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The Psychological Risks and Harms of Working Children: Developing a Network Communication Model

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Children under labor can be considered as one of the most vulnerable classes of the society. The labor shouldered by these children is a prevailing global issue affecting millions of children, incurring massive detrimental consequences on their psychological health. This paper deals with investigating the deep psychological risks and harms associated with child labor, and studies multidimensional communication paths between them through network analysis. Past research about child labor has mostly focused on examining the individual and familial factors contributing to this phenomenon. Nevertheless, better understanding of the complex networks that interconnect the risks and harms of child labor is essential for development of more effective interventions. Accordingly, all texts published about the risks and harms resulting from child labor underwent census, whereby 40 non-repeated main variables were identified. Since most of the texts were in English and the researchers were

preoccupied with the variables being native, semi-structured interviews were performed with specialists involved in child labor, whereby three other variables that did not exist in the set of variables extracted from the research background were added. Thereafter, a sample consisting of 2161 children under labor was chosen through cluster sampling from all provinces of the country. Then, questionnaires dealing with measuring the research variables were implemented on them and in some cases on their guardians. The results of network analysis of the collected data led to identification of the most important psychological harms and risks resulting from child labor. The results indicated that no unidimensional causal relation can be determined for the effect of labor on the psychological health of children, which here had been defined in the form of psychological risks and harms of child labor. In other words, not only is child labor effective on their psychological health, but also affects working children. Although the psychological harms and risks resulting from child labor interact with environmental factors, generally child labor has detrimental effects on their health. The challenge that the present research dealt with has been prioritization of the psychological harms and risks resulting from child labor.

Keywords: network data analysis, working children, psychological harm, modeling, network psychometrics.

According to the statistics of UNICEF (as quoted by international labor organization (ILO) mentioned in their official website (<https://www.unicef.org/press-releases/child-labour-rises-160-million-first-increase-two-decades>), up to June 2021, 160 million children suffer from child labor, with 8.4 million of them being related to the four recent years. UNICEF had also warned about the risks of affliction with coronavirus of these children. ILO in 2020 initiated estimations on the status of children under labor; all of these results are available in the official website pages of UNICEF (<https://data.unicef.org/wp-content/uploads/2021/06/Child-Labour-Executive-Summary-EN.pdf>) and ILO. Out of the 160 million working children, 79 million are involved in high-risk jobs. This number of child

labor includes both boy and girl children concurrently. However, according to the ILO statistics, the number of boys involved in child labor is higher than that of girls. Nevertheless, it should be noted that the type of work performed by children determines whether it is harmful for them or not. Meanwhile, the complexity of the nature of child labor complicates discerning the harmlessness or harmfulness of the work (Punch, 2009).

Health both in psychological and physical health, plays a key role in defining the international rights of child labor. Since 1950, the psychological aspects of labor have undergone extensive research (Johnson and Hall, 1996; Sauter et al., 1998). Research in this regard with the emergence of studies on psychosocial working environment (Johnson and Hall, 1996) shifted from focus on individual views to the effect of special aspects of the work environment on health (Cox, Griffiths, Rial-Gonzalez, 2000). Most studies regarding the effect of psychosocial risks in the workplace employ adult worker samples, and in recent years some studies have dealt with examining the detrimental effect of special aspects of workplace on children (such as ILO, 2004). The factors affecting the psychosocial development of children were first discussed in 1976 by the WHO specialized committee. The working environment and the intrinsic nature of working are both very important variables affecting psychological health. Nevertheless, the effect of psychological immaturity and the biological development process in the age situation of children significantly increase their vulnerability, subjecting them to a major risk of health issues related to the work (Forastieri, 2004; Forastieri 1997; and O'Donnell et al., 2002).

Unfortunately, in Iran there is no specific and systematic framework for determining the domain of research on child labor. Most studies performed in this regard in Iran have been student research, and the very sparse studies performed in Iran are methodologically highly defective, whose results cannot be relied upon.

One of the methodological limitations of psychological studies of child labor is absence of a specific model about the psychological risks of these children. If there is a prevailing underlying model about the psychological risks of children, decision-making, guidance, control, and prevention from child labor would be easier and more based on a roadmap. Absence of suitable modeling and model development based on empirical data is not merely limited to the area of labor and especially child labor; rather, the numerous and various problems that exist in the country all trace back to absence of plans and one of the intermediate causes of that is absence of a suitable and comprehensive empirical model. One of the methodological limitations of psychological studies on child labor also specifically is absence of a specific model about the psychological risks of these children. If there is a prevailing underlying model about the psychological risks of children, decision-making, guidance, control, and prevention from child labor would be easier and based on a roadmap.

The model seeking process in psychology involves a history of methods based on biological data up to textual data. Scientific modeling is a developing process which through benefiting from different methods, techniques, and theories deals with development of mathematical, graphical, conceptual, and abstract models. Scientific model as the fruit of modeling is an

essential and inseparable part of scientific activity, and provides a way for revisiting complex phenomena and issues (Box & Draper, 1987). Models have their own special goals as well as different aims and applications in different sciences. Psychometrics, which according to some researchers is one of the most complex and difficult scientific fields (Markus & Borsboom, 2021) attempts to develop models for psychological processes and its related areas through proper usage of mathematical and statistical techniques as well as methods in a way that is based on scientific methodology and according to content area. Development and challenging different models are the basis for scientific transformations, where the empirical discoveries and discussions in models lead to selection of the most suitable model about a specific issue.

This becomes more relevant to psychometrics when we know that one of the main issues of psychological assessment and measurement is empirical and theoretical investigation of the manner of pattern of relations under the shadow of scientific models. The psychological measurement models that have been developed so far are based on two interpretive approaches: Reflective interpretations in which the measured traits are considered as the shared cause of the observations, as opposed to formative interpretations in which the measured attributes are deemed as a shared effect of observations (Borsboom, 2005). Reflective and formative models cannot offer a true interpretation of the relationship between psychological constructs and the observed variables (ibid). The alternative method for these models is a third approach in which a phenomenon or issue is conceptualized as a network of observations. This approach allows for using inferential

techniques for ontology of psychological constructs and epistemology of validity strategies (Zand Scholten et al/, 2011). Modeling and measurement in child labor area would not only fail to facilitate the process but also adds to the complication. This is because in addition to the dynamic and interactive nature of psychological and physical characteristics of children, data collection from them is also more difficult. Network analysis as one of the available approaches in psychological measurement and assessment as well as a research methodology has potentials that can overcome the major problems of research on children. Nevertheless, network analysis is a macro term encompassing a wide range of correlation to advanced AI-based methods. Another major limitation that exists in development of instruments in psychometrics is creating the instrument without existence of a special model in a special context. In other words, most of the psychological instruments are created without considering the research content setting and context (Wilson, 2023). For example, MMPI test which has been created in a special context is used in various settings ranging from academic guidance to occupational promotion, which not only is psychometrically inefficient but also leads to misleading results (Wilson, 2023). The most suitable method of instrument development is model-based method (Utting, M., & Legeard, 2010). In other words, first the theoretical model related to a research area should be specified and then the instrument should be developed based on the extracted model (Utting, M., & Legeard, 2010). The results obtained from this research can be used in development of instruments for measuring the psychological harms and risks of child labor.

In this study, researchers intend to investigate different psychological aspects of child labor including the psychological risks and psychological effects of child labor, and provide an instrument for future studies in this regard for other researchers. It should be noted that usage of these instruments can present an immediate image of the status of the interrelationships between psychosocial aspects of child labor in different areas. Nevertheless, in order to achieve accurate results about different aspects of the proposed model, more profound research is required. This research is the first important step in systematic identification of psychosocial indicators, which can be considered in research related to child labor in Iran with the aim of guiding and supervising the psychosocial conditions and outcomes of child labor across the country by adopting a public health approach. Every day on the streets, in farms, factories, workshops, shops, and other places, thousands of Iranian children are working instead of benefiting from their life opportunities; working in occupations that mostly have a compulsory nature. The most important compulsion seems to be the poverty of families (economic, cultural, and social), which is not shouldered by anyone, and there is less of a specific plan for supporting these families. Apparently, this segment of the population has been forgotten. This research helps to take a small step to introduce this population to academic communities. Researchers intend to investigate the issue of child labor by introducing a network analysis method.

Most of the studies regarding the effect of psychological risks of labor have been performed on adult worker samples, and only a few recent studies have dealt with determining the effects of the work environment on children (such as international labor

organization, 2004). A specialized committee of WHO in their report (WHO, 1977) dealt with the importance of guaranteeing healthy psychosocial development as well as prevention and treatment of psychological problems of children. This report includes discussions about neurological factors, cognitive factors, ecological and social factors, upbringing models, as well as the effects of improving the factors that lead to positive psychosocial development. Poverty, immigration, housing, urbanization, and industrialization all are discussed as social and environmental factors, but no direct mention of child labor has been presented. Nevertheless, in this report, child labor has not been examined either. Most studies related to child labor are based on this model and focus on the effect of labor on the psychosocial development of children (Brewer, 2003).

