parental phubbing on child social-emotional adjustment,⁵⁻⁷ their findings have been inconsistent due to variations in research design and measurement tools. There is an urgent need for a systematic review and meta-analysis to address this ambiguity and provide a more

comprehensive understanding of the association between parental phubbing and child social-emotional adjustment. To fill this gap, this meta-analysis will integrate the findings from multiple studies to establish a more robust and reliable estimate of effect size and to verify the moderators that may influence the strength of this association. The findings will contribute to the existing literature and have practical implications for promoting social-emotional adjustment and the healthy development of children in the digital age.

Child Social-Emotional Adjustment

Social-emotional adjustment is a broad concept involving cognitive, emotional, and behavioral aspects. Empirical studies on social-emotional adjustment have mainly focused on two aspects: social-emotional competence and behavior problems.^{8–10} Social-emotional competence refers to young children's ability to form close and secure connections with adults and peers, explore the world, and promotes learning, experiencing, regulating, and expressing emotions in a socially and culturally acceptable manner.¹¹ Behavior problems are mainly divided into internalizing problems (eg, sad mood, depression, anxiety) and externalizing problems (eg, aggression, conduct problems).¹² Early social-emotional problems in children (eg, externalizing and internalizing behaviors) can cause disadvantages in later childhood and adulthood, such as inferior academic achievement, decreased peer acceptability and well-being, and mental health problems.^{13,14} On the contrary, children's positive development of social-emotional competence enhances their current learning and adjustment and plays a vital role in later health outcomes.^{1,2,15}

Parental Phubbing and Child Social-Emotional Adjustment

However, parental phubbing may adversely affect children's social-emotional adjustment, as parents commonly concentrate on phone use and neglect their children in parent-child social settings.^{3,4} A similar concept to phubbing is technofence,¹⁶ but some researchers see they have two key differences.^{17,18} Firstly, "phubbing" specifically refers to the use of smartphones, whereas "technofence" encompasses any kind of technology device (eg, smartphones, tablets) and can occur in various settings. Secondly, "phubbing" refers to the intentional act of snubbing someone during face-to-face interaction by using a phone, while "technofence" focuses on the interruptions caused by technology devices. Given the prevalence of smartphones in daily life, and particularly in the field of studying parental distraction due to electronic device use, examining parental phone use during interactions with their children is the most common scenario.¹⁶ Therefore, our study specifically focuses on this phenomenon, which we refer to as "parental phubbing". In the digital era, parental phubbing is a common phenomenon in daily life. For instance, Vanden Abeele and colleagues found that nearly half of the parents had used a mobile phone at least once during their research observation period.¹⁹ There are many reasons parents use mobile phones in front of their children, such as smartphones becoming an integral part of daily life, mobile phone addiction, boredom, loneliness, or negative emotional experiences.³ However, a considerable number of studies have revealed that parental phubbing is detrimental to young children's language, cognitive, social, and emotional development.^{5,20–22}

Parental phubbing affects child's social-emotional development mainly in two aspects. First, parental phubbing reduces parents' responsiveness and sensitivity to their children and affects the quality of parenting.^{3,23} According to the displacement hypothesis,^{23,24} parents' time on media and technology devices may displace and reduce meaningful parent-child interactions. Vanden Abeele and colleagues revealed that using a phone increased the likelihood that parents would ignore a request for attention from their child by five times, and parents also responded less quickly, weaker, with less emotion, and were less likely to put their child's needs ahead of other activities.¹⁹ Moreover, according to the multitasking theory,^{25,26} paying attentions to mobile phone information while accompanying their children and trying to complete multiple tasks simultaneously can lead to inefficiency and more mistakes. Thus, it is inferred that parental phubbing may be associated with lower parental responsiveness and sensitivity,²⁷ which subsequently hinders their care or support for their children, and thus impairs children's development.

Second, based on the expectancy violations theory, parental phubbing affects children's expectations of interaction with their parents.²⁸ This theory postulates that people often have some expectations about interpersonal communication and social interactions. Expectation violation will have a negative, interaction-destroying effect. In the case of parental phubbing, children expect their parents to be fully present and engaged during interactions, providing them with attention

and emotional support. When parents engage in phubbing behavior during interactions with their children, it violates the child's expectation of undivided attention and responsiveness.³ This violation can lead to adverse emotional reactions, such as feelings of neglect and frustration. Elias et al found that children experienced frustration and disappointment during parental phone use, leading to different behavioral problems or withdrawal from communicating with their parents.²⁹ Even infants (under one-year-old) could respond to distractions caused by the mother's phone during the mother-child interaction in the form of increased heart rate and negative emotions.³⁰ In summary, parental phubbing violates children's expectations of parental attention and responsiveness, leading to adverse emotional reactions and potentially impacting their social-emotional adjustment.

Many studies have investigated the relationship between parental phubbing and children's social-emotional development outcomes. However, it is worth noting that previous findings regarding the magnitudes and directions of the association between parental and child social-emotional adjustment are mixed. For instance, some researchers found that parental phubbing and child social competence are moderately negatively correlated,³¹ while others have failed to detect a significant association between these two variables.⁵ This discrepancy implies that it is vital to obtain reliable estimates of the effect sizes and examine a range of characteristics as moderators to account for such discrepancies through a meta-analysis.

Impact of Moderator Variables

The children's gender differences have been documented in the relevant literature regarding parental phubbing and child development. A recent study examining the relationship between parental phubbing and adolescents' mental health symptoms found that boys are at greater risk of developing deviant peer relationships and mobile phone addiction than girls when they are phubbed by their parents.⁴ Furthermore, one study discovered that the negative correlation between parental phubbing and parent-adolescent communication is more pronounced in girls compared to boys.³² This discrepancy suggests that parental phubbing may affect boys and girls differently. Hence, it is necessary to consider the role of gender when discussing the influence of parental phubbing on child development.

Children's age might also moderate the relationship between parental phubbing and child social-emotional adjustment. As children grow older, parenting styles affect children's behavior differently. Hoeve et al found that the relationship between general parenting and child delinquency was stronger in early adolescents than in mid and later adolescents.³³ The authors believed that as children grew older, their peers or other life experiences would significantly impact them more than their parents. However, Pinquart found that parenting dimensions and style with externalizing problems were more robust in older samples, possibly due to externalizing problems becoming more visible in adolescence.³⁴ Thus, parental phubbing may have different effects on children's behavior of different ages. Therefore, child age is included in the moderator analysis.

Furthermore, some research has explored the relationship between phubbing and adolescents' mental health by examining the phubbing behavior of fathers and mothers as a whole.^{4,6,35,36} However, such an approach is problematic as fathers and mothers may have different parenting roles and practices,^{37,38} which can shape children's development differently. McDaniel and Radesky found that mother technofence in parenting was positively correlated with child externalizing and internalizing behaviors, while father technofence in parenting was not related to the child's problem behavior.³⁹ Therefore, father phubbing and mother phubbing may affect children's development differently. It is necessary to explore their influences respectively. This study examines the moderating effects of the parental phubbing group.

In addition, this study will also examine the moderating effects of parental phubbing measurement tools, publication status, and study design on the relationship between parental phubbing and child social-emotional adjustment. Specifically, we will investigate whether different measurement tools for parental phubbing influence the relationship. Furthermore, we will compare the findings of published studies with unpublished master's theses to determine if the conclusions are consistent. Additionally, given that most studies on parental phubbing adopt a cross-sectional design, we will explore potential differences in conclusions between cross-sectional and longitudinal research.

