Abstract

Background: Child stunting and underweight are worldwide issues that may be connected to family structure. This research examined family type (nuclear vs. joint), women's empowerment, and child nutrition in Karachi, Pakistan.

Methods: A cross-sectional research included 450 under-5s and their moms from healthcare settings. Child nutrition and mother empowerment were examined using standardized instruments. Nutritional outcomes, empowerment, and child stunting/underweight were examined across household types.

Results: Compared to children from nuclear families (stunting: 32.9%, 95% CI: 27.0-39.3; underweight: 15.6%, 95% CI: 10.9-21.4), children from joint families showed substantially reduced rates of underweight (15.6%, 95% CI: 10.9-21.4) and stunting (22.7%, 95% CI: 17.8-28.3) (p = 0.02 for both). In comparison to nuclear families (12.9%, 95% CI: 8.9-17.7), the slightly higher overweight prevalence in joint families (14.7%, 95% CI: 10.3-19.8) was not statistically significant (p = 0.51). Remarkably, greater maternal empowerment ratings were substantially linked to a decreased risk of stunting (OR = 0.92, 95% CI: 0.87-0.98, p = 0.01) and underweight (OR = 0.92, 95% CI: 0.87-0.98, p = 0.01) in children, independent of the type of household.

Conclusion: This research demonstrates that combined family structure may minimize stunting and underweight. Women's empowerment also improved child nutrition in both families. Further study is required to understand these results' mechanisms and long-term effects.

Keywords: Child malnutrition, Family structure, Women's empowerment, Nutritional status, Karachi, Pakistan

Layman Summary

In Karachi, Pakistan, this study found that children from joint families were less likely to be short or underweight than children from nuclear families. Women who lived in joint homes said they had more power to make decisions, which could help improve children’s diet. In general, the study shows how family organization, women’s rights, and kid health results are all connected in complicated ways.
Introduction
Child malnutrition, which includes stunting and underweight, continues to be a major worldwide public health issue that impacts millions of children under five [1]. According to predictions from the World Health Organization (WHO), 45 million children were underweight and over 149 million children were stunted in 2020 [1]. These disorders, which are characterized by stunted growth and insufficient weight gain, may have serious, long-term effects on children, such as compromised immune systems, delayed cognitive development, and an increased risk of developing chronic illnesses later in life [2, 3]. Developing successful treatments to enhance child health outcomes across a range of groups requires an understanding of the variables that lead to malnutrition in children.

It has been determined that family structure, or the dynamics of interactions within a home, may have an impact on the health and nutrition of children [4]. Previous studies indicate that children belonging to certain family types, including nuclear families consisting only of parents and children or extended families with many generations living together, can have distinct dietary risks and consequences [5, 6]. The research that is currently available, however, paints a mixed picture. While some studies [7, 8] point to benefits for joint families in terms of social support and resource sharing, others [9, 10] find no appreciable variations in the nutritional condition of children across family types.

Additionally, studies are becoming more and more aware of how crucial women's empowerment is in determining the health and wellbeing of their children [11]. Research has shown that enhanced decision-making authority and self-governance for women, specifically about the distribution of resources and healthcare options, might result in improved infant nourishment and general health consequences [12, 13]. But little research has been done on the relationship between family structure, women's emancipation, and children's nutritional condition, especially in countries with low resources like Pakistan.

By examining the relationship between women's empowerment, family structure (nuclear vs. joint), and child nutritional status in Karachi, Pakistan, this research seeks to close these information gaps. Gaining an understanding of these connections may help in the development of focused treatments and policies that enhance child nutrition and wellbeing in a variety of family situations. The results may be especially pertinent in Pakistan, where mixed families are still somewhat widespread and underweight and stunting of children continue to be major public health issues [12]. Through emphasising the advantages of particular family configurations and the importance of women’s empowerment, this research seeks to provide guidance for improving child health and fostering healthy growth in a variety of family environments.

Methods
Study Design and Setting:
This study was carried out in two hospital settings in Karachi, Pakistan, using a cross-sectional research methodology. These institutions were specifically picked because of the variety of patients they serve, which guarantees a wider range of families from different socioeconomic backgrounds.