The factors affecting the psychosocial development are important since they consider both the psychosocial risks in the workplace as well as the impact of labor on the psychosocial well-being of children. Unluckily in Iran the psychological risks of child labor have not been examined directly. Nevertheless, not very comprehensive reports have been mentioned about the status of some psychological variables of child labor, presenting descriptive reports of the status of child labor in Iran. Hosseini (2005) in research stated that the phenomenon of child labor is a major plight of most metropolises in today's world; this problem has been developed to such an extent that it has afflicted both developed and developing countries equally. Through collecting data from working children in five provincial centers of Tehran, Mashhad, Ahwaz, Shiraz, and Rasht, he has dealt with investigating the factors contributing to child labor. According to his findings, factors such as failure of social institutions such

as family and school, economic poverty, the family of street children and their inability in adaptation to the lifestyle of major cities, the pollution and pathogenicity of the suburban districts, absence of sufficient supervision by the responsible organizations, as well as wrong interactive models of reaction between citizens and street children all have contributed to the ongoing plight of street children (mostly being working children on the streets) in major cities. Most of the studies performed in Iran have dealt with introducing the phenomenon of child labor or comparison of different variables between normal children and working children. For example, Hashemi and Fadavi (2009) analyzed the drawings of child labor. Davarpanah et al. (2009) in the Journal of social welfare studied poverty of children and its association with the working market. They believe that the most important factor in the phenomenon of child labor is the poverty of families and the structure of job market in Iran. Shishehgaran and Hajidehabadi (2018) also investigated the cognitive delinquency of child labor. Abdoli et al. (2012) compared motor competency of working children and schoolchildren. He concluded that generally the motor skills of working children are weaker than those of their school-going counterparts. In a sociological investigation of the school of child labor, their schooling was also examined (Skandari, 2021). The issue of education and employment of these children has been examined in another research by Afshani et al. (2012). Kazemi (2017) in research entitled “child labor: in a world they have never made!”, presented a harsh criticism about the status of child labor phenomenon in the community and the community’s ignorance about it. Analysis of self-concept in street working children has been presented by Tabarsi et al.

(2017). Imani and Narsisians (2012) dealt with child labor with an anthropological approach. They performed their research in Karaj city. In addition, Asadpour and Azamzadeh (2020) dealt with studying factors affecting development of child and street labor in the form of a meta-analysis.

In experimental studies in which intervention has been done, the impact of anger management on aggression and anxiety of working children has been examined in 2020 by Khankesh, Amini Rarani and Nosrat Abadi. In addition, in another research, the impact of philosophy education program for children on working children emotion self-regulation has been inspected (Fathi azar, Taghipour, and Haj Agahei, 2019).

However, no research in Iran has dealt with modeling or development of an instrument specifically for children labor. Only in one research (Farzad, Imamipour, Vakil Ghahani, 2011), the validity, reliability, and norm assessment of the children's disease symptoms questionnaire on child labor have been addressed. In methodology of child labor studies, the only domestic research is related to the etiology of child labor phenomenon in Tehran city with a fuzzy approach (2020). Other studies performed in Iran about child labor all have dealt with description and etiology, and thus they are not mentioned here. Therefore, the literature related to the present research can less be linked to precipitation of the available knowledge regarding child labor in Iran.

Meanwhile, according to the International Labor Organization (1995), psychosocial factors in labor refer to interactions between the working environment, job content, organizational conditions as well as talents of workers, expectations, norms, culture, and extra-occupational personal

considerations, affecting health, working performance, and satisfaction through perceptions and experiences. Accordingly, this definition refers to interactions that prove that experience has a serious impact on staff health. A simpler definition of psychosocial risks may be some aspects of work design and management as well as its organizational and social contexts, with a potential of causing physical or psychological harm (Cox and Griffith, 2005). In the literature related to the nature of psychosocial risks, there is some consensus among experts.

Psychosocial risks are associated with experiencing work-induced stress. Work-induced stress is a response individuals may show when facing working pressures and demands which do not align with their knowledge and abilities, and challenges their ability to cope (WHO, 2003). psychosocial risks, work-induced stress, violence, molestation, and bullying are currently widely known as the main challenges for occupational health (EU-OSHA, 2007). Quick, Quick and Horn (2014) noted that work-induced stress can lead to behavioral, medical, and psychological problems. Behavioral changes are the first and most salient symptoms of stress including (1) alcohol overconsumption and taking drugs of abuse, (2) increased cigarette smoking, (3) more accidents, and (4) violence. The psychological consequences of work-induced stress include: 1) familial problems, 2) sleep disorders, 3) sexual dysfunction, and 4) depression. The medical problems include (1) accelerated emergence of disease and (2) aggravation of impact of disease. The studies performed on occupational stress and staff health suggest that occupational stress indirectly and directly affect the performance of biological organs (Ganster, Schaubroeck, 1991).

Systematic investigations and longitudinal studies using adult worker samples have shown that stress in the workplace is associated with cardiac disease, depression, and musculoskeletal disorders (MSDs). Also, there is consistent evidence suggesting that high job demands, poor control, and lack of balance in rewards are risk factors for physical and psychological health issues (e.g. Johnson et al., 1996; Stansfield and Candy, 2006). In a wider perspective, the psychosocial risks of public health are increasingly recognized in industrial countries (WHO, 2003). Nevertheless, considering globalization processes and changes in the nature of jobs, these risks are not limited to developed countries. There is progressive concern over the causes and health consequences of psychosocial risks especially in developing countries.

These issues and concerns that have been noted for adult worker population also exist at a greater extent in child labor. Child labor when compared with worker adults has some intrinsic stress-inducing psychosocial factors (Hossian, 2023). In addition, the special position of children and being worker either causes development of psychosocial risk factors more than for adults in the workplace they are dealing with or causes children to show a different reaction to similar psychosocial risks when compared with adults. Further, regardless of the economic sector or form of employment, the very undesirable socioeconomic as well as familial grounds that may have forced children from the very beginning to join the workforce are a source of stress. When children work not only are they subject to general risks in the workplace similar to adult workers, but they are also subject to more special risk factors due to deprivation from childhood games, school and education, family life conflicts, as well as

poor interpersonal relations in the workplace (WHO, 1977). A preliminary investigation into special health risks affecting children in the workplace by the WHO indicated that there is no research on the psychosocial risks faced by children in the workplace or their impacts on children in near future or thereafter in the life (WHO,1987). After more than 20 years, access to evidence has not changed much, since only a few studies have been done on examining the health effect of psychosocial risks on child labor. Hossian (2023) in a library investigation indicated that most child labor studies have compared the psychological and developmental health in non-working and working children (e.g. Dorman, 2008; Dawes and Donald, 2000; Catani et al., 2009). These studies suggest that there is a significant difference between the psychological health of working and non-working children (favoring non-working children). Nevertheless, there is some literature on the impact of psychosocial risks in the workplace in adult population; in spite of the evident similarities between these two classes of workers, the psychological and biological risks and harms that are specific to children have mostly remained neglected. Such studies can propose new lines of research and identify some solutions for addressing the psychosocial risks about working children (Hossian, 2023).

Nevertheless, based on searches performed in the references available to the researcher, there is no universal research dealing with modeling psychological risks of child labor. Most studies in the world on child labor have been done through institutions such as UNICEF and ILO as well as WHO, or been sponsored accordingly.

Absence of a suitable methodology in studying child labor, lack of a suitable instrument or model for these risks, and absence of a suitable and comprehensive model-based instrument in measuring the psychological risks of child labor have intensified the necessity of conducting this research. Network mythology is also a novel method in psychological studies, which is being progressively employed. Very sparse studies have used this suitable research method in human sciences; in particular there is no research (according to the searches done) employing network models directly for identifying the important variables in a content area for test development. This research is considered a novel and influential approach in development of psychometric tools. It can be a solution to instrument development method and model for using network data analysis in identifying the main market variables in a special context.

Method

in terms of aim, this research is considered as applied type. As mentioned earlier, one of the very serious and major challenges of the country is child labor leading to serious harm to them, their families as well as society. The present research has been based upon the goal of responding to determination of the most important child labor harms, and as such it is regarded applied research. Another aspect of categorization of research methods is being descriptive or nondescriptive. The main aim of this research is considered development of a network model of psychological risks based on network modeling and the research is considered correlational research. This is because the basis of network modeling is on correlations between psychological risks

of child labor. In other words, the input matrix of correlation matrix network (separated) is psychological risks.