The Current Study

As discussed earlier, the empirical research investigating the relationship between parental phubbing and child social-emotional adjustment has yielded inconsistent results. To our knowledge, there are no meta-analysis studies in this area to explain these differences. The present meta-analysis aims to address two core research questions:

1. What is the overall relationship between parental phubbing and child social-emotional adjustment?
2. Are there any moderating variables that influence the relationship between parental phubbing and child social-emotional adjustment? We will explore potential moderating variables, such as the child's age, gender, measure of parental phubbing, parental phubbing group, and research design.

By addressing these research questions, we aim to contribute to the existing literature by providing a comprehensive analysis of the relationship between parental phubbing and child social-emotional adjustment and identifying potential factors that may influence this relationship.

Method

The present meta-analysis was conducted by the guidelines of the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) statement.⁴⁰ In order to increase transparency and prevent unintended duplication of effort, the protocol of this meta-analysis was preregistered at the International Prospective Register for Systematic Reviews (PROSPERO) with registration number CRD42022325091.

Search Strategy

A systematic literature search was performed according to the Journal Article Reporting Standards for Quantitative Research in Psychology⁴¹ and descriptions given by Braune-Krickau et al²⁷ and Garrido et al⁴². Studies were searched in multiple electronic databases, including the Web of Science, EBSCO, ProQuest, Springer, and China National Knowledge Infrastructure (CNKI). The search string was comprised of three elements: (a) parent (specific terms included parent*, parental*, dad*, father*, mom*, mother*), (b) child (specific terms included child*, infant*, preschool*, teen*, adolescent*), and (c) phubbing (specific terms included phubbing*, technology interference*, distraction with phones*). According to the suggestion of Frandsen et al,⁴³ outcomes terms related to child social-emotional adjustment will not be searched as searching for outcomes has been found to influence the retrieval of relevant research. The truncation character (*) was utilized to obtain different forms of the search term. Furthermore, operators such as "AND" were employed to merge the three categories of search terms, while "OR" was used to combine search terms within each category. The keywords of these three elements were searched in the title, abstract, and/or keywords of the databases to obtain the primary studies. The time limit is set as January 2012 to May 2023, as the search for phubbing by Garrido et al⁴² was first recorded in 2012. In order to reduce the risk of missing relevant literature in the database search, the researchers manually searched the reference lists of eligible study reports. This process was iterated until no further studies could be identified.

Inclusion and Exclusion Criteria

The literature included in the meta-analysis should meet the following criteria: (a) child is less than 22 years old; (b) examine the relationship between parental phubbing and child social-emotional adjustment; (c) use a valid and reliable measure of parental phubbing and child social-emotional adjustment; (d) the correlation coefficients (r) between parental phubbing and child social-emotional adjustment, or t , F , chi-square values that can be converted into r , was clearly reported in the study; (e) The sample size was reported; (f) were cross-sectional or longitudinal studies; (g) were written in Chinese or English.

In addition, exclusion criteria were as follows: (a) studies examined parental technofence, that is, parental distraction caused by the use of computers, tablets, and other devices, not just phones; (b) the child development outcome indicator assessed was not socio-emotional adjustment; (c) included a sample size less than 30; and (d) were case reports or review articles.

It is worth mentioning that the protocol did not differentiate between technoference and phubbing. However, during the literature review process, we came across studies that argued for the existence of differences between phubbing and technoference. As a result, we decided to only include studies that examined phubbing, and studies focusing on technoference were excluded. By making this decision, we aimed to maintain consistency and specificity in our investigation of the relationship between parental phubbing and child social-emotional adjustment. This allowed us to provide a more targeted analysis within the scope of our research question.

Selection Procedure

Out of 643 reports initially identified (see Figure 1), 110 duplicates were excluded. Of the 533 reports remaining, 362 were excluded based on title and abstract. The remaining 171 reports were screened at the full-text level. Based on the predefined inclusion and exclusion criteria, 42 studies were included.

Data Extraction

According to the measurements used in the research, child social-emotional adjustment outcomes were coded according to how they were defined in each study and then divided into four groups. (1) Social-emotional competence includes emotional expressiveness, understanding of emotion, regulation of emotion and behavior, social problem-solving, and social and relationship skills.¹⁵ (2) Internalizing problems, according to Goodman et al⁴⁴ and Labella et al,⁸ include emotional problems and peer problems, such as sad moods, frequent worries, and somatic complaints. (3) Externalizing problems include symptoms such as peer fights, cheating, stealing, inattentiveness, and impulsiveness.^{8,44} (4) Self-concept includes self-esteem and core self-evaluation.⁴⁵

The following data were extracted: (1) author names and publication year. (2) correlation coefficient. (3) the number of study samples. (4) gender distribution of children (measured by “male ratio”). (5) average age of children. (6) measurement instrument. (7) parent phubbing group (father phubbing vs mother phubbing vs parental phubbing). (8) publication type (Journal article vs Thesis).

In the data-extracting process, several principles were followed: (1) The generation of effect size was based on an independent sample. The correlations between parental phubbing and child social-emotional adjustment were analyzed separately for each kind of social-emotional adjustment. Each independent sample can contribute one effect size for

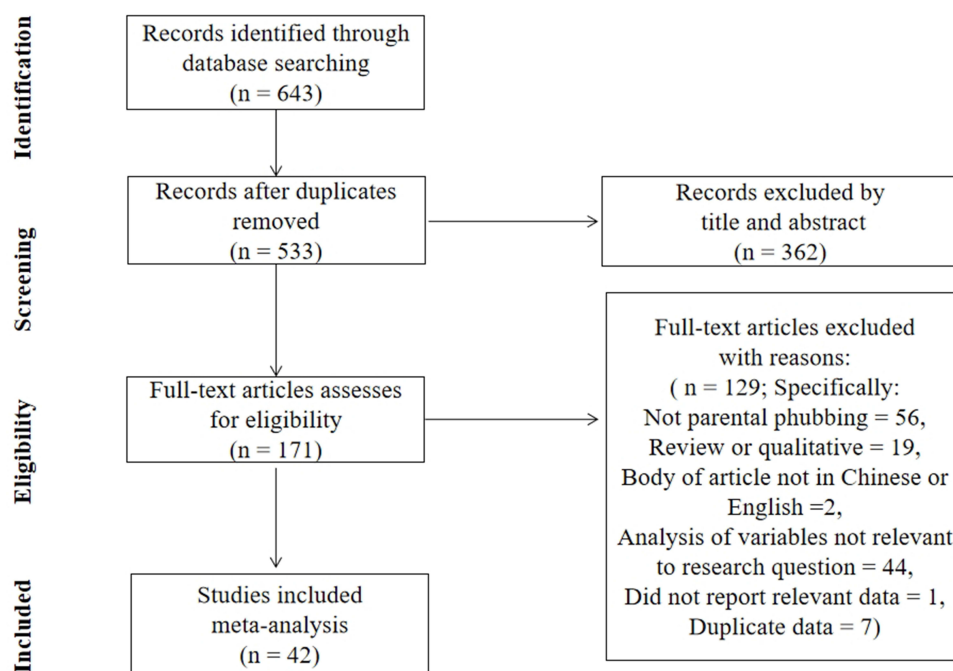


Figure 1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram of study search.

a specific social-emotional adjustment. (2) If two effect sizes based on the same sample can be classified into two subgroups for the moderator analysis, the two effect sizes can be considered independent for the moderator analysis. For example, a sample separately reported the correlation coefficients between father phubbing and mother phubbing and children's internalization problems, and these two effect sizes were considered independent when examining the moderating effect of the target parent. In other cases, to ensure the independence of the effect sizes, if more than one effect size was reported on the same parameter for the same group, the mean correlation was used to address the issue of dependence. (3) For longitudinal studies, we only kept one longitudinal correlation between the initial measurement of parental phubbing and the final measurement of child social-emotional adjustment. (4) If the participant's characteristics (eg, boys and girls) were reported separately, we coded them separately.