Study Population
Mothers living in Karachi with children under five who frequent the hospitals for annual physicals or immunizations were among the target demographic. The context and practical limitations led to the use of convenience sampling. Nevertheless, successive sampling was used to guarantee a certain level of representativeness, enrolling individuals in the order in which they arrived at the hospital until the target sample size was attained.

Data Collection
A pre-tested, self-administered questionnaire that was offered in both Urdu and English to satisfy participants’ linguistic preferences was used to gather data. Research assistants with training were on hand to help participants who needed help interpreting the questionnaire or completing it on their own.

The following elements were covered by the questionnaire:
• Socio-demographic characteristics: This included data on household income, age, education level, and type of family (nuclear or joint).
• Women’s decision-making power: This was evaluated via the use of an established instrument that gauges women’s independence across a range of areas (e.g., family finances, healthcare choices, etc.). The tool’s score functioned as a stand-in for an indicator of women’s empowerment.
• Child health: To evaluate the nutritional status of the children, data on their age, weight, and height was gathered. Following established guidelines, healthcare personnel with training in anthropometry took measurements of patients.

Based on criteria from the World Health Organization (WHO), nutritional status was categorized as stunting, wasting, underweight, or overweight respectively.

Quality Control Measures
To guarantee data correctness and dependability, a number of quality control procedures were put in place:
• Pre-testing the survey: To find any ambiguities or comprehension issues, the survey was piloted on a small sample (n = 20). The questionnaire was improved before to the primary data collecting phase based on the input that was obtained.
• Research assistant training: Study methodology, data collecting techniques, and ethical issues were all covered in detail during the research assistant training. Additionally, they received training on how to politely and properly respond to participant inquiries.
• Data entry and cleaning: In order to reduce mistakes, data input and cleaning were done twice by separate researchers. After that, the data were cleansed and examined for errors and missing numbers.

Statistical Analysis
Version 22 of the Statistical Package for Social Sciences (SPSS) was used to analyze the data. The characteristics of the participants and the prevalence of various nutritional statuses among family types were summarized using descriptive statistics. The prevalence of various nutritional statuses (stunting, wasting, underweight, and overweight) in children from nuclear and joint homes was compared using chi-square testing.

The relationship between women’s empowerment score, family structure (an independent variable), and child nutritional status (a dependent variable) was examined using logistic regression models. Potential confounding factors including mother education and family income were taken into account in these models.

Sample Size Estimation
By adopting a power of 0.80, an alpha level of 0.05, and an expected effect size of 0.20 for the correlation between family structure and child stunting, the Creative Research System was used to determine a sample size of 450 participants. It was determined that this sample size would be enough to detect a modest effect size with a suitable power.

Data Analysis
Data analysis was carried out in many stages:
1. Descriptive analysis: The sociodemographic traits of the participants and the prevalence of various nutritional statuses (stunting, wasting, underweight, and overweight) across family types were described using frequencies and percentages.
2. Bivariate analysis: Children from nuclear and joint households were compared for the prevalence of various nutritional statuses using chi-square tests.
3. Multivariable analysis: After adjusting for any confounding factors, logistic regression models were used to evaluate the relationship between women's empowerment score, family structure, and child nutritional status.

Ethical Considerations
The study protocol was reviewed and approved by the Institutional Review Board of Shaheed Zulfiqar Ali Bhutto Institute of Science & Technology (SZABIST). Written informed consent was obtained from all participants after explaining the study objectives, procedures, potential risks and benefits, and their right to withdraw at any time without consequences. Confidentiality and anonymity of the participants were ensured throughout the study. All data were securely stored and accessed only by the research team.

Results
Characteristics of the participants
The research had 450 participants, of whom 225 were children from nuclear homes and the other 225 were from mixed households. The majority of women (62%) only had an elementary education, and there were differences in family income levels across the sample.

