

## PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form (<http://bmjopen.bmj.com/site/about/resources/checklist.pdf>) and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below.

### ARTICLE DETAILS

<b>TITLE (PROVISIONAL)</b>	Factors influencing developmental delay among young children in poor rural China: a latent variable approach
<b>AUTHORS</b>	Zhang, Jingxu; Guo, Sufang; Li, Ying; Wei, Qianwei; Zhang, Cuihong; Wang, Xiaoli; Luo, Shusheng; Zhao, Chunxia; Scherpbier, Robert

### VERSION 1 – REVIEW

<b>REVIEWER</b>	Helena Silveira Schuch The University of Adelaide, Australia
<b>REVIEW RETURNED</b>	10-Feb-2018

<b>GENERAL COMMENTS</b>	<p>Thank you for the opportunity to review this paper. It is an interesting study but some aspects need to be improved before publication.</p> <p>The title uses the term latent variable approach but this is barely mentioned in the paper. I strongly suggest defining it in the introduction section and clearly explaining in the methods how different observed variables were combined to represent the latent variables.</p> <p>The term “suspicious developmental delay” is not very used in the literature. Can you please justify the choice and include references? ZSDS: the abstract states it was parent reported but in the methods it says primary caregiver. Please keep it consistent.</p> <p>Social-emotional/social emotional: Please standardize and use always the same writing.</p> <p>Aims: “... and compare the prevalence of developmental delay in rural China to other developing countries”. I suggest removing this from the aims. It is expected that the authors are going to compare their findings with similar populations but in this paper I do not see this as one of the aims of the study. For example, which methods were used to answer this aim??</p> <p>Methods: The authors are citing the ASQ-C in the paper but it is not in the reference list, please include.</p> <p>Infant and child feeding index: Please include the reference in the end of the sub-section, after explaining about the scores. Also, the paper from Ruel and Menon has a more complex scoring system. Was it used in your study? Or did you used a modified version? Please clarify and include this information if you used a modified version.</p> <p>ASQ: There are more questionnaires in this age range 6-35 months than the questionnaires used. For example, if a child was 9 months, was he/she included in the study? Which questionnaire was used? In the original ASQ it would be used the 9 or 10 month questionnaire but it is possible that in the Chinese version the age range for each questionnaire is bigger. I tried to check the paper validating ASQ-C but it is published in Chinese.</p>
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	Results: Birth weight ranged from 1.4 to 6kg. Is that correct? 1.4kg at 6 months? Discussion: Lines 294-295: Please include the direction of association. Reference 26: Please include year, journal, volume, page number.
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<b>REVIEWER</b>	Soheila Shahshahani Pediatric Neurorehabilitation Research Center, University of Social Welfare and Rehabilitation Sciences, Koudakyar St, Daneshjoo Blvd, Tehran, Iran
<b>REVIEW RETURNED</b>	11-Mar-2018

<b>GENERAL COMMENTS</b>	<p>This is a good article but there are some comments.</p> <p>There is some native article that evaluated child development in China. It is better that authors refer to your native studied such as</p> <p>1- "Caregiver's depressive symptoms and young children's socioemotional development delays: a cross-sectional study in poor rural areas of china" by Wei Q1, Zhang C1, Zhang J1, Luo S1, Wang X1, Infant Ment Health J. 2018 Feb 27. doi: 10.1002/imhj.21699.</p> <p>2- "Effectiveness of integrated early childhood development intervention on nurturing care for children aged 0-35 months in rural China" by Shi HF1, Zhang JX, Wang XL, Xu YY, Dong SL, Zhao CX, Huang XN, Zhao Q, Chen XF, Zhou Y, O'Sullivan M, Pouwels R, Scherpbier RW, Zhonghua Er Ke Za Zhi. 2018 Feb 2;56(2):110-115. doi: 10.3760/cma.j.issn.0578-1310.2018.02.007.</p> <p>In page 5 line 59, the word "motor" is better than "physical"</p> <p>In page 8 line 125, did you include children with obvious developmental delay in yor study?</p> <p>In page 9 line 135 and 136 [problem solving (CG)] what is the meaning of CG?</p> <p>In page 16 line 226 you wrote "highest rate (48.9%) among children aged 6-11 months .." but in the table 3 it is 48.0%. which one is correct?</p> <p>In page 17 line 241 you mentioned that "Birth weight of the surveyed children ranged from 1.40 to 6.00 kilograms", is 6.00 kg correct?</p> <p>In general, the authors paid attention to one of the important aspect of pediatric medicine in rural and deprived area and as a pediatrician, I appreciate this work.</p>
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### VERSION 1 – AUTHOR RESPONSE

Reviewer: 1

Reviewer Name: Helena Silveira Schuch

Institution and Country: The University of Adelaide, Australia

Please state any competing interests: None declared

Please leave your comments for the authors below

Thank you for the opportunity to review this paper. It is an interesting study but some aspects need to be improved before publication.