Since the two authors completed our coding work separately, it was essential to determine their agreement level. We used the intraclass correlation coefficient (*ICC*) to calculate interrater reliability for continuous variables and Cohen's Kappa (*k*) for categorical variables. For continuous variables, intercoder reliability was calculated for correlation coefficients (*ICC* = 1.000), sample (*ICC* = 0.999), gender (*ICC* = 0.990), and age (*ICC* = 1.000). For categorical variables, intercoder reliability was calculated for publication year (*k* = 1.000), publication status (*k* = 0.931), measurement of parental phubbing (*k* = 1.000), parental phubbing group (*k* = 1.000), and research design (*k* = 0.880). The findings indicated a favorable level of interrater reliability, suggesting a strong consensus between the two separate raters regarding the study characteristics. Any discrepancies were resolved by discussion.

Risk of Bias Assessment

The Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies (National Institutes of Health, 2014) was used to evaluate the risk of bias of all the studies included in this analysis.⁴⁶ This assessment tool consists of 14 items, with each item offering five choices: yes, no, cannot determine, not reported, and not applicable. A score of 1 was assigned for "yes", while the remaining choices did not receive any points. The quality of the literature was then categorized as good (total score > 7), fair (total score between 5 and 7), or poor (total score < 5). In general, a study of high quality is characterized by minimal risk of bias. The coding process was conducted independently by two authors, and their agreement on the total reached a high level of consistency (*ICC* = 0.906). Any discrepancies in the coding process were resolved through consensus discussions.

Statistical Analyses

The current meta-analysis was performed in R (version 4.2.1-win), using the functions of meta and metafor package. The random effects model in the analysis was used. The correlation coefficients (*r*) in the present study were employed as indicators of the effect sizes. Before conducting the meta-analysis, all correlation coefficients were converted to Fisher's z-scores. After conducting the analysis, Fisher's z-values were transformed back to Pearson's correlation coefficient to make their interpretation easier.

To assess publication bias, funnel plot interpretation and Egger's regression intercept were used. If the funnel plot displayed a symmetrical inverted funnel shape and Egger's regression was insignificant, it was decided that publication bias should be disregarded. We applied the *Q* and *I*² test statistics evaluating heterogeneity.⁴⁷ The significant *Q* test reflected the true heterogeneity among the included effect sizes. The *I*² shows the extent of heterogeneity, ranging from 0–100% [small (25%), medium (50%), and large (75%)].⁴⁸ If there was statistically significant heterogeneity, moderator analysis was performed.

We used random effects models for the moderator analysis. The *Q* statistic was used to test for the significance of moderators. According to Huang,⁴⁹ each subgroup should include at least three studies before conducting the moderating analysis for categorized moderating variables.

Results

Study Characteristics

The specific information of the literature included in the meta-analysis is shown in Table 1. In total, 59 effect sizes from 42 studies were retrieved for the current meta-analysis, which included 56,275 participants. Study sample sizes ranged from 293

Table 1 Overview of Studies Included in the Meta-Analysis

| Study (Year) | n | Age | Gender | PP Scale | Type of PP | SEA Indicators | Publication Status | Research Design | Literature Quality |
|---|------|-------|--------|----------|------------|----------------|--------------------|-----------------|--------------------|
| Bai et al (2020) ²⁰ | 3322 | 16.64 | 0.43 | GSBP | P | Int | Journal | C | Fair |
| Ding et al (2022) ⁵³ | 812 | – | 0.43 | PPS | P | Int | Journal | C | Good |
| Ding et al (2023) ⁵⁴ | 782 | 14.88 | 0.53 | PPS | P | Int | Journal | C | Good |
| Dong et al (2022) ⁵⁵ | 2286 | 13.46 | 0.49 | PPS | P | Int | Journal | C | Good |
| Gao et al (2023) ⁵⁶ | 2407 | 12.75 | 0.50 | PPS | P | Ext | Journal | C | Good |
| Geng et al (2021) ⁵⁷ | 1447 | 16.15 | 0.40 | GSBP | F, M | Int | Journal | L | Good |
| He et al (2022) ⁵⁸ | 808 | 14.10 | 0.48 | PPS | P | Int | Journal | C | Good |
| Hong et al (2019) ⁶ | 1721 | 13.35 | 0.46 | PPS | P | Self | Journal | L | Good |
| Ji. (2022) ⁵⁹ | 2090 | 16.00 | 0.44 | PPS | P | Int | Journal | C | Good |
| Li et al (2022) ⁷ | 3770 | 16.44 | 0.49 | GSBP | F | Int | Journal | C | Good |
| Li. (2022) ⁶⁰ | 1545 | 14.48 | 0.47 | PPS | P | Ext | Journal | C | Good |
| Liu and Chen. (2023) ⁶¹ | 1003 | 13.5 | 0.57 | PPS | P | Int, Ext | Thesis | C | Good |
| Liu and Xiao. (2023) ⁶² | 1954 | 14.18 | 0.50 | PPS | P | SEC | Journal | C | Good |
| Liu et al (2021) ⁶³ | 300 | 14.03 | 0.49 | GSBP | P | Self | Journal | C | Good |
| Niu et al (2020) ³⁵ | 726 | 14.55 | 0.51 | PPS | P | SEC | Journal | C | Good |
| Ou. (2021) ⁶⁴ | 636 | 19.60 | 0.45 | PPS | P | Int | Journal | C | Fair |
| Qu et al (2022) ⁶⁵ | 4213 | 16.41 | 0.47 | GSBP | M | Ext, SEC | Journal | C | Good |
| Shao et al (2020) ⁶⁶ | 564 | 13.63 | 0.43 | PPS | P | Ext | Journal | C | Good |
| Shen et al (2022) ⁶⁷ | 809 | 13.15 | 0.49 | PPS | P | Self | Journal | C | Good |
| Wang et al (2020) ⁶⁸ | 2407 | 12.75 | 0.49 | PPS | P | Int, Self | Journal | C | Good |
| Wang, Mao et al (2022) ³² | 4213 | 16.41 | 0.53 | GSBP | F, M | Int | Journal | C | Fair |
| Wang, Qiao et al (2022) ⁶⁹ | 465 | 6.18 | – | PPS | P | Int, Ext | Journal | C | Good |
| Wang, Wang et al (2022) ⁷⁰ | 2407 | 12.75 | 0.49 | PPS | P | Ext | Journal | C | Good |
| Wang, Zhao et al (2022) ⁷¹ | 3293 | 16.28 | 0.47 | GSBP | M | Int | Journal | C | Good |
| Wang, Zhou et al (2022) ⁷² | 689 | 17.01 | 0.60 | PPS | P | Ext, SEC | Journal | C | Good |
| Wei et al (2022) ⁷³ | 874 | 14.07 | 0.51 | PPS | P | Int, Ext | Journal | C | Good |
| Wei et al (2023) ⁷⁴ | 810 | 14.11 | 0.48 | PPS | P | Int | Thesis | C | Good |
| Xiao et al (2022) ⁷⁵ | 819 | 13.48 | 0.46 | PPS | P | Int, Self | Journal | C | Good |
| Xiao. (2020) ⁷⁶ | 452 | 16.90 | 0.43 | PS | P | Int | Journal | C | Good |
| Xie et al (2020) ⁷⁷ | 293 | 12.87 | 0.52 | PPS | P | Int | Journal | L | Good |
| Xie et al (2021) ⁷⁸ | 779 | 13.15 | 0.50 | PPS | P | Int | Journal | C | Good |
| Xie et al (2023) ⁷⁹ | 670 | 14.38 | 0.51 | PPS | F, M | Int, SEC | Journal | C | Good |
| Yang et al (2022) ⁸⁰ | 333 | 13.41 | 0.52 | PPS | P | Int | Thesis | L | Good |
| Yang. (2021) ⁸¹ | 527 | – | – | PPS | P | Int, Ext | Thesis | C | Good |
| Zhang & Zhang. (2020) ⁸² | 411 | 19.82 | 0.38 | PPS | P | Int | Thesis | C | Good |
| Zhang and Jin. (2022) ⁸³ | 1189 | – | 0.51 | PPS | P | Int | Thesis | C | Good |
| Zhang et al (2021) ⁸⁴ | 471 | 13.46 | 0.40 | PPS | P | Int, Self | Journal | C | Good |
| Zhang et al (2022) ⁸⁵ | 812 | – | 0.43 | PPS | P | Int, Ext, Self | Journal | C | Good |
| Zhang, Zhang et al (2022) ⁸⁶ | 562 | 8.817 | 0.505 | PPS | F, M | SEC | Journal | C | Good |
| Zhao et al (2023) ⁸⁷ | 914 | 12.61 | 0.50 | PPS | P | Ext | Journal | C | Good |
| Zhou et al (2022) ⁸⁸ | 1021 | 10.33 | 0.55 | PPS | P | Int | Journal | C | Good |
| Zhou. (2020) ⁸⁹ | 669 | – | 0.51 | PPS | P | Int, Ext, Self | Journal | C | Good |