Table 1. Characteristics of Study Participants by Family Type (Nuclear vs. Joint)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Nuclear Family (n=225)</th>
<th>Joint Family (n=225)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal Age (years)</td>
<td>Mean (SD): 28.5 (5.2)</td>
<td>Mean (SD): 29.1 (4.8)</td>
<td>0.12</td>
</tr>
<tr>
<td>Maternal Education</td>
<td>- No education: 25%</td>
<td>- No education: 10%</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td>- Primary (1-5 years):</td>
<td>- Primary (1-5 years):</td>
<td></td>
</tr>
<tr>
<td></td>
<td>37%</td>
<td>32%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Secondary (6-9 years):</td>
<td>Secondary (6-9 years):</td>
<td></td>
</tr>
<tr>
<td></td>
<td>22%</td>
<td>28%</td>
<td></td>
</tr>
<tr>
<td>Households income (Monthly)</td>
<td>Low: 35%</td>
<td>Low: 28%</td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td>Medium: 42%</td>
<td>Medium: 45%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High: 23%</td>
<td>High: 27%</td>
<td></td>
</tr>
</tbody>
</table>

Main findings
Nutritional Status:
In comparison to children from nuclear families, children from joint families had a much reduced rate of stunting and underweight. In contrast, although not statistically significant, the prevalence of overweight was somewhat greater in mixed families.

Table 2. Prevalence of Child Nutritional Status by Family Type (Nuclear vs. Joint)

<table>
<thead>
<tr>
<th>Nutritional Status</th>
<th>Nuclear Family (n=225)</th>
<th>Joint Family (n=225)</th>
<th>OR (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stunting (%)</td>
<td>22.7 (17.8 - 28.3)</td>
<td>15.6 (10.9 - 21.4)</td>
<td>0.64 (0.43 - 0.94)</td>
<td>0.02</td>
</tr>
<tr>
<td>Wasting (%)</td>
<td>5.8 (3.1 - 10.2)</td>
<td>4.9 (2.5 - 9.2)</td>
<td>0.84 (0.51 - 1.40)</td>
<td>0.52</td>
</tr>
<tr>
<td>Underweight (%)</td>
<td>32.9 (27.0 - 39.3)</td>
<td>23.6 (18.5 - 29.4)</td>
<td>0.66 (0.46 - 0.94)</td>
<td>0.02</td>
</tr>
<tr>
<td>Overweight (%)</td>
<td>12.9 (8.9 - 17.7)</td>
<td>14.7 (10.3 - 19.8)</td>
<td>1.16 (0.74 - 1.82)</td>
<td>0.51</td>
</tr>
</tbody>
</table>

Women's Empowerment:
Compared to women in nuclear households, those in mixed families reported far greater levels of empowerment. A noteworthy difference in the average empowerment rating between the two cohorts (p < 0.01) supported this.

Table 3. Association between Women's Empowerment and Child Nutritional Status (Logistic Regression Analysis)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Adjusted OR (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family Type (Joint vs. Nuclear)</td>
<td>0.87 (0.72 - 1.05)</td>
<td>0.14</td>
</tr>
<tr>
<td>Women's Empowerment Score</td>
<td>0.92 (0.87 - 0.98)</td>
<td>0.01</td>
</tr>
</tbody>
</table>

The findings show the following:
- Children from joint families had a decreased risk of stunting and underweight compared to children from nuclear families.
- The prevalence of overweight was slightly greater in joint families, but this difference was not statistically significant.
- Women in joint families exhibited greater empowerment levels than those in nuclear couples.
- Increased maternal empowerment correlated with reduced chances of stunting and underweight in children, irrespective of family structure.
- The results indicate a possible link between living in a joint family structure and better child nutritional status, especially in terms of stunting and underweight. Furthermore, women's empowerment was shown to significantly improve child health outcomes, particularly among women living in joint family setups.

Discussion
This study reveals a potentially advantageous relationship between joint family structures and child nutritional outcomes, specifically affecting the risk of stunting and underweight. Our findings support and add to the expanding studies on the complex interplay among family structure, societal dynamics, and child health, although the precise processes still need more investigation.

Resource Pooling and Mitigating Economic Strain:
Studies in many geographical situations support the idea that combined families offer a broader resource pool. A study conducted by Mohangi et al. (2022)[7] indicates that extended family networks serve as a safety net, reducing financial pressure and enabling children to access crucial services such as healthcare and education. A study conducted by Lee et al., 2020[8] discovered that children living in multigenerational homes had reduced rates of stunting and underweight. The authors suggested that this was due to the households' capacity to combine resources and alleviate financial pressure. Our research supports the idea that extended families serve as a protective barrier against economic challenges, which may enhance the availability of crucial resources for children's nutrition and overall welfare.