The title uses the term latent variable approach but this is barely mentioned in the paper. I strongly suggest defining it in the introduction section and clearly explaining in the methods how different observed variables were combined to represent the latent variables.

Answer: In our study, a structural equation model has been used to explore the direct, indirect and total effects of multiple factors such as social, biological and psychological factors on child

developmental delay. For example, when three indicators (caregivers' education, caregivers' age and wealth index) mapped onto "caregiver factors", a latent variable emerged(see figure). We added explanation and reference on latent variable in structural equation model in the induction (page 7 line 104-111) and method parts (page 9 line 152-153, page 12 line 199-201 .

The term "suspicious developmental delay" is not very used in the literature. Can you please justify the choice and include references?

Answer: It is my mistake. Yes, the term "suspicious developmental delay" should be revised to "suspected developmental delay" which is widely used in the literatutre. We have revised all "suspicious developmental delay" to "suspected developmental delay" in the whole manuscript.

ZSDS: the abstract states it was parent reported but in the methods it says primary caregiver. Please keep it consistent.

Answer: Yes, the objects were primary caregivers in our study. We have revised "parent" in the abstract to "primary caregiver".

Social-emotional/social emotional: Please standardize and use always the same writing.

Answer: We have revised and used the same writing as "social emotional" in page 5 line 61 and 65.

Aims: "... and compare the prevalence of developmental delay in rural China to other developing countries". I suggest removing this from the aims. It is expected that the authors are going to compare their findings with similar populations but in this paper I do not see this as one of the aims of the study. For example, which methods were used to answer this aim??

Answer: The aim: "... and compare the prevalence of developmental delay in rural China to other developing countries" have been removed from our manuscript in page 8 line 112.

Methods: The authors are citing the ASQ-C in the paper but it is not in the reference list, please include.

Answer: The reference number[20] on ASQ-C have been added in page 9 line139 and in the reference list. Another revision was the last dimension "social emotional" in ASQ-C to "personal-social" (reference 21 was added in page 9 line 146), which is my mistake. The relative discription on this dimension, "personal-social", were all revised in page 22 line 282, table1, table3, table 4, figure and supplementary 1.

Infant and child feeding index: Please include the reference in the end of the sub-section, after explaining about the scores. Also, the paper from Ruel and Menon has a more complex scoring system. Was it used in your study? Or did you used a modified version? Please clarify and include this information if you used a modified version.

Answer: This infant and child feeding index was constructed by ourselves based on WHO recommedation and Ruel and Menon's paper. So, I agreed with the reviewer's suggesstion to add a "modified" word and this will be accuracy. We have revised relevant discriptions in page 11 line 169 and line 176, in Table 1, in page 18 line 259, in page 25 line 344,as well as in page 26 line 357.

ASQ: There are more questionnaires in this age range 6-35 months than the questionnaires used. For example, if a child was 9 months, was he/she included in the study? Which questionnaire was used? In the original ASQ it would be used the 9 or 10 month questionnaire but it is possible that in the

Chinese version the age range for each questionnaire is bigger. I tried to check the paper validating ASQ-C but it is published in Chinese.

Answer: Yes, you are right, there are more questionnaires in the age range 6-35 months. We have added another reference(19), which explained in detail and I also listed questionnaires in different ages in ASQ-C in the following table.

Table Check list

ASQ questinnaires	Range of months age
2m	1m0d-2m30d
4m	3m0d-4m30d
6m	5m0d-6m30d
8m	7m0d-8m30d
9m	9m0d-9m30d
10m	10m0d-10m30d
12m	11m0d-12m30d
14m	13m0d-14m30d
16m	15m0d-16m30d
18m	17m0d-18m30d
20m	19m0d-20m30d
22m	21m0d-22m30d
24m	23m0d-25m15d
27m	25m16d-28m15d
30m	28m16d-31m15d
33m	31m16d-34m15d
36m	34m16d-38m30d
42m	39m0d-44m30d
...	...

Results: Birth weight ranged from 1.4 to 6kg. Is that correct? 1.4kg at 6 months?

Answer: The birth weight was recorded from birth registration, we checked the data, it is correct and 1.4 kg is the birth weight, not at 6 months.

Discussion: Lines 294-295: Please include the direction of association.

Answer: The direction of association was added in page 23 line 305.

Reference 26: Please include year, journal, volume, page number.

Answer: Reference 26 is now becoming 29, it is an Chinese book on the method of structural equation model and relative informations have been added.