Abbreviations: N, number of participants; Age, mean age of children; Gender, percentage of boys; PP, Parental Phubbing; SEA, Social-emotional Adjustment; For PP Scale: PPS, Parent phubbing scale, GSBP, Generic scale of being phubbed, PS, phubbing scale; For Type of PP: P, Parent, F, Father, M, Mother; For SEA Indicators: Int, Internalizing problems, Ext, Externalizing problems, Self, Self-concept, SEC, Social-emotional competence; For Research design: C, Cross-sectional research, L, Longitudinal research; “–” mean data missing.

to 4213, with a mean participant age of 13.32 years. The publication year of the included studies ranged from 2018 to 2022. There were 38 cross-sectional studies and 4 longitudinal studies. There are 36 published journal articles and 6 unpublished master’s theses. The primary measurement method used in parental phubbing research is questionnaire surveys. Commonly employed questionnaires include the Partner Phubbing Scale (PPS), Phubbing Scale (PS), and the Generic Scale of Being

Phubbed (GSBP). PPS, developed by Roberts and David,⁵⁰ is a single-dimensional scale with 9 items originally designed to measure partner phubbing but often adapted for parent phubbing research. PS, developed by Karadag et al,⁵¹ consists of two factors, communication interference and mobile phone obsession, with 10 items assessing individuals' self-perceived phubbing behavior. The GSBP, created by Chotpitayasunondh and Douglas,⁵² comprises three factors: perceptual norms, feelings of neglect, and interpersonal conflict. These studies measured social-emotional adjustment in four aspects, including internalizing problems, externalizing problems, self-concept, and social competence, and there are 32, 13, 8, and 6 effect sizes, respectively. Regarding the literature quality, three articles were rated as "fair" while the remaining 39 were rated as "good". In addition, it is worth noting that we planned to investigate the moderating effect of culture in our protocol. However, based on the established search strategy and inclusion and exclusion criteria, all the studies that met the requirements for inclusion in the meta-analysis were conducted with Chinese participants. Therefore, we were unable to explore cultural differences.

Analysis of Publication Bias

All funnel plots show that effect sizes were roughly evenly distributed on either side of the total effect (Figures 2–5). Egger's test showed no intercept values in the outcome categories were statistically significant. Specifically, for internalizing problems, the intercept was 2.08 ($p = 0.169$). For externalizing problems, the intercept was 3.64 ($p = 0.249$). For children's social-emotional competence, the intercept was -0.11 ($p = 0.961$). Lastly, for children's self-concept, the intercept was -3.51 ($p = 0.065$). Collectively, these analyses suggest that the findings of the current meta-analysis are robust and unlikely to be substantially influenced by publication bias.

Homogeneity Test

As shown in Table 2, the Q values fell between 15.16 and 251.32, the p-value were all less than 0.05, and the I-squared values were between 65.3% and 93.0%. These findings, in turn, indicate that the effect sizes were heterogeneous and that most of the observed variation was caused by the effect sizes of the real differences. Therefore, the current study adopted the random effect model to test the overall effect and moderating effect.

Overall Relations Between Parental Phubbing and Children's Social-Emotional Adjustment

The overall relationship between parental phubbing and child social-emotional adjustment was analyzed using a random-effects model. The effect sizes of the relation between parental phubbing and children's social-emotional adjustment were summarized in Table 2. The results showed a significant positive correlation between parental phubbing and internalizing

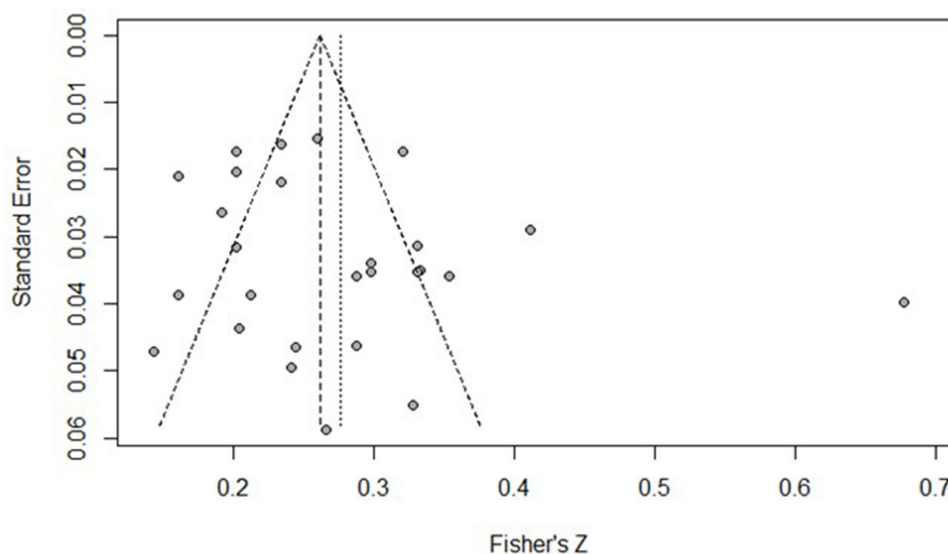


Figure 2 Funnel plot of the association between parental phubbing and children's internalizing problems.