Shared Caregiving and Reduced Maternal Burden:
The potential advantage of shared caregiving in extended families aligns with the results of a study conducted by Ae-Ngibise et al., 2015[9]. Their research showed that moms in multigenerational households had reduced workloads and lower stress levels because they received support from other family members in childcare duties. This enabled them to focus more on child nutrition and well-being, perhaps leading to improved health outcomes as seen in our study. A study conducted by Johnson et al., 2010[10] discovered that moms in extended families experienced less fatigue and depression due to the shared tasks and emotional support they got. Shared caring in joint families can reduce the load on mothers, which may result in enhanced maternal mental health and improved child health outcomes[13].

Enhanced Social Support and Positive Child Development:
Our research findings on the potential protective effect of social support in extended families are consistent with a study where it was shown that social support provided by extended family members not only serves as a protective factor against stressors[11] but is also crucial in mitigating the negative impact of adverse childhood experiences on children's behavior, highlighting the role of extended family networks in fostering resilience[12]. Children in multigenerational households experienced enhanced social networks and emotional support, leading to improved physical and mental well-being. Additional caregivers and family members in joint families may create a more supportive atmosphere, enhancing a sense of security and leading to improved child health outcomes. A study conducted by[12] emphasizes the complex and varied aspects of social support among extended families, which could enhance children's resilience and well-being.
Women's Empowerment and Improved Child Health Outcomes:
This study emphasizes the importance of women's empowerment in promoting child health, irrespective of household dynamics. A study in 2020 argued that women empowerment is crucial in achieving the health benefits in children[1]. The results, in conjunction with our own, highlight the vital importance of women's empowerment in enhancing child health and well-being in various family settings. Enhanced independence in making decisions about resource distribution, childcare methods, and healthcare options empowers mothers to effectively support their children's requirements and establish a more caring atmosphere, thereby benefiting child health outcomes[13].

Beyond the Nuclear Family: Implications for Public Health Approaches:
This study, in addition to the stated studies, emphasizes the necessity of public health strategies that extend beyond concentrating simply on the nuclear family and take into account the wider social environment that impacts child health and well-being. Nuclear families are the most common family structure in many areas, although joint families, extended families, and single-parent households also have a substantial impact on child development. It is essential to acknowledge and comprehend various family structures and their possible effects on children's health in order to create successful interventions.

Public health interventions should prioritize enhancing and reinforcing support structures within families, regardless of their composition. This may include encouraging communication and cooperation across different generations, providing resources and support services for families dealing with difficulties, and tackling social and economic disparities that affect specific family configurations more severely. Empowering individuals, especially women, within families to make educated decisions about their health and well-being can greatly enhance child health outcomes.

Study Strengths and Limitations
The study provides useful insights on the correlation among family structure, women's empowerment, and child nutritional status in Karachi, Pakistan. It is important to recognize both the advantages and constraints of the research strategy and results.

Strengths
- **Representative sample**: Despite utilizing convenience sampling, the sequential sampling method was employed to enhance the representativeness of the sample within the hospital environment, encompassing families from various socioeconomic backgrounds.
- **Validated tools**: Using pre-validated methods like questionnaires and anthropometric measuring techniques improved the accuracy and reliability of the findings.
- **Control for confounding variables**: Logistic regression models were utilized to control for confounding variables such as maternal education and household income, enhancing the validity of the findings on the separate impacts of family structure and women's empowerment on child nutrition.
- **Focus on a relevant public health issue**: This study focuses on the significant public health issue of child malnutrition in Pakistan, providing vital information to guide future interventions and policy.
- **Cross-sectional design**: The cross-sectional nature of the study precludes the ability to establish causal relationships between family structure, women's empowerment, and child nutrition. The findings suggest associations, but they do not conclusively demonstrate that one variable directly causes the other. Longitudinal studies with repeated measurements over time are necessary to delineate the causal pathways and evaluate the temporal relationships between these factors.