Reviewer: 2

Reviewer Name: Soheila Shahshahani

Institution and Country: Pediatric Neurorehabilitation Research Center, University of Social Welfare and Rehabilitation Sciences, Koudakyar St, Daneshjoo Blvd, Tehran, Iran

Please state any competing interests: None declared

Please leave your comments for the authors below

This is a good article but there are some comments.

There is some native article that evaluated child development in China. It is better that authors refer to your native studied such as

1- "Caregiver's depressive symptoms and young children's socioemotional development delays: a cross-sectional study in poor rural areas of china" by Wei Q1, Zhang C1, Zhang J1, Luo S1, Wang X1, Infant Ment Health J. 2018 Feb 27. doi: 10.1002/imhj.21699.

2- "Effectiveness of integrated early childhood development intervention on nurturing care for children aged 0-35 months in rural China" by Shi HF1, Zhang JX, Wang XL, Xu YY, Dong SL, Zhao CX, Huang XN, Zhao Q, Chen XF, Zhou Y, O'Sullivan M, Pouwels R, Scherpbier RW, Zhonghua Er Ke Za Zhi. 2018 Feb 2;56(2):110-115. doi: 10.3760/cma.j.issn.0578-1310.2018.02.007.

In page 5 line 59, the word "motor" is better than "physical"

Answer: The word "physcial" had been revised to "motor" in page 5 line 58.

In page 8 line 125, did you include children with obvious developmental delay in yor study?

Answer: The obvious developmental delay were excluded in our study because one aim of our study was to explore factors contributing to child developmental delay in community surveyed population. So, the children with hearing disabilities (e.g., deaf children) were excluded.

In page 9 line 135 and 136 [problem solving (CG)] what is the meaning of CG?

Answer: Two dimensions of "problem solving" and "personal-social" might have same abbreviation, "problem solving" reflect cognition part and it was abbreviated as CG (two consonants of cognition). We have deleted all abbreviations of the five dimensions, because we readeed other references on ASQ, the abbreviations were not used widely. (References :Lisbeth Valla1 et al. Prevalence of suspected developmental delays in early infancy: results from a regional population-based longitudinal study. BMC Pediatrics (2015) 15:215. K. C. Chong,et al. ASQ-3 scores are sensitive to small differences in age in a Peruvian infant population. Child: care, health and development (2017) 43, 4, 556–565)

In page 16 line 226 you wrote "highest rate (48.9%) among children aged 6-11 months .." but in the table 3 it is 48.0%. which one is correct?

Answer: I feel so sorry. We have checked the data and 48.0% is correct. We revised the right number to 48.0% in page 17 line 239 and in the abstract, that is "highest rate (48.0%) among children aged 6-11 months ..".

In page 17 line 241 you mentioned that "Birth weight of the surveyed children ranged from 1.40 to 6.00 kilograms", is 6.00 kg correct?

Answer: We have checked the data and 6.00 kg is correct.

In general, the authors paid attention to one of the important aspect of pediatric medicine in rural and deprived area and as a pediatrician, I appreciate this work.

FORMATTING AMENDMENTS (if any)

Required amendments will be listed here; please include these changes in your revised version:

**VERSION 2 – REVIEW**

<b>REVIEWER</b>	Soheila Shahshahani Pediatric Neurorehabilitation Research Center, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran
<b>REVIEW RETURNED</b>	02-Apr-2018

<b>GENERAL COMMENTS</b>	<p>1- As I recommended before, it is better that the authors refer to their national studies in the field of child development. For example:  A- "Caregiver's depressive symptoms and young children's socioemotional development delays: a cross-sectional study in poor rural areas of china" by Wei Q1, Zhang C1, Zhang J1, Luo S1, Wang X1, Infant Ment Health J. 2018 Feb 27. doi: 10.1002/imhj.21699.  B- "Effectiveness of integrated early childhood development intervention on nurturing care for children aged 0-35 months in rural China" by Shi HF1, Zhang JX, Wang XL, Xu YY, Dong SL, Zhao CX, Huang XN, Zhao Q, Chen XF, Zhou Y, O'Sullivan M, Pouwels R, Scherpbier RW, Zhonghua Er Ke Za Zhi. 2018 Feb 2;56(2):110-115. doi: 10.3760/cma.j.issn.0578-1310.2018.02.007.</p> <p>2- Please emphasize that you excluded the children with obvious developmental disabilities or included apparently normal children (as you said about the hearing disabilities).</p>
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<b>REVIEWER</b>	Helena Silveira Schuch The University of Adelaide, Australia
<b>REVIEW RETURNED</b>	05-Apr-2018