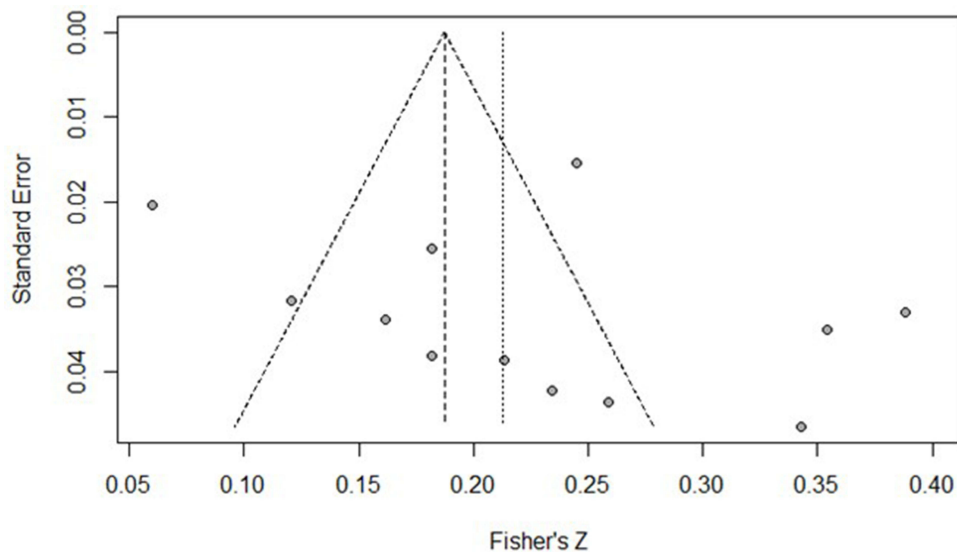


Figure 3 Funnel plot of the association between parental phubbing and children's externalizing problems.

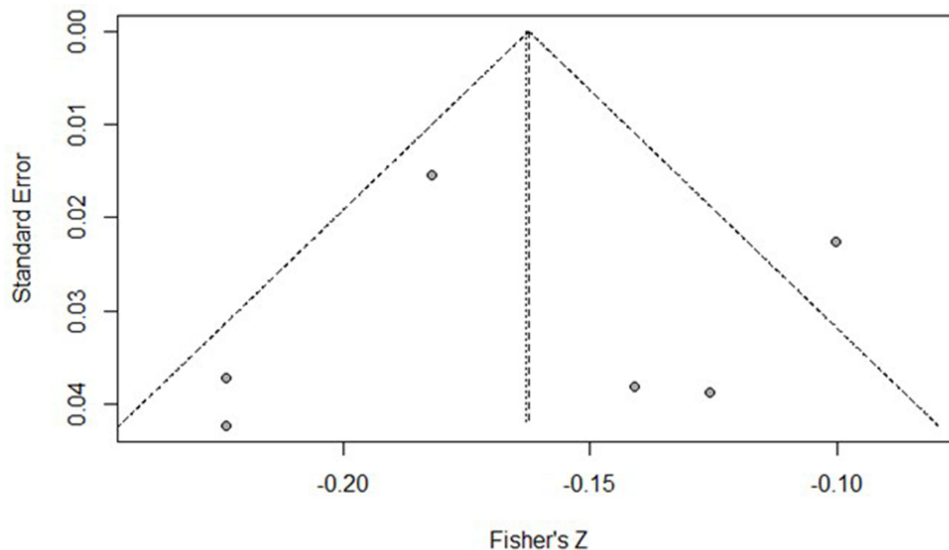


Figure 4 Funnel plot of the association between parental phubbing and children's social competence.

problems ($r = 0.270$, 95% $CI = [0.234, 0.304]$), as shown in Figure 6. The results showed a significant positive correlation between parental phubbing and externalizing problems ($r = 0.210$, 95% $CI = [0.154, 0.264]$), which are summarized in Figure 7. The results showed a significant negative correlation between parental phubbing and social-emotional competence ($r = -0.162$, 95% $CI = [-0.207, -0.120]$), and the results are summarized in Figure 8. The results showed a significant negative correlation between parental phubbing and self-concept ($r = -0.206$, 95% $CI = [-0.244, -0.168]$), as shown in Figure 9. When $|r| \leq 0.1$, this represents a low correlation; when $0.1 < |r| < 0.4$, this denotes a medium correlation; and when $|r| \geq 0.4$, the correlation is high (Lipsey & Wilson, 2001). Therefore, the mean r effect sizes of the correlation between parental phubbing and children's social-emotional adjustment were considered medium.

Analysis of Moderator Variables

Moderating analysis was conducted to examine the relationship between parental phubbing and child internalizing problems. For the continuous moderating variable, the results of the meta-regression analysis showed that the moderating

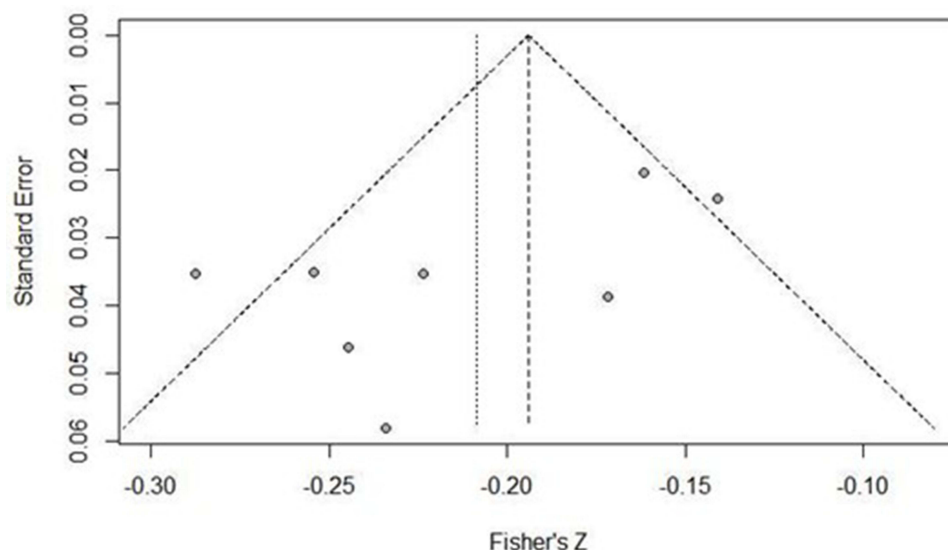


Figure 5 Funnel plot of the association between parental phubbing and children's self-concept.

effects of gender ($b = -0.07$, $SE = 0.43$, $95\% CI = [-0.91, 0.77]$, $Z = -0.16$, $p = 0.870$) and age ($b = 0.008$, $SE = 0.01$, $95\% CI = [-0.008, 0.023]$, $Z = 0.935$, $p = 0.350$) were not significant. The specific analysis results for the categorized moderating variables can be found in Table 3. The moderating effects of the measurement of parental phubbing, publish status and research design were not significant. However, the moderating effect of the parental phubbing group was found to be significant. In particular, the effect size of phubbing on children's internalizing problems was found to be greater when both parents engage in phubbing compared to when only one parent engages in phubbing.