Limitations:
- **Cross-sectional design**: The study's cross-sectional methodology hinders the ability to demonstrate causal links between family structure, women's empowerment, and child nutrition. The findings imply connections, but they do not conclusively demonstrate that one variable is the cause of the other. Longitudinal research is required to investigate the causal pathways as they unfold across time.

- **Potential for selection bias**: Convenience sampling in hospital settings may lead to selection bias, as families seeking healthcare at these facilities may not be representative of the greater population of Karachi.
- **Limited generalizability**: The results may not be applicable to other communities with distinct socio-cultural circumstances and family arrangements. Additional research in other contexts is necessary to evaluate the applicability of these results.
- **Self-reported data**: Self-reported data on women's empowerment may be influenced by social desirability bias, leading participants to overstate their decision-making authority to appear more socially desirable. Self-reported information may also be limited in terms of accuracy.
- **Selection bias and representativeness**: The use of convenience sampling in hospital settings may have introduced selection bias, limiting the generalizability of the findings. Families seeking healthcare at these facilities may differ systematically from the broader population of Karachi in terms of socioeconomic status, health-seeking behaviors, or other characteristics. Future studies should employ probability-based sampling techniques, such as cluster or stratified random sampling, to enhance the representativeness of the sample and improve the generalizability of the results to the target population.

Conclusion
This study provides initial observations on the intricate connection of family structure, women's empowerment, and child nutritional results in the specified study region. Our research indicates that living in joint family setups may reduce the likelihood of children experiencing stunting and being underweight. Additionally, women in joint families tend to have higher empowerment levels. Women's empowerment is a crucial element in enhancing child health results, irrespective of household dynamics. These results emphasize the need to focus more on the wider socioeconomic factors influencing child nutrition and to create strategies that strengthen family units and promote women's empowerment.

Recommendations:
- **Public health interventions**: Public health policy should expand their attention beyond the nuclear family to incorporate the larger societal context, including different family arrangements. This may include encouraging intergenerational support and communication within families, providing access to resources and support services customized to various family needs, and tackling social and economic disparities that affect distinct family structures more severely.
- **Empowering women**: Empowering women through educational and economic opportunities, including enhancing their decision-making authority in resource allocation and healthcare choices, is essential for enhancing child health outcomes within families.
- **Further research**: Further investigation is needed through longitudinal studies with more participants to examine the causal connections between family structure, women's empowerment, and child health results. Studying the distinct functions of dads, grandparents, and other relatives in various family setups can offer a more thorough comprehension of the intricate relationship between family dynamics and child welfare.

Implications and Future Research
Although limited, this study holds significant implications. It implies that advocating for comprehensive strategies in child nutrition should not only concentrate on the immediate family but also take into account the wider social context. Possible interventions may involve:
Family Structure, Women's Empowerment, and Child Nutrition

**Community-Based Support:** Initiatives focused on enhancing support systems within extended families (e.g., sharing childcare knowledge, pool resources) may have a beneficial effect on child health.

**Empowerment Initiatives:** Empowerment initiatives that aim to empower women in nuclear and joint families, specifically in decision-making and resource allocation, have the potential to enhance child nutritional outcomes.

**The findings highlight the need for public health interventions and policies to adopt a comprehensive approach that acknowledges the influence of family structures and women's empowerment on child nutrition.** Interventions should focus on strengthening support systems within extended families, promoting resource-sharing, and fostering intergenerational cooperation. Additionally, initiatives aimed at enhancing women's decision-making power, access to education and economic opportunities, and knowledge of child health and nutrition practices are crucial. Policymakers should consider implementing family-centered programs that address the unique needs and challenges faced by different household structures. Furthermore, efforts to challenge traditional gender norms and promote gender equity within families and communities may contribute to improved child health outcomes.

Additional study using longitudinal designs and more comprehensive evaluation of women's empowerment is needed to validate and expand upon these results. Furthermore, investigating the involvement of dads and other family members should be explored.

**Authors contributions**

We are grateful to the authorized personnel of the authorities who provided assistance with the study. Their contributions were instrumental in completing this research.

**Supporting Information**

File: E - Questionnaire/tool

Any additional information or data can be accessed through the corresponding author.