This research focuses on communication network model between variables (psychological harms and risks of child labor) using network data analysis. To this aim, the main variables of the research should be identified. For this purpose, the researchers have used three different samples. The first sample includes the research literature and background which was mostly in the form of papers published across the Internet. The second sample consisted of specialists in child labor. Accordingly, the first population consists of all available research background and literature (both domestic and foreign), which has been the basis for choosing the main variables of the research. The second population consisted of child labor specialists. This means specialists with minimum a bachelor's degree and active in child labor area. Finally, the third population consisted of all working children (ages 4 to 17 years).

A) the sampling from the research background and literature aimed to extract important variable covering the information collected through the Internet. Collection of this information from the Internet has been in the form of systematic study and from specialized databases of publishing papers including ISI, PubMed, and Scopus as well as more general databases including Google scholar. The researchers have attempted to consider all contents directly related to the research subject in the Internet as their sample. In other words, at this stage, we had census instead of sampling. In addition, researchers have attempted to incorporate the research literature and background that has not even dealt with the subject directly but is somehow

close to the research subject. B) sampling from specialists: although researchers have investigated and studied all available texts that have been directly related to the psychological forms of child labor in a systematic way, since the research literature and background in this area in Iran was sparser compared to the foreign references, there was the challenge that there may be some variable regarding the psychological harms of Iranian child labor that may have not been considered in the research literature. In addition, most domestic studies of child labor were not comprehensive enough. In order to ensure the comprehensivity of the research variables, the researcher-initiated interviewing with the child labor specialists. One of the most important criteria of selection of specialists is their focus of activity. To perform the interview, only the specialists with at least five years of working background with working children, as constant communication and interaction, and being satisfied with their activity in this area were chosen. Most of these individuals work in nongovernmental organizations (NGOs). The second criterion was their voluntary and willing participation for the interview. Accordingly, no financial support or methods of attracting their satisfaction for the interview were done. Before recording the voices of the specialists, permission was acquired from them and their voices were reported in their own presence. The considerations related to the sampling from the population of specialists are of interest since we have not used the census method. The criterion of selecting the sample size from the specialists for performing interview with them was the saturation method. The basis of judgment about interview saturation was considerable commonalities of the specialists' opinions in four consecutive runs. Indeed, the first interview that

would apparently reach the degree of saturation would become stopped in case the opinions of the three next specialists would also reach saturation. In other words, through four consecutive interviews, indices would be extracted that already existed. Based on this index, we reached saturation from interviews 14 to 18. C) sampling from working children: since the population present in this research consisted of all working children across the country, the sampling in both stages of the research has been based on nonrandomized cluster sampling. It has been clustered sampling since the working children across the province of Iran have been employed, and since it was not possible to have access to all working children, and the research has been done on only available volunteer children and the sampling is nonrandomized. The cluster sampling in the first stage of the cluster consisted of all provinces of the country. In the second phase or stage the focus was on working children of capital of provinces. The researcher tried to choose a sufficiently large sample size. At this stage, the researchers intended to perform the network modeling of the psychological risks of child labor, the guideline of the utilized modeling technique sample size and the extent of the studied population. Network data analysis would be performed with sample size of at least 1200 individuals to estimate that network reliability indices (Marcot, B. G., & Hanea, 2021). Nevertheless, in the first stage of the research, the researcher chose 2161 working children.

Instruments

The data collection instrument in this research was identified after detecting the most important variables (psychological harms and risks of child labor). Indeed, the questionnaires chosen for implementation were those that would cover the identified variables. Accordingly, the questionnaires that are mentioned further were used in implementation of this research for data collection. 1) child abuse self-report scale, 2) adolescent and child resilience index, 3) problems and strengths questionnaire, 4) parent stress scale, 5) family support scale, 6) reaction to diagnosis questionnaire, 7) personality traits of children, 8) emotion regulation checklist, 9) cognitive resilience and inhibitory control for detrimental behavioral problems inventory 10) demographic variables. They have been used in past studies for measurement of children and teenagers (age range of 4-17 years of age), and many of them have been norm-referenced and employed in the content context of measuring psychological risks. The reliability index of the instruments ranged from 0.82 to 0.91, and had content validity according to the experts. Their validation indices are also available, which are not presented here for the sake of brevity.

Regarding the procedure of implementation, different stages of it have been expressed clearly and concisely.

s1. Studying the literature and background about the keywords of the research in a systematic way and according to APA thesis writing standards. For notetaking and management of references, Mendeley software was used. At this stage, all available and accessible references across the Internet in Persian and English that were directly related to the research subject were investigated. The aim of this section in addition to

composing the research literature and background was to select the variables related to the psychological harms and risks of child labor as well.

2. Since the majority of studies have been conducted abroad and in order to ensure the variables related to the psychological harms and risks of child labor specific to the Iranian ecology have all been included in the research, the child labor specialists were interviewed. For this interview, all scientific steps of designing a semi-structured interview (validation) were taken and ultimately several questions were asked about the child labor specialists with the aim of identifying the psychological harms and risks of child labor in Iran, to which we may have not had access through investigating their background. Most of the interviewees were female (n=16, 89%), which is something to be expected given the type of activity and area of working with children as well as the form of their frequency distribution in the child labor specialist's community in Iran. In other words, although we performed the sampling from the specialists conveniently, the obtained results somehow confirm the proportionality of the interviewees regarding gender. One of the main conditions of selecting interviewer was his or her mastery over child labor domains as well as the manner of conducting the interview. The interviewer performed interview with all the interviewees according to the standards mentioned above. He recorded them and translated and transcribed them precisely into electronic versions. For analyzing the data obtained from the interviews, analysis methods were studied thoroughly and precisely. Natural language processing analysis is considered the most advanced and powerful method of interview analysis (Wee et al., 2022).

3. Data collection: implementation of predicted tests and instruments was done with the aim of discovering the underlying model of psychological risks both in the form of pencil and paper and electronically.

4. Drawing the network of the interrelationship between the variables of psychological risks based on Reingold Fruchterman and Reingold (1991): the data obtained from implementation of the tests provide the possibility of network analysis. The main input of the network analysis is the correlation matrix between the items. This matrix can be used with the aim of different analyses. This matrix is based on the raw scores of variables - being considered the psychological risks of child labor here - which are calculated according to the guidelines of implementation of each test.

5. Determining the network indices for every single variable (the variables affecting psychological risks) and for the macro indices of the network for the entire test: the numerical values obtained from the network attributes can be achieved both at the level of the variable itself and across the entire level of network of psychological risks.

6. Selecting the best network model for developing the model of child labor psychological risks: network models are diverse and each of the attributes have their own special characteristics and features. These different models are implemented on the obtained data to test the best model. The important psychological risks have been obtained from census of different network parameters.

Results

the number of psychological risks and harms (main research variables) that existed in the research literature and background (without repetition) was 40 variables. Out of these 40 variables, family income and parent education were two demographic variables, while other variables were considered to be linked to the child labor harms and risks. Analysis of interview with the specialists involved in child labor issues also led to obtaining two variables related to the labor harms and risks which did not exist in the research background (depression, suicide, and self-esteem). Psychological abuse, neglect, physical abuse, sexual abuse, personal skills, peer support, social skills, physical caregiving, psychological caregiving, spiritual , educational, cultural, social, hyperactivity, emotional, guidance, peers, parent stress scale, emotional score, externalizing score, hyperactivity score, internalizing score, peer problems score, behavioral problems score, total score of reaction to diagnosis, family support scale, extroversion, conscience and responsibility, openness to experience, adaptation and agreeableness, neuroticism, inhibitory control, cognitive resilience, emotion identification, understanding emotions, emotion regulation, behavioral problems according to parents, behavioral problems according to the child, depression, suicide, self-esteem, family income and family education were the variables related to the psychological harms and risks of child labor in this study.