Moderating analysis was conducted to examine the relationship between parental phubbing and child externalizing problems. For the continuous moderating variable, the moderating effects of gender ($b = -0.79$, $SE = 0.64$, $95\% CI = [-2.04, 0.45]$, $Z = -1.25$, $p = 0.21$), age ($b = -0.012$, $SE = 0.013$, $95\% CI = [-0.037, 0.013]$, $Z = -0.92$, $p = 0.36$) were not significant. Due to the limitation of the number of effect sizes, we were unable to explore whether publication status, research design, and parental phubbing measurement play a moderating role in the relationship between parental phubbing and children's externalizing problems. For the same reason, the moderating analysis of parental phubbing and child social-emotional competence and self-concept was not done.

Discussion

Although mounting empirical studies were performed to investigate the relationship between parental phubbing and child social-emotional adjustment, no meta-analysis has been conducted to synthesize their findings. Uncertainty also remained about how parental phubbing was associated with child development. To address these issues, the present meta-analysis was conducted to estimate the overall relationship and examine moderator effects on it.

Table 2 Mean Effects of Outcome Categories

| | <i>k</i> | <i>n</i> | <i>r</i> | 95% CI | <i>Q</i> | <i>df</i> (<i>Q</i>) | <i>I</i> ² |
|------------------------|----------|----------|----------|----------------|-----------|------------------------|-----------------------|
| Internalizing problems | 29 | 37,464 | 0.270 | 0.234, 0.304 | 251.32*** | 28 | 88.9% |
| Externalizing problems | 13 | 17,089 | 0.210 | 0.154, 0.264 | 171.71*** | 12 | 93.0% |
| Social competence | 6 | 8814 | -0.162 | -0.207, -0.120 | 15.16** | 5 | 67.0% |
| Self-concept | 8 | 8008 | -0.206 | -0.244, -0.168 | 20.20** | 7 | 65.3% |

Notes: ** $p < 0.01$, *** $p < 0.001$.

Abbreviations: *k*, number of studies; *n*, number of observations; CI, confidence interval; *df*, degrees of freedom.

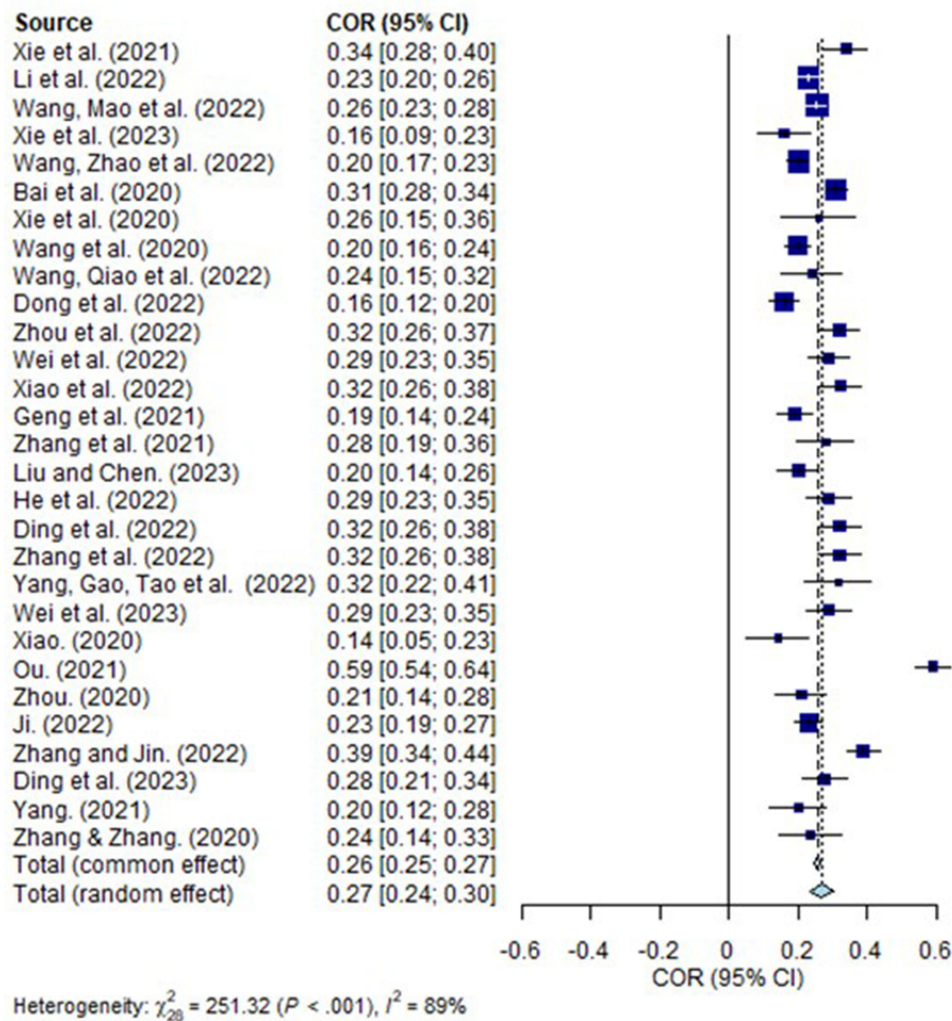


Figure 6 Forest plot for correlation between Parental phubbing and Internalizing problems.

Overall Association Between Parental Phubbing and Child Social-Emotional Adjustment

The present meta-analysis contributes to the literature by providing further evidence on the relationship between parental phubbing and children's social-emotional development. Specifically, it demonstrated that parental phubbing is associated with increased child internalizing and externalizing problems while negatively correlates with self-concept and social-emotional competence.

The positive association between parental phubbing and child internalizing and externalizing problems aligns with previous research,^{4,31,36,69} emphasizing the detrimental impact of parental phone use on children's mental health and behavior. When parents are focused on their phones, they may inadvertently ignore their children's emotional needs, leading to increased internalizing symptoms such as anxiety and depression. In addition, limited attention and responsiveness due to parental addiction to smartphones may lead to externalizing problems in children, including aggression and hyperactivity. These findings emphasize the importance of parental presence and involvement in promoting positive mental health and behavior in children.