**Acknowledgements**

The study was supported by the Pakistan National Research, Development and Innovation Foundation (PNRDF) and the Pakistan Science Foundation (PSF) under the Pakistan Science Foundation Grant No. 2000301. The authors would like to acknowledge the contributions of all the participants who volunteered to be part of the study. The study was conducted in collaboration with the Pakistan Institute of Development Economics (PIDE) and the Department of Social Sciences, University of Karachi. The authors would like to thank the anonymous reviewers for their valuable comments and suggestions.

**Keywords:** Family structure, Women's empowerment, Child nutrition, Child health outcomes, Poverty, Social support, Gender norms, Economic opportunities.

---

**Context:** The relationship between poverty and child nutrition is crucial in determining the health and well-being of children in developing countries. This study aimed to explore the impact of family structure and women's empowerment on child nutrition outcomes in Pakistan, with a focus on the Karachi metropolitan area.

**Methods:** A cross-sectional study was conducted among mothers of children aged 2-5 years in Karachi, Pakistan. The sample was selected using a random stratified sampling method. The data was collected through a standardized questionnaire that included questions on demographic characteristics, family structure, women's empowerment, and child nutrition outcomes.

**Results:** The results showed that family structure and women's empowerment significantly influenced child nutrition outcomes. Children from joint families had higher rates of malnutrition compared to those from nuclear families. Additionally, women's empowerment was positively associated with better child nutrition outcomes.

**Conclusion:** This study highlights the importance of considering family structure and women's empowerment in the design and implementation of policies aimed at improving child nutrition outcomes. Further research is needed to understand the mechanisms through which these factors influence child nutrition and to develop effective interventions.
Family Structure, Women’s Empowerment, and Child Nutrition

Abstract

Antecedentes: El retraso del crecimiento infantil y el peso insuficiente son problemas mundiales que pueden estar relacionados con la estructura familiar. Esta investigación examinó el tipo de familia (nuclear o conjunta), el empoderamiento de las mujeres y la nutrición infantil en Karachi, Pakistán.

Métodos: Una investigación transversal incluyó a 480 niños menores de 5 años y sus madres de entornos rurales. La nutrición infantil y el empoderamiento de las madres se examinaron utilizando instrumentos estandarizados. Se examinaron los resultados nutricionales, el empoderamiento y el retraso del crecimiento y el peso insuficiente de los niños en todos los tipos de hogares.

Resultados: En comparación con los niños de familias nucleares (retraso del crecimiento: 32,9%; IC 95%: 27,0-39,9; bajo peso: 15,6%; IC 95%: 10,9-21,4), los niños de familias conjuntas mostraron tasas sustancialmente reducidas de bajo peso (12,9%; IC 95%: 7,0-20,3) y retraso del crecimiento (22,7%; IC 95%: 17,1-28,9) (p = 0,02 para ambos). En comparación con las familias nucleares (32,9%; IC 95%: 8,9-17,1), la prevalencia de sobrepeso ligeramente mayor en familias conjuntas (14,7%, IC 95%: 10,3-19,8) no fue estadísticamente significativa (p = 0,11). Sin embargo, las mayores calificaciones de empoderamiento materno se vincularon sustancialmente con un menor riesgo de retraso del crecimiento (OR = 0,92, IC 95%: 0,87-0,98, p = 0,01) y bajo peso (OR = 0,92, IC 95%: 0,87-0,98, p = 0,01). En niños, independientemente del tipo de hogar.

Conclusión: Esta investigación demuestra que la estructura familiar combinada puede minimizar el retraso del crecimiento y el bajo peso. El empoderamiento de las madres también mejoró la nutrición infantil en ambas familias. Se requieren más estudios para comprender los mecanismos de estos resultados y los efectos a largo plazo.

Palabras clave: Desnutrición infantil, Estructura familiar, Empoderamiento de las mujeres, Estado nutricional, Karachi, Pakistán

Key messages

1. The research draws attention to a possible link between lower rates of underweight and stunting in children and joint family structures.

2. The research highlights how important it is for women to be empowered in order to promote improved infant nutrition in a variety of household situations.

3. In order to enhance child health outcomes, public health strategies must take into account the larger social environment, which includes different family patterns.

4. The study recommends further investigation to examine the underlying processes and long-term consequences of the associations found.

References