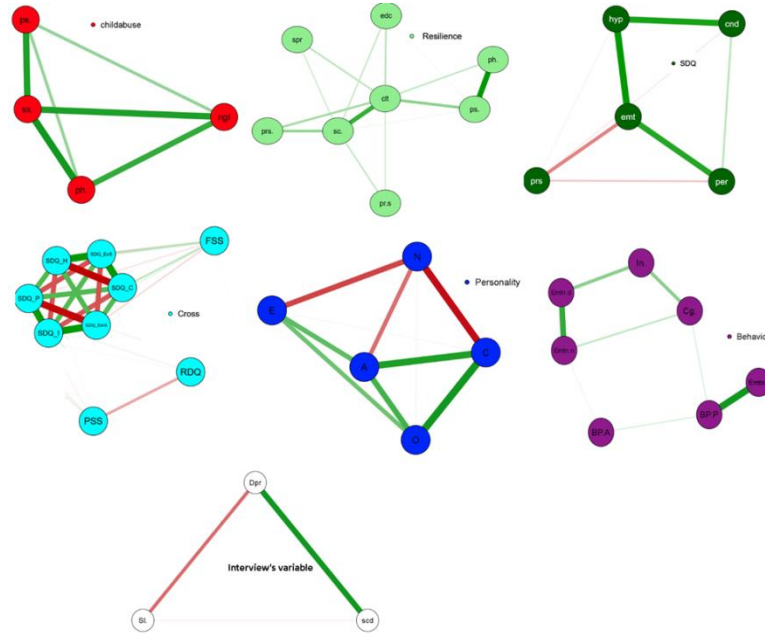


Figure 1. The network of the relations between the study variables per every subscale

In order to draw the map of the interrelated network throughout the entire research, pairwise Markov random field (PMRF) model has been used under Fruterman-Raingold algorithm. The features related to this model and algorithm are as follows: 1) the color of the connecting lines between different variables known as edge is meaningful. Green represents positive relationship while red indicates negative relationship. 2) The relationship between the variables is based on their partial correlation; in other words, this link is a pure pairwise relationship between variables, and it has been obtained after eliminating the effect of each of the other variables on the paired relationship of the variables. In other words, if no edge has been drawn between two edge variables, this means that these two

variables while keeping the effect of other variables constant are considered independent of each other. 3) The diameter of the edges is also meaningful. The larger this diameter, the greater the net or interdependent relationship between the two variables and vice versa. 4) The distance between the two variables across the plane from each other is also meaningful. Fruterman-Raingold algorithm has been developed based on the spring law, where it juxtaposes variables alongside each other (Euclidean the distance) that express a shared concept. Therefore, the closer two variables are to each other, the more similar they are together regarding underlying concept and vice versa. 5) Existence of any edge between two variables in the maps related to different scales indicates a meaningful pure relationship between two variables. In other words, if no edge has been connected between two variables, this means that their pure relationship is significant at 95% level, and they are independent of each other with conditioning on the research variables. These features hold for all graphs of the network drawn in this report.

Next, all variables related to the psychological harms and risks of child labor have been embedded within an integrated network. In other words, a pure relationship has been shown between all of these 43 variables in a single network (the relationship between every two nodes (here the node represents the variables related to the psychological harms and risks of child labor) after removing the effect of the other 41 nodes from their relationship).

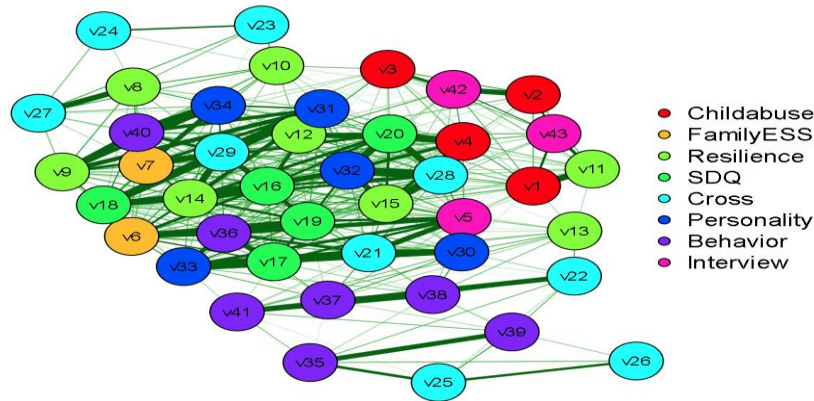


Figure 2. The map of the network of the relationships between variables, psychological harms and risks of child labor

The next part of the relationships between variables has a relatively high consistency. The network is connected meaning that there is either direct or indirect relationship between every two variables. The notable point is the considerable convolution of the variables into each other. None of the subscales has formed a cluster or pseudo-cluster, indicating high convolution of variables in different subscales. It can be an empirical piece of evidence on the claim that all variables are related to the psychological risks and harms of child labor. Only 5% of the subscale of the behavior have been positioned close to each other spatially. Interestingly, the network of the pure relationships between the variables of this subscale was not very consistent in Fig. 1. Meanwhile, six subscales of the Cross scale (turquoise color) have formed a very strong cluster. However, after removing the effect of other variables in the entire network, the clustering has been decomposed. The variables extracted from the interview have mostly approached the variables of

child abuse. This itself can confirm the validity of the obtained results. The interviewers in their interview heavily emphasized working children abuse, and considered them among the main cases of harm. The proximity of these variables to the subscales of child abuse, obtained independent of the interview, is itself evidence on the validity of the results obtained from the interview as well as the validity of the network methodology.

The guideline related to the drawn networks and tables is presented in the following table.

Table 1

The Guideline of the Abbreviated Letters Presented in Figs. 1 and 2 for the Variables Related to the Psychological Harms and Risks of Child Labor

Scale name	No	Subscale name in English	Abbreviation
Child abuse self-report scale	1	psychological abuse	ps. (v1)
	2	neglect	ngl (v2)
	3	physical abuse	ph. (v3)
	4	sexual abuse	sx. (v4)
Child and adolescent resilience scale	5	personal skill	prs. (v8)
	6	peer support	pr. s (v9)
	7	social skill	sc. (v10)
	8	physical caregiving	ph. (v11)
	9	psychological caregiving	ps. (v12)
	10	spiritual	spr (v13)
	11	educational	edc (v14)
	12	cultural	clt (v15)
Strengths and weaknesses questionnaire	13	prosocial	prs(v16)
	14	hyperactivity	hyp(v17)
	15	emotional	emt(v18)
	16	conduct	cnd(v19)
	17	peer	per(v20)
Parent stress, family support, and reaction to	18	parental stress scale	PSS (v21)
	19	SDQ_Emoional Score	SDQ_EmS (v22)
	20	SDQ_Externalizing Score	SDQ_ExS

diagnosis			(v23)
	21	SDQ_HyperactivityScore	SDQ_H (v24)
	22	SDQ_InternalizingScore	SDQ_I (v25)
	23	SDQ_PeerProblemsScore	SDQ_P (v26)
	24	SDQ_ConductProblemsScore	SDQ_C (v27)
	25	Reaction to Diagnosis Questionnaire	RDQ (v28)
	26	Family Support Scale	FSS (v29)
Personality	27	E	E (v30)
	28	C	C (v31)
	29	O	O (v32)
	30	A	A (v33)
	31	N	N (v34)
Variables related to behavioral problems	32	Inhibitory control	In. (v35)
	33	Cognitive flexibility	Cg. (v36)
	34	Emotion identification	Emtn.d (v37)
	35	Emotion understanding	Emtn.n (v38)
	36	emotional regularization	Emtn.r (v39)
	37	BP.P	BP.P (v40)
	38	BP.A	BP.A (v41)
Extracted from interview	39	Depression	Dpr(v42)
Family	40	Suicide	scd(v43)
socioeconomic status	41	self esteem	Sl. (v5)
	42	family income	v6
	43	parent education	v7

In the following diagram, the central indices between the 43 variables of the study have been compared.

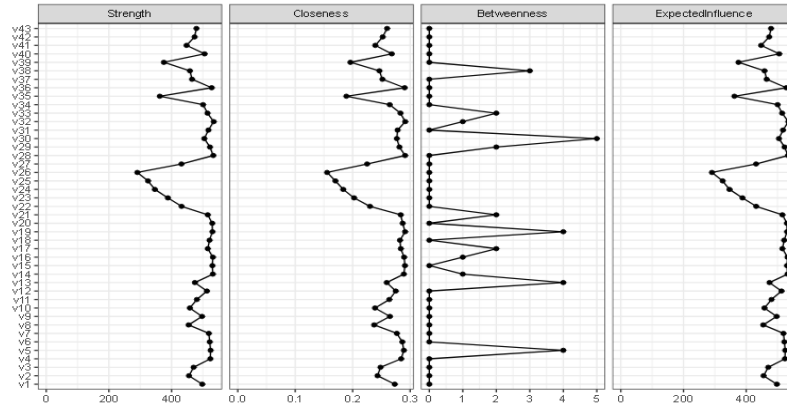


Figure 3. Comparing the centrality indices of the study variables

The largest value of the betweenness index is related to v30, i.e. extroversion variable. Self-esteem, social variable (from the questionnaire of problems and strengths), as well as the behavioral problems from the weaknesses and strengths scale, family support and reaction to diagnosis stand second in the network betweenness. Extroversion has by far had a larger betweenness value compared to other variables, indicating the importance of extrovert personality in the network of relationships between variables. Based on the results obtained from this central index, measurement of extroversion, self-esteem, social variable, and emotional score is of great importance, since they are considered as the most important relationship pathways for the variables of this research. The following figure indicates the more important variables based on this index in black. These variables have been positioned according to their status at the point of the communication bridges of the East, West, North, and South of the map.

