

# The Effect of a Yoga Program on "Health-Related Quality of Life" of Children in Residential Care Centers

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## Abstract

**Introduction:** Children living in residential care centers are a vulnerable population and have a lower Health-Related Quality of Life (HRQOL). This study explored a yoga exercise program on HRQOL