Furthermore, the negative correlation between parental phubbing and self-concept emphasizes the impact of parental phone use on children's perception of themselves. From the perspective of expectancy violation theory,²⁸ children often expect their parents to pay attention to them and meet their needs in parent-child interactions. However, parental

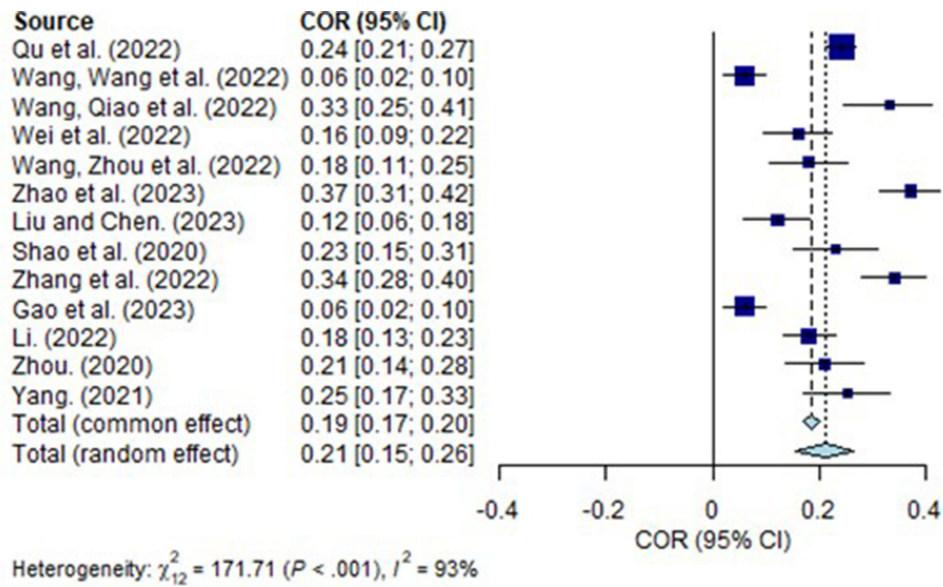


Figure 7 Forest plot for correlation between Parental phubbing and Externalizing problems.

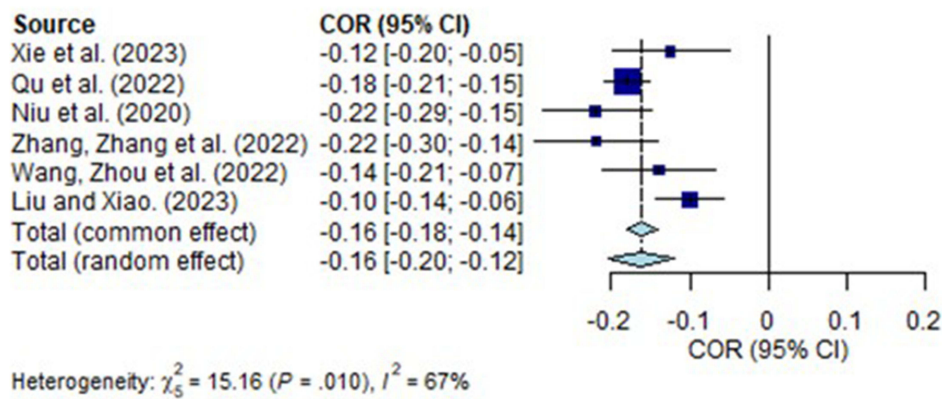


Figure 8 Forest plot for correlation between Parental phubbing and Social-emotional competence.

phubbing violates these expectations, interrupting parent-child communication and resulting in reduced interaction and poor responsiveness to children’s cues.³⁹ This impact of expectancy violation conveys a message of diminished importance and value of children to their parents, leading to lower self-esteem and less positive self-concept. Therefore, parents must create a secure and supportive environment that promotes children’s healthy self-worth and identity development. Further research should also explore potential interventions and strategies to help parents balance digital devices and parenting responsibilities, promoting healthy child development and well-being.

The negative association between parental phubbing and social-emotional competence suggests that children exposed to high parental phone use may face challenges in developing crucial social and emotional skills. Parental phubbing disrupts the quality of parent-child interactions, hindering the child’s ability to communicate effectively, regulate emotions, and form secure attachments. These findings align with previous research highlighting the role of parental responsiveness and attunement in fostering children’s social-emotional competence.^{5,16,36,90} Parents must be present and actively engage with their children to promote the development of these essential skills.

In conclusion, the findings of this meta-analysis provide substantial evidence for the detrimental impact of parental phubbing on various aspects of children’s social-emotional development. The positive associations with internalizing and externalizing problems and the negative correlations with self-concept and social-emotional competence underscore the

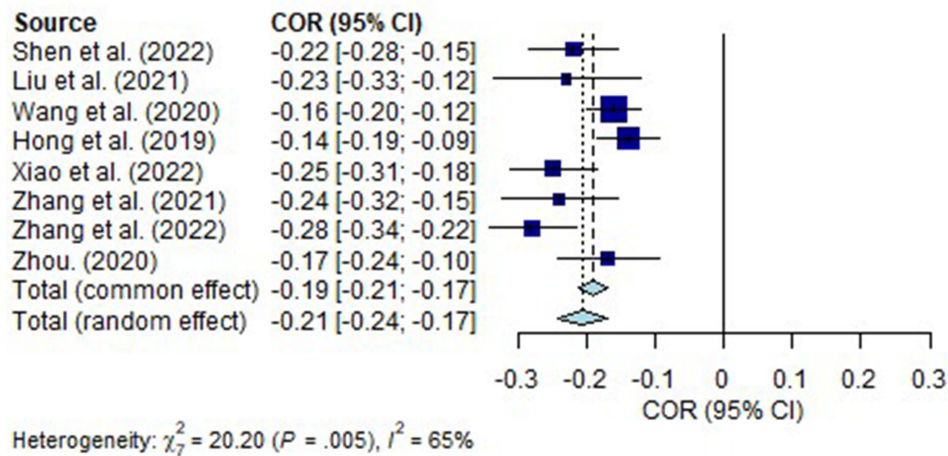


Figure 9 Forest plot for correlation between Parental phubbing and Self-concept.

importance of minimizing parental phone use and prioritizing meaningful interactions with children. Future research should explore potential interventions and strategies to help parents strike a balance between their digital devices and their parenting responsibilities, ultimately fostering healthy child development and well-being.

Moderator Analysis

One notable finding was that the parent phubbing group moderated the association between parental phubbing and child internalizing problems. Specifically, when both parents engage in phubbing, there is a stronger association with children’s externalizing problems compared to when only one parent is engaging in phubbing. Some recent empirical studies have explored the role of father and mother phubbing, respectively.^{32,91} According to family system theory, the father and mother can cooperate in parenting and play a unique role in the development of children.⁹² Therefore, in future research, it is still a valuable topic to study the relationship between father and mother phubbing and child development. Furthermore, this finding suggests that in addition to examining the unique role of father and mother phubbing, we

Table 3 Categorical Moderator Analysis of Parental Phubbing and Internalizing Problems

| Moderator variables | k | r | 95% CI | Q _B |
|-------------------------------------|----|-------|--------------|----------------|
| Measure of parental phubbing | | | | 2.22 |
| PPS | 23 | 0.283 | 0.242, 0.323 | |
| GSBP | 5 | 0.239 | 0.196, 0.281 | |
| Parental phubbing group | | | | 8.42* |
| Parents both phubbing | 24 | 0.284 | 0.245, 0.322 | |
| Father phubbing | 4 | 0.216 | 0.176, 0.256 | |
| Mother phubbing | 4 | 0.209 | 0.168, 0.249 | |
| Publication status | | | | 0.03 |
| Journal article | 23 | 0.269 | 0.228, 0.309 | |
| Thesis | 6 | 0.276 | 0.212, 0.337 | |
| Study design | | | | 0.42 |
| Cross-sectional | 26 | 0.272 | 0.235, 0.309 | |
| Longitudinal | 3 | 0.245 | 0.168, 0.319 | |

Note: *p < 0.05.