The variable of openness to experience has had the greatest proximity value compared to the other variables of the research

in the network of relationships. It is followed by the variable of behavioral problems and reaction to diagnosis. Other variables have also been shown in the following map. These variables are considered among the central variables of the network and have a median status. It is the proximity of a central criterion in the network data analysis that quantifies the extent of proximity of one node to other nodes of the network. Conversely, the sum of the shortest path distances between one node and all other nodes of the network is calculated. The nodes with high proximity centrality are considered as more central nodes in the network, as they can have quick interactions with all other nodes and change them to efficient propagation of information or references. Briefly, the centrality of proximity measures the extent of proximity of one node to other nodes of the network, and it is an important criterion for identifying the key players in the network.

Strength refers to the average weight of the relationship of nodes with other adjacent nodes. Thus, this index is only dependent on the extent of their relationship with the adjacent nodes. Openness to experience, reaction to diagnosis, resilience educational component, social difficulties, resilience cultural index, conduct problems, emotional difficulties as well as peers and cognitive flexibility have had the greatest strength in the network of relationships of the study variables. In the following map, the nodes with high strength have been marked.

One of the important points about the nodes with high strength is that most of these nodes exist in the center of the network of relationship between variables. In other words, they have high proximity. These nodes have mostly high betweenness. As can be seen, the ranking of the research

variables based on the centrality indices has almost a homogeneous pattern. Variables 23-27 which are related to the cross scale, are positioned at the end of the ranking of indices.

Since relationships in the network are all positive, thus the anticipated effect and the ranking is equal to the strength value; not only ranking but also the extent of their anticipated effect is also equal to the value of strength. The following table well indicates this issue. Therefore, all variables that have the highest value and rank in the strength index have also the maximum value in the index of the anticipated effect. The ranking pattern in the above diagram of these two indices is thoroughly similar to each other.

One of the indices of network be great importance in development of questionnaires is the eigenvector index. This index is based on factor analysis logic in test development. The eigenvector centrality value is used for measuring the level of impact of a node inside the network. Each of the nodes inside the network with a higher eigenvector value has a greater level of influence inside the network. The value of this index is associated with the number of relationships of other nodes, but it is mostly affected by the relationships with the more important nodes of the network. In other words, a node in the network may have a high degree score (which is merely dependent on the number of links), but its eigenvector value is low. Meanwhile, the betweenness value of a node which mostly considers the relationship of different parts of the network may be high; however, since it is far from the network power center, it would have a low eigenvector value. Indeed, the eigenvector value of nodes indicates the influence domain of the node in the network.

Variables No. 32, 28, 14, 16, 20, 19, 15, 36, 4, and 29 are the most important nodes of the network based on the eigenvector value, respectively. The rank of other variables is presented in the table. Since other indices have been standardized, this index has also been standardized.

To select the most important variables in the network (network of all variables), as mentioned earlier, there are different indices. If we want to specify, based on all variables, which variables are of greater importance, decision should be made based on all indices. The expected impact index throughout the network is neglected since it is the same as strength. The correlation matrix of the ranking of the study variables has been shown in the following table.

Table 2

The Correlation Matrix of the Ranks of the Central Indices Related to the Network of the Relationships of the Study Variables

	Betweenness	Proximity	Strength	Eigenvector
Betweenness	1			
Proximity	.31	1		
Strength	.37	.99	1	
Eigenvector	.25	.99	.99	1

The relationship between proximity, strength, and eigenvector is around 1. However, betweenness has had correlation coefficients of .31, .37, and .25 with proximity, strength, and eigenvector. Thus, although ranks are almost the same in proximity and strength indices, the ranking in the betweenness index is different with these two indices. Meanwhile, the variables that have had betweenness (i.e., their betweenness has

not been zero) have positive betweenness values in the standardized ranking table, all variables with negative standardized betweenness of -530.0 have had zero nonstandard betweenness. Therefore, betweenness is important only for nodes with positive betweenness value: variables 32, 16, 14, 33, 29, 21, 17, 19, 13, 5, and 30, while for nodes with zero betweenness, the importance is determined based on proximity, strength, and eigenvector.

Accordingly, the final value of the importance of each variable is obtained based on summing up the three values of proximity and betweenness. If we call this index I, we will have:

$$I = \text{betweenness} + \text{strength} + \text{eigenvector} + \text{closeness}$$

Based on the obtained results, v19 (conduct problems), 5 (self-esteem), 30 (extrovert personality type), 29 (family support), 32 (openness to experience personality type), 17 (hyperactivity), 16 (social component of difficulties and strengths), 21 (parent stress), 14 (resilience educational component), 33 (adaptation and agreeableness personality type), and 13 (resilience spiritual component) accounted for 25% of the important variables of the relationship network. These variables have been followed by 28 (reaction to diagnosis), 15 (resilience cultural component), 36 (cognitive flexibility), etc.

Eleven important variables of the network of relationships of variables related to the psychological harms and risks of child labor in Iran are considered as the main variables for development of the instrument "measurement of psychological harms and risks of child labor". The final map of the relationship of these main 11 variables is presented in the following Figure 4.

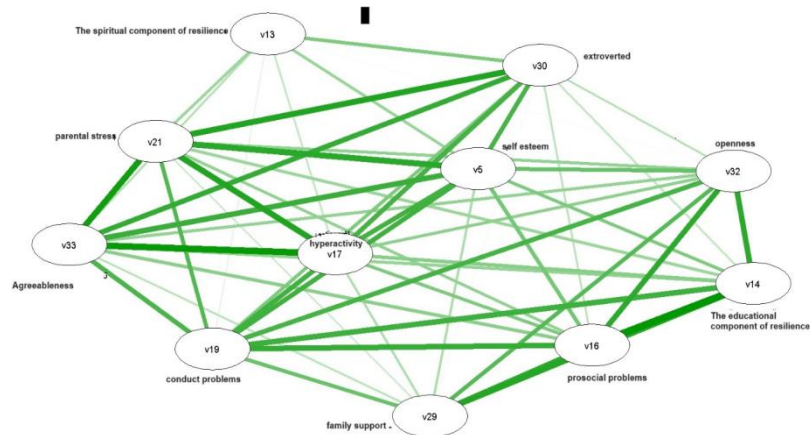


Figure 4. Final map of the relationship of these main 11 variables

Discussion

Child abuse: one of the important variables in this study which is both considered psychological harm and is itself an important factor in psychological harms for child labor is abusing these children. The network methodology power lies in the fact that the dependent and independent variables (cause and effect) interact with each other and there is not merely a unilateral relationship between them. As such, use of this methodology in child abuse, which itself is a psychological harm and can be a factor in other psychological harms is crucial. Bennett, A., Jackson, Y., & Gabrielli (2023) in a study entitled "analysis of social networks of agents of misbehavior against children", whose data were obtained from children report in orphanage centers, used. In another study related to "eight-year analysis of files of working children smuggling in the US", in which the

features and patterns of working children snuggling have been examined (Letsie, N. C., Lul, B., & Roe-Sepowitz, 2021), network methodology has been employed. Child maltreatment and neglect is a serious global issue, which can take the form of physical, sexual, emotional or merely negligence in fulfilling the child's needs. These factors can subject the child to serious and long-term psychological harm. In a study on 5-17-year-old Nigerian children (Oyebanji, 2023), it was found that in addition to child labor being unethical, the health, development, and education of many of such children are lost. According to this research, one of the factors causing serious psychological harms to working children is abusing these children. Based on this research, 5-17-year-old children are tempted economically and physically, or are even forced to do special tasks which most probably would harm their health and education, and impair them. This research work has dealt with examining the health and educational outcomes of child maltreatment and child labor in Nigeria using descriptive survey. The difference between their research and ours has been the method of data analysis. One of the interesting points between this research and the present one has been jobs in which children are involved. Hawking, beggary, carrying heavy loads have been among the most important jobs of working children in both studies. There are also common health and educational problems and harms among working children in Iran (according to this research) and Nigeria (according to Oyebanji research). Another research performed on Bangladeshi children in rural areas (Hadi, 2000) indicated that around 21% of children have to work. Indeed, poverty can be itself a cause of child labor. Therefore, this study again cannot clearly differentiate between cause and effect

regarding determinants of child labor harms and has shifted most of its research results to reporting the percentage of prevalence of child abuse. Xia et al. (2023) employed network data analysis for studying "relationships between childhood trauma and psychological health along the COVID-19 pandemic". In this study, one of the main variables has been child abuse. The network of the relationships between child abuse subscales indicated that among all subscales, child abuse has a greater importance. The result obtained from this research is in line with the finding obtained from the present study. Both researches have used network data analysis for achieving the importance of variables. The following diagram reveals the graph related to the research by Xia et al. (2023).