<b>GENERAL COMMENTS</b>	<p>Thanks for sending an updated version of the manuscript. It improved substantially but I still have some minor suggestions. Please find the suggestions below:</p> <p>Abstract:  Lines 28 and 32: The authors are using both "primary caregivers" and "first caregivers" in the text. I recommend using "primary caregivers".  Outcomes Measures: I suggest few changes to improve readability: "Child suspected developmental delay WAS EVALUATED using the [...]. Haemoglobin value WAS measured using a calibrated, automated analyzer. Birth weight WAS obtained from medical record.</p> <p>Introduction: Line 77: Please change context for contextual.  Line 93: Please change show for showing.  Lines 104-111: The concept of latent variable is still confusing in the paper. I strongly recommend the authors to clearly state a definition of latent variable and how it applies to their analysis.</p> <p>Methods: Line 126: Please change the work finished for completed.  Line 138: Please change the word conducted for evaluated, and the word interviewed for conducted.  Line 159: Here you are mentioning children under five years old, but before it says 3 years old. Please check.</p> <p>Discussion: Line 357-358: "[...] it is known that poor maternal nutrition, infections and child feeding practices can impact child nutrition and development." Please insert a reference.  Line 368: Please change "to" for "for".</p>
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## VERSION 2 – AUTHOR RESPONSE

Reviewer(s)' Comments to Author:

Reviewer: 2

Reviewer Name: Soheila Shahshahani

Institution and Country: Pediatric Neurorehabilitation Research Center, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran

Please state any competing interests: None declared

Please leave your comments for the authors below

1- As I recommended before, it is better that the authors refer to their national studies in the field of child development.

For example:

A- "Caregiver's depressive symptoms and young children's socioemotional development delays: a cross-sectional study in poor rural areas of china" by Wei Q1, Zhang C1, Zhang J1, Luo S1, Wang X1, *Infant Ment Health J.* 2018 Feb 27. doi: 10.1002/imhj.21699.

B- "Effectiveness of integrated early childhood development intervention on nurturing care for children aged 0-35 months in rural China" by Shi HF1, Zhang JX, Wang XL, Xu YY, Dong SL, Zhao CX, Huang XN, Zhao Q, Chen XF, Zhou Y, O'Sullivan M, Pouwels R, Scherpbier RW, *Zhonghua Er Ke Za Zhi.* 2018 Feb 2;56(2):110-115. doi: 10.3760/cma.j.issn.0578-1310.2018.02.007.

Answer: Yes, the reference of these national studies on caregiver's depression symptoms had been added in page 10 line 164.

2- Please emphasize that you excluded the children with obvious developmental disabilities or included apparently normal children (as you said about the hearing disabilities).

Answer: We have emphasized that the apparently normal children were included in our analysis in page 8 line 130.

Reviewer: 1

Reviewer Name: Helena Silveira Schuch

Institution and Country: The University of Adelaide, Australia

Please state any competing interests: None declared

Please leave your comments for the authors below

Thanks for sending an updated version of the manuscript. It improved substantially but I still have some minor suggestions. Please find the suggestions below:

Abstract:

Lines 28 and 32: The authors are using both “primary caregivers” and “first caregivers” in the text. I recommend using “primary caregivers”.

Answer: Yes, “first caregivers” have been revised to “primary caregivers” in line 28.

Outcomes Measures: I suggest few changes to improve readability: “Child suspected developmental delay WAS EVALUATED using the [...]. Haemoglobin value WAS measured using a calibrated, automated analyzer. Birth weight WAS obtained from medical record.

Answer: Yes, all were revised accordingly in line 29, 32 and 33.

Introduction: Line 77: Please change context for contextual.

Answer: Yes, context has been revised to contextual in line 77.

Line 93: Please change show for showing.

Answer: Yes, “show” has been revised to “showing” in line 93.

Lines 104-111: The concept of latent variable is still confusing in the paper. I strongly recommend the authors to clearly state a definition of latent variable and how it applies to their analysis.

Answer: A statement on a latent variable has been revised in “Induction” of page 7 line 109-110 and “Data analysis” of page 13 line 217-219.



Methods: Line 126: Please change the work finished for completed.

Answer: Yes, finished has been revised to completed.

Line 138: Please change the word conducted for evaluated, and the word interviewed for conducted.

Answer: Yes, conducted has been revised to evaluated and interviewed has been revised to conducted.

Line 159: Here you are mentioning children under five years old, but before it says 3 years old. Please check.

Answer: this is a mistake. The right word is “three” and it has been revised in line 159.

Discussion: Line 357-358: “[...] it is known that poor maternal nutrition, infections and child feeding practices can impact child nutrition and development.” Please insert a reference.

Answer: reference 5 has been added in page 26 line 361.

Line 368: Please change “to” for “for”.

Answer: the word “to” has been revised to “for” in page 26 line 370.