Abbreviations: k, number of studies; CI, confidence interval; PPS, parental phubbing scale; GSBP, General Scale of Being Phubbed.

should also pay attention to the possible superimposed effects of father and mother phubbing in the family. Children who are phubbed by both father and mother are likely to experience more internalization problems.

No significant moderator effect for child gender and age was found in the present meta-analysis. Regarding the absence of statistically significant gender differences in the moderating effect of parental phubbing on child social-emotional adjustment, it is possible that the existing studies did not capture the full range of gender-specific effects. While some studies have reported gender differences in the impact of parental phubbing on specific outcomes such as deviant peer relationships and mobile phone addiction,⁴ the overall effect on social-emotional adjustment may not vary significantly between boys and girls. It is also essential to consider that the influence of parental phubbing on child development may be influenced by various factors beyond gender, such as individual differences, family dynamics, and cultural context. Similarly, the non-significant moderating effect of child age on the relationship between parental phubbing and social-emotional adjustment suggests that the impact of parental phubbing may be consistent across different age groups. While previous research has indicated that parenting styles may have varying effects on children's behavior as they grow older,³³ the specific influence of parental phubbing on social-emotional adjustment may not differ significantly based on age. Overall, the non-significant moderating effects of gender and age in the relationship between parental phubbing and child social-emotional adjustment suggest that parental phubbing may have a consistent impact regardless of gender or age. However, further research incorporating larger and more diverse samples across a wider age range is needed to provide a more comprehensive understanding of the potential moderating effects of gender and age in this relationship.

The findings of this study indicate that the moderating effects of parental phubbing measurement tools were not significant between parental phubbing and internalizing problems. It is highly likely that the measurement tools used in our study capture related aspects of parental phubbing. Firstly, considering the timeline of scale development, the PS scale was developed first, followed by the PPS, and the GSBP scale was developed last. It is common for later-developed scales to reference and include items from earlier scales, indicating a conceptual overlap. Secondly, upon examining the items themselves, we can observe that they all measure aspects such as parental distraction and neglect of children due to phone use. These behaviors are key components of parental phubbing. This implies that regardless of the specific measurement tool used, parental phubbing consistently impacts children's internalizing problems.

Furthermore, the findings of this study indicate that research design and publication status were not significant between parental phubbing and internalizing problems. The non-significant moderating effects of publication status and study design indicate that the conclusions drawn from both published studies and unpublished master's theses and from cross-sectional and longitudinal research designs are consistent. Overall, these non-significant moderating effects highlight the robustness of the relationship between parental phubbing and child internalizing problems. Regardless of the specific measurement tool used, publication status, or study design, parental phubbing consistently emerges as a significant factor influencing children's internalizing problems. However, it is essential to acknowledge that further research is needed to explore potential moderators that were not examined in this study, such as individual differences, family socioeconomic status, and cultural context, which may play a role in shaping the impact of parental phubbing on child development.

Limitations and Future Directions

Clearly, some limitations of the present meta-analysis should be considered. Firstly, the participants included in this meta-analysis were all Chinese, and the conclusions should be generalized to other cultural backgrounds with caution. China features a collectivist culture that emphasizes family ties and fitting in with individuals belonging to a larger group.^{93,94} In contrast, individualism culture emphasizes individual freedom and independence. In collectivist cultures, where interpersonal relationships are more important,⁹⁵ parental phubbing may have a greater negative effect on children. Therefore, whether parental phubbing affects children differently in different cultural contexts remains to be explored in the future.

Secondly, as the meta-analysis mainly included cross-sectional studies, a limitation of this study was that the conclusion relating to the causal directions of the association between parental and child social-emotional adjustment was hindered. This causal association may be bidirectional. A six-month longitudinal study found that higher technology

use during parent-child interactions predicted a significant increase in child externalizing behavioral difficulties over time.⁹⁶ Conversely, they also found that child behavioral difficulties were associated with later higher technology use during parent-child activities. Accordingly, it would be necessary for future experimental and longitudinal studies to establish the directions of causality for the relationship between parental phubbing and child development.

Another limitation of our study was the small number of effect sizes available for specific subgroups within the categorical moderators. For instance, when analyzing the relationship between parental phubbing and child externalizing problems, we found only one effect size for the subgroup of mother phubbing in the parental phubbing group measure, one effect size for the GSBP subgroup in the measure of parental phubbing, and one effect size for the longitudinal subgroup in the research design. As a result, we could not explore the potential moderating effects of publication status, research design, and parental phubbing group on the relationship between parental phubbing and externalizing problems, social-emotional competence, and self-concept. To address this limitation, future studies should adopt more longitudinal study designs to further investigate the association between parental phubbing and child social-emotional adjustment and explore the unique and combined roles of father and mother phubbing.

Implications

Nevertheless, this meta-analysis provides essential insights into parenting practices in the digital age. The findings highlight the significant and enduring negative impact of parental phubbing on children's emotional and behavioral problems and their self-concept and social skills. Given these findings, educational recommendations can be considered from parents' perspectives, future research, and policy-making.

Firstly, for parents, it is crucial to clearly understand the widespread and long-lasting negative consequences of phubbing on child development. Parents should take steps to regulate their own smartphone usage in the presence of their children. Based on the American Academy of Pediatrics,⁹⁷ parents can be encouraged to establish boundaries for smartphone use and implement screen-free time or areas. During these designated periods or specific areas, phones should be set aside to minimize distractions and enhance parent-child relationship. The core characteristic of the parent-child relationship is parent-child attachment, which refers to an affectionate and mutually satisfying bond between a child and their caregiver. This attachment serves the purpose of making the child feel safe, secure, and protected.⁹⁸

Secondly, this meta-analysis also provides implications for future research. On the one hand, research can delve deeper into the underlying mechanisms and moderating factors in the relationship between parental phubbing and child outcomes. On the other hand, future studies should explore potential interventions and strategies to assist parents in reducing phubbing and increasing their awareness of its impact on children.

Finally, the findings of this meta-analysis can inform policy-making related to digital device use and parenting practices. Guidelines and recommendations, such as those provided by the American Academy of Pediatrics, can be integrated into policies and initiatives to promote healthy digital habits and strengthen parent-child relationships. Policy interventions can include public awareness campaigns, educational resources, and support programs for parents.

In conclusion, the implications of this meta-analysis call for concerted efforts from parents, researchers, and policy-makers to address the negative impact of parental phubbing on children's well-being. Promoting awareness, providing practical strategies, and integrating guidelines into policies can create a healthier digital environment for children and support positive parent-child interactions.

Conclusion

This study employed meta-analysis to quantitatively synthesize the relationship between parental phubbing and child social-emotional adjustment. The findings revealed that parental phubbing positively affects child internalizing and externalizing problems while negatively correlates with self-concept and social-emotional competence. This study served the purpose of a better understanding of the association between parental phubbing and child social-emotional adjustment. Furthermore, our findings might pave the way for further empirical studies of varying designs investigating parental phubbing on child development.

Data Sharing Statement

The datasets used or analyzed during the current study are available from the corresponding author upon reasonable request.

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Disclosure

The authors report no conflicts of interest in this work.

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