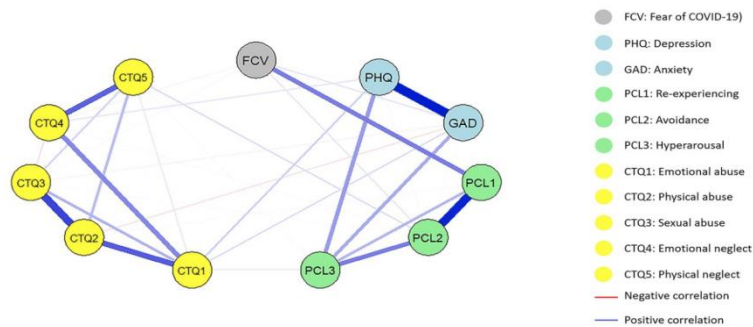


Figure 5. The network of relationships between the subscales of study by Xia et al. (2023)

Working children's resilience

Resilience is so important that it has been considered as tantamount to snow chains in snowy roads. From among the 43 important variables, 11 of them have been chosen as the main variables in this research, being of great importance in the extent of risks and harms incurred to working children (or being harm themselves). Two out of these 11 variables are related to resilience subscale. Thus, the results of the present research are in line with the findings of studies that consider children resilience in the extent of harm they receive as important (e.g. Rentschler 2013). Rentschler (2013) in his research entitled "why resilience matters?", deals with the importance of resilience in the quality of life especially children's lives. In the present research, not only is resilience considered a factor in (reducing) psychological harms and risks of child labor, but it is also a harm resulting from child labor. Libório & Ungar (2010) in a paper entitled "child labor as a high-risk path for resilience" stated that one of the most important psychological harm factors

for child labor in environments with poor resources is their reduced resilience power. Again, in our research, although the net effect of different variables was the basis of the model, again the two resilience subscales were found as important psychological harms of child labor. In the paper by Libório & Ungar (2010) child labor has been viewed as a complex phenomenon which on the one hand captures risk factors and possible positive outcomes on the other. In the studies related to job, resilience is considered a pressure management indicator (Shearer, 2023), is dependent upon individual differences. The findings of Ungar (2008), being an outcome of studying 14 mixed methods on more than 1500 children and teenagers worldwide, emphasized the importance of cultural issues as the main skeleton and pillar of resilience. The results of network analysis of relationships of child labor resilience subscales (in which specifically cultural subscale enjoyed greater central indices) concurred with the results of Ungar (2008). Pasyar, Rezaei and Mousavi (2019) performed a study on child labor in Tehran. Part of their results indicated that working children had less resilience compared to their non-working counterparts; however, the main effect of gender alone as well as the interaction between group and gender on resilience scores was not significant ($p = 0.05$). Their findings emphasized the protective role of secure attachment and resilience in prevention from possible psychological and behavioral disorders in working children. Their study population was similar to our studied population, and in both studies, resilience has been one of the important components in developing risks and harms resulting from child labor. The present study when compared with the study of Pasyar, Rezaei and Mousavi (2019) dealt with the

importance of type of child resilience against psychological harms and risks of child labor and sorted its subscales in terms of importance. The study by Pasyar, Rezaei and Mousavi (2019) indicated that the children employing effective coping strategies are boosted in terms of resilience, and when facing stress, they function better especially against depression, anxiety, and stress. In other words, if coping strategies are trained to children, they would function better when facing psychological harms such as depression, anxiety, and stress. This issue in the present study is in line with the importance of the component of educational resources in enhancing working children resilience. In the present study, from among resilience components and among all variables related to working children harms and risks, the resilience educational component, dealing with the examination of educational resources available to working children is of greater importance. It should be noted that not all working children experience negative psychosocial consequences. Some children may create coping strategies and resilience, helping them overcome the child labor challenges. Nevertheless, knowing the potential psychosocial risks and their impact on child labor is essential, so that measures can be taken for protecting children and mitigating its negative consequences.

Difficulties and strengths

The strengths and weaknesses questionnaire in children has 5 main subscales, measured through 25 items, and has been implemented on working children by many researchers (Bandeali et al., 2008; Feeny et al., 2021; Hindman & Hindman, 2014; etc.). The results of the data collected through this questionnaire in our research indicated that the subscale of

emotional problems is the most important questionnaire subscale. This subscale had larger central indices compared to other subscales, and the problems related to hyperactivity and attention deficit of these children were among second-level important problems. Mahendra, Baria, and Yani (2023) who utilized SDQ for emotional wellbeing assessment of children in research on working children in Indonesia stated that the emotional problems of working children have the highest prevalence. Hindman and Hindman (2014) in their paper entitled "the world of child labor: a historical and regional survey" dealt with drawing the child labor world map based on the data collected from different surveys. Their results about the strengths and weaknesses (problems) of children indicated that the most important problem of working children is either directly emotional harms or are problems whereby emotional problems are their drivers. Fekadu, D., Hagglof, B., & Alem (2010) performed a study on psychological health of working children. In their research, they incorporated important psychological health variables. The strengths and weaknesses (problems) questionnaire were one of the health measurement tools. Their results indicated that hyperactivity and attention deficit are a serious and important harm in the psychological health of working children. In network analysis of the relationships between the subscales of strengths and weaknesses in the present study done on Iranian children also attributed the main and central role of strengths and problems in working children to the subscales of emotional problems and hyperactivity/attention deficit. According to the research by Dinopoulos & Zhao (2007), the first harm to working children is emotional harm. Emotional harms are considered as the origin

of the serious subsequent problems for working children. This result concurrent with the present study findings indicates that emotional problems are the most central problems of working children in Iran. Fanton d'Andon (2022) performed a research on working children in Ethiopia. This research has been performed with the secondary objective of investigating the psychological harms and risks of working children, and as such it is similar to our study goal. Fanton d'Andon (2022) performed exploratory factor analysis on all of the obtained data. The results of analysis indicated five underlying factors: self-esteem, job-related stress, workplace supervision, emotional as well as somatic well-being, and self-determination. In their study, the work-related well-being dimensions such as stress, self-esteem, and supervision were considerably associated with the family and household environment characteristics. These findings suggest that work conditions should be considered commonly alongside the family life and household environment, since some common factors in both environments affect the social-emotional well-being and development of working children. In their study, emotional harms were found as one of the most important harms children can endure in the working environment. The results obtained from their research have great correspondence with the results of network analysis in this study. Accordingly, we also emphasized the proposal made by Fanton d'Andon (2022): "a systemic approach for supporting and preventing from psychological harms especially emotional harms of working children in which both the family and working environment as well as the child themselves are considered". Wulansari, A., Taufik, T., & Oktavian (2023) consider child labor as a complex issue, which is mostly

associated with conduct (behavioral) problems in children. In part of the research based on their network methodology they concluded that the important point about conduct (behavioral) problems of children is that children should not be blamed for these behavioral problems. Rather, they are the outcome of conditions in which they have to tolerate, and attempts should be made for removing child labor and supporting the children that have been involved in it. Thus, according to the Wulansari, A., Taufik, T., & Oktavian (2023), the behavioral problems of children are themselves caused by the working conditions, and based on this research they can be considered as psychological harm and risk of working children. Once working children develop behavioral and conduct problems, they are more predisposed to developing psychological risks. Jenabi et al. (2021) in a meta-analysis entitled "is there any relationship between labor and ADHD?", investigated the status of hyperactivity in working children. The empirical data of their meta-analysis indicated that child labor is highly associated with hyperactivity, which is in line with the selection of the variables related to the psychological harms and risks of working children in this study as well as the great role of hyperactivity in these harms and risks. According to the map of the overall relationship of variables in this study based on the indicators of betweenness, proximity, and strength, three variables of v17, v16, and v19 being the variables of social and behavioral problems of working children, hyperactivity, and their conduct problems all have been positioned adjacent to each other. In other words, after eliminating the effect of 41 variables in the pairwise relationship of these three variables, still these three variables have been positioned alongside each other in the map,

suggesting their effect and impressionability concurrently. However, when 11 variables with higher priority have been drawn in the present research (i.e. the diagram of the network relationships of the important psychological harms and risks of working children), the harm of social difficulties or social problems stands farther away from these two variables, which can be in accordance with the results of Hudson and Hyang (2010). In other words, hyperactivity mediates between these two harms. This means that if in our study hyperactivity is kept constant, the relationship between the conduct disorder and social behavioral problems is eliminated, but both will remain in connection with hyperactivity.

Parent stress, family support, and reaction to diagnosis

based on the result obtained from the network analysis of the relationship between these variables alone, it was found that the scores the parents or guardians assigned to emotional problems, externalizing problems, hyperactivity, internalizing problems, problems of relations with peers as well as behavioral problems from the behavioral strengths and weaknesses questionnaire (parent form), they have powerful significant relationship with each other, while other variables including parent stress, family support, and reaction to diagnosis were peripheral variables. As stated earlier, the network has been formed based on eliminating the effect of other variables on their pairwise relationship. One of the reasons for formation of such layout can be the issue of data collection and measurement. When the parents and guardians are asked to respond to the strengths and weaknesses questionnaire (problems) of children, they need to express their opinion about the child, whereby a kind of judgment is made

about the other person (child). However, in other variables they should direct the attitude and judgment to themselves. Cluster formation for the strengths and weaknesses variables indicated an integrated view held by parents about the children. Briefly, according to the principle of energy parsimony (psychological), individuals have integrated views about others. This integrated view causes reduction of the need to expending energy for judgment about any aspect of the person's life. Gavalas in a paper entitled "brain parsimony and its effect on the decision-making process" performed an interdisciplinary review on the principle of parsimony and a solution through which this principle can affect the human decision-making process. The principle of parsimony as an approach in evolutionary studies needs interpretation regarding cortical cognitive function and is dealt with as such. He in his research concluded that the studies performed on this principle and decision-making about judgment about individuals for prevention from loss of time and energy cause judgment of individuals through giving them label. Here, it seems that parents and guardians without proper care and contemplation about the content of the item have presented their integrated view about judgment about children, causing occurrence of the highest correlation between the subscales of strengths and weaknesses. Another interesting point is that the subscales of weaknesses and strengths of the parent form are not adjacent to the subscales of the same questionnaire which is a self-report form and been drawn in a single network. This can be another piece of evidence in presentation of integrated view of parents for different aspects of child's problems. Gavalas in a papers state that if we want to test all information and investigate different alternatives and then make decisions, much

energy is expended. However, when parents and guardians intend to offer some statements as judgment about themselves, since generally judgment about oneself is mostly devoid of integrity (Davis, 1984), the guardians regarding judgment about different variables related to person generally responded such that these variables fell far away from other variables in the interrelationship network. As possible justification, Epstein (1984) believes that conservative approach in science indicates our weakness in data processing. In other words, as the data gets larger and more complex, researchers attempt to simplify the concepts so that they can save the energy for explaining different phenomena through other terms and concepts (Gavalas, 2014).

Different studies have dealt with comparing the data obtained from two questionnaire forms (self-report form of child labor and the form for the response of guardians and parents of working children). They have shown that there is difference between them and the results obtained from them are not necessarily the same. For example, Anmyr et al. (2012) compared the results obtained from these two forms on children who had cochlear implants. They showed that the total score ($p=0.000$), emotional symptoms ($p=0.000$), and behavioral problems ($p=0.007$) were higher according to the children's forms compared to parents and teachers. This comparison has been different even on the results obtained from two different guardian communities. Murray et al. (2021) stated that when assessing the psychological health issues during childhood and adolescence, it is important to obtain the view of several sources of information. They dealt with ranking comparison from parents and teachers about the strengths and weaknesses

(problems) of student children. They stated that although it facilitates measurement of similarities and contrasts in the nature and severity of symptoms in the household environment and school, these informants may be different in their interpretations about the observed behaviors, and create some questions about the validity of comparing the rankings of parents and teachers. The network of the relationship between the variables of these two forms in our study also indicated substantial difference in the structure of the relationship between the variables of these two different forms.

Personality of working children

the results of network analysis of the relationships between the working children personality indicated that different personality types of children are in close association with each other. Each of the personality types in a central index has a high degree of importance. For example, the betweenness of the personality types N and C has been greater than that of other personality types. Personality types A and C showed the highest average value of relationship with their adjacent nodes and showed the greatest strength. Finally, personality type O indicated the highest value of expected effect. It seems that personality cannot be directly considered as a psychological harm. However, personality significantly contributes to formation of the ground for increasing or decreasing psychological risks. Accordingly, presentation of discussion and conclusion about the network of relationship between different personality types of working children is not directly related to our study. Nevertheless, there are some studies indicating that external variables influence the personality of children. For

example, Akee et al. (2018) in a quasi-experimental study investigated the effects of household income on the emotional and behavioral health as well as personality traits of children. Using longitudinal data, they indicated that the household income has considerable useful effects on the emotional and behavioral health as well as personality traits of children during adolescence. Thus, personality in the child is itself affected by external factors, and it is wrong to conceive it as invariable. It seems that personality is an inseparable part of psychological studies (Laylokhan, 2023). Although a major part of psychological harms and risks of working children depends on the external environment such as social culture, social norms, the family and its supportive role, etc., the personality of children affects the intensity of these harms. The child is considered a defenseless creature. However, when working children receive conspicuous differences regarding psychological harms, there would be some discrepancy. It can be concluded that the child's attributes are not much ineffective regarding the harms they receive. The main issue of influence of personality becomes evident when it is placed in the network of relationships with other harms and risks as well as the variables related to the psychological domain of working children (the map of the network of relationship between variables, psychological harms and risks of working children). In the relationship of different personality types with the psychological harms and risks, three personality types play a central role. Extrovert, openness to experience, as well as adaptive and agreeable personality types. Extroversion showed the greatest value of betweenness index among the 43 variables. Openness to experience showed the highest value of proximity, strength,

and expected impact among all of the 43 variables. A person with a high level of openness to experience enjoys testing new things. They have great imagination, and are curious with an open mind. The individuals who have not much willingness to experience prefer not to test new things. They are practically kind and enjoy having a routine. High openness means being creative and welcoming novel ideas. The individuals who have high level of openness have general appreciation of ideas and atypical arts. Instead of being practical, they are usually imaginative. Being creative, welcoming novel and different ideas, as well as being in contact with their emotions are among the characteristics of these people. The individuals who acquire a lower score of openness in the occupational test are usually less open, more resistant to change, and analytical. The secondary features of the openness include daydreaming, artistic interests, being emotional, and being adventurous. Although openness to experience seems to be a desirable personality type, when it is related to working children, this feature heavily leads to increasing rate of different harms and risks (psychological and somatic) for working children.

Having a high level of openness to experience is important in occupations that require creative thinking and flexible attitude. Occupations such as advertising, research, and other artistic jobs all benefit from high openness (Hurtz & Donovan, 2000). The qualitative research results of this study indicated that working children are often involved in activities (such as beggary, load carriage, errand child, selling simple items, etc.) where low scores of openness to experience would increase their probability of success. Meanwhile, Nyhus & Pons (2005) in research entitled "the impact of personality on the level of

income" based on the empirical data collected in a meta-analysis research indicated that openness to experience helps increase the level of income when the person enjoys environmental supports (organizational structure, family, balanced society, etc.). When there are no environmental supports, the openness to experience personality type is considered a risk (Nyhus & Pons, 2005). This is in particular true for working children who in addition to being child not only are deprived of legal and social supports, but also most of them belong to families with low socioeconomic levels of the society. Intuitively, it can be found that the extent of harm and risk a child with openness to experience can receive is far greater than the level experienced by a child with low value of this feature. Accordingly, it is expected that the openness to experience personality type would be placed at higher priorities in the central indices of psychological harms. Our research indicates that this personality type ranks the first in the three central indices of the network of the harms and risks of working children. High correlations have been observed between extrovert personality type and openness to experience. There are numerous studies (e.g. Halligan, 2023) indicating that these two personality types have high correlation with each other. Thus, it is expected that this personality type would also be considered as one of the personality types affecting the extent of psychological harms and risks for working children. The extrovert personality type in the working environment has characteristics that seem to considerably increase the psychological harms and risks for the vulnerable status of working children and their working subject. Extrovert individuals in the workplace get energy from being with others, they want to be the center of attention, they think aloud, they

can be easy to know, they talk more than they listen, they communicate enthusiastically, they respond rapidly, they care for others, they are interested in different activities, they have numerous acquaintances, they befriend with others easily, they constantly wonder "how can I influence the situation?", they investigate their opinions externally, they take risks, they think less about the consequences of their decision, and they have a high demand for excitement. It seems that these characteristics will provide the grounds for harm for children. As such, it is expected that in the network of the variables of psychological harms and risks of working children, it should be among the highly important issues, as also found in our study. Therefore, regarding personality types, it can be stated that it is itself a kind of harm and heavily contributes to other harms. This issue also holds true about the adaptive and agreeable personality type. If we consider the characteristics of this personality type, it is also found that it is absolutely not in line with child labor and working children, and sets the ground for serious harms for them. Although adaptability indices are generally positive, they should be viewed in the context of children and their working domain and especially external risks. Individuals with high adaptability or agreeableness are altruistic individuals, have sympathy and empathy with others, and eagerly help others, and they believe that other individuals have also the same kind of relationship with them. In comparison to these individuals, maladaptive or disagreeable individuals are self-centered humans who are suspicious of the intentions of others, and are mostly competitive rather than cooperative. The individuals who obtain very low scores in this index usually have the behavioral characteristics of those with personality disorders including

paranoid, antisocial, and narcissistic personality disorder. However, those with very high scores in this index have dependent personality disorder or behaviors (Lee & Ohtake, 2018).

Variables related to behavioral problems

inhibitory control, cognitive flexibility, identification of emotions, understanding of emotions, emotion regulation, behavioral problems according to the parents and behavioral problems according to the child are the main subscales related to this set. None of the variables of this scale are considered among the important variables in the analysis of the entire network of variables. This can be due to variance interpretation created by these variables in the total variance of the network of harms and risks of working children. The variance related to these variables is interpreted by other variables especially domain 11 variables. Meanwhile, analysis of their network, due to absence of high levels of relationship, indicates measurement of different aspects and high independence of variables from each other. Meanwhile, the samples studied here consisted of working treatment, whose levels of needs include more basic needs such as food and security. Accordingly, inhibitory control, cognitive flexibility, identification of emotions, understanding of emotions, and emotion regulation are issues that become important at higher levels. As such, not only it has not been considered a serious harm, but also if it is the cause of harms other variables, it would cover an extensive part of this causal interpretation. Therefore, briefly the subscales of inhibitory control, cognitive flexibility, identification of emotions, understanding of emotions, emotion regulation, behavioral

problems according to parents and behavioral problems according to the child are excluded from the high priority of psychological harms and risks of working children. Another important point is that these variables can be mediating and intermediate variables, though the present research does not focus on them.

Depression, suicide, and self-esteem (variables extracted from the interview)

the results of analysis of the network of the relationships between these three variables extracted from the interview indicated that only in the index of the expected effect of suicide, the highest degree of importance was found, while in other central indices, depression showed the highest level of importance. The greater degree of expected effect of suicide indicates the validity of the results. In particular, when a person commits suicide all of their life issues are captured by it and lose its importance. As such, the highest level of expected effect has belonged to suicide. Accordingly, this result does not require searching for the research background and literature. In other central indices, depression has a higher level of importance. Since the analysis has been done based on PMRF model, it can be easily specified that depression has an intermediate and mediating role in the relationship between the variables of self-esteem and suicide. Interestingly, by eliminating the effect of depression from the relationship between suicide and self-esteem, the association between these two is also eliminated. This issue in PMRF analyses accurately means the mediation of depression in this relationship (Isvorano, Epskamp, Waldorp, and Borsboom, 2022). The network of the relationship between

these three variables in Fig. 1 well reflects the obtained result. Gijzen et al. (2021) studied network analysis method in the relationship between the depression-associated variables. According to the network view, psychological pathology is the outcome of the interaction between the symptoms. In their study, they employed network analysis for identifying the central symptoms of depression among children and teenagers. The aim of their research was to repeat and expand this study by incorporating suicidal ideation or thoughts as one of the symptoms of depression and investigating which of the depression symptoms are among the factors affecting suicidal ideation in children and adolescents. Therefore, it has been similar to our study regarding the type of methodology and variables. Their research results showed that the symptoms of depression have a direct impact on suicide, where psychological variables such as self-hate, self-contempt, and self-esteem have an indirect relationship with suicide. Indeed, symptoms of depression play an effective mediating role for these variables with regards to suicide. The methods and results obtained from this research fully concur with the network analysis of the relationship of these three variables through interviews with child labor specialists. Meanwhile, the sample of both studies also covered the age group of children and adolescents. Nevertheless, the children in our study have been working children in Iran, but the study by Gijzen et a. dealt with children and adolescents in Netherlands.

In analyzing the relationship between all of the research variables, from among the three variables obtained from the interview, only self-esteem found a higher importance. Sharman & Kiran (2017) in their study on working children dealt with

measuring their self-esteem. They stated that working children suffer from different psychological problems because of the stress at younger ages. Respect is worse among children involved in working activities as compared to the peer group. The children who suffer from different psychological problems because of stress at younger ages and self-esteem among children involved in working activities is significantly lowered because of different reasons related to the work and other factors as compared with other age groups. In their study, state self-esteem scale (SSES) developed by Tad F. Hiterton (1991) was implemented. Their research results indicated that the level of self-esteem of working children was high in the hoteling industry while being low in the auto manufacturing industry. Meanwhile, they indicated that the intensity of psychological harms and risks of children working in the hoteling industry was significantly lower than that of children working in the auto manufacturing industry. The results of the research by these researchers can also be generalized to our present study. In this research, we also noted the important role of self-esteem in the network of psychological harms, and considered self-esteem as not only harm but also as an important variable in the network of harms (cause of harm). According to research by Woodhead et al. (2004) entitled "the psychosocial effects of child labor: a framework for research, supervision, and intervention", in the section of personal identification they noted self-esteem. They considered self-esteem as an important criterion in identification and believed that according to different studies self-esteem is heavily damaged in working children, seriously affecting the psychological well-being of working children. Here, self-esteem has been tightly interwoven with the problem of identification.

Identification is the cornerstone of important psychological problems and issues.

Family income and parent education

Two major demographic variables that have been included in the present study have been family income and parent education. As stated in the discussion of other variables, family income and parent education both play an important role in psychological harms of working children. However, these variables did not find high priority in the network of relationships between variables. This is because parent education and income does not have a direct impact on harms, and these variables leave their effects in the harms with high rank. Rooz (1996) dealt with the issue of child labor and family income in detail. The results of their research considered household family as the most important cause of children's activity in the Carolina state of the US. This indicates that selection of family income as one of the demographic variables in the present study has been valid. This is because this research has assumed that children get involved into labor and presence in these jobs causes them to develop psychological harms and problems. However, what is the root cause of the child labor compulsion? Rose (1998) in their research considered the household income as the main issue of child labor. The effect of parent employment which is closely associated with the academic status of parents of working children has been investigated in a study by Parikh and Sadoulet (2005) on Brazilian children. This paper indicates that after controlling the family attributes, the personality traits of parents, regional variables, as well as the psychological traits of the child, the children whose parents have higher levels of

education, regardless of the sectors the parents are involved in, work more than children of employees and enjoy greater psychological health. In addition, this paper also emphasizes the recent findings, i.e. the children of the regions in which the adult employment rate is higher are more likely to work as compared with children in regions with a low adult mean employment rate. The interesting point in the study by Parikh and Sadoulet (2005) is that child labor does not necessarily mean trading it with education (i.e. working equals academic decline), and this issue is mostly related to the education, income, and occupational parents. Their ultimate results again emphasized the individual role of harms resulting from child labor. Nevertheless, their research does not deny the fact that psychological harms in working children are significantly lower compared to their peers. Meanwhile, although the parent education and income are considered a basis and cornerstone for child labor, our research indicates that when the variance resulting from the psychological harms and risks of working children is interpreted through other variables and absence of these variables as high rank variables are expectable in interpreting child labor.

One of the major psychological effects of child labor is impairment in the normal development of the childhood. Long working hours, often in dangerous environments deprive children from the essential time for playing, social interaction, and personal development. This deficit of opportunity for physical and social interaction can lead to emotional and behavioral problems including anxiety, depression, and low self-confidence. Child labor also subjects children to conditions which can reinforce sense of inability and vulnerability, and contribute to development of posttraumatic stress disorder

(PTSD). Witness or experience of violence, exploitation or abuse in the working environment can leave unresolvable wounds on the psyche of children, and hinder their inability to establishing healthy relationships and guiding social situations. In addition, child labor can aggravate the current psychosocial vulnerabilities such as impairment in the family function or poverty. The extra stress and pressure resulting from income generation can pressure family relations and contribute to sense of isolation and despair. In addition, the financial burden of work can prevent from educational opportunities of children, limit their future perspectives, and perpetuate the cycle of poverty. Dealing with the psychological risks of child labor requires a comprehensive approach which addresses both the root causes of the issue and the immediate needs of harmed children. Interventions should focus on providing access to education, healthcare services, as well as psychosocial support especially for children who have experienced trauma or abuse. Furthermore, attempts for fighting poverty and enhancing the socioeconomic development is crucial in addressing the underlying factors that guide children towards labor. Child labor is a considerable threat for psychological well-being of children, prevents from their development and hinders their ability for growth. By understanding the complex psychological consequences of child labor, we can design interventions that would enhance child support, psychological health support, and sustainable opportunities for a brighter future for all children.

The results of this research can be used in development of tools for measuring psychological harms and risks of child labor. Also, by identifying the most important psychological risks and the harms of working children, we can develop,

prepare, and validate interventional and educational protocols focused on the most important harms for educating the society, families, as well as the children themselves with methods in proportion with each group, in order to be used in the creation of books, guidelines, films, and animations to individuals who are concerned with child labor. In addition, the entire research process can be provided to the activists of child labor (such as philanthropists, social workers, and people-founded organizations) as a research report, so that in addition to its usage, it is further investigated and criticized by them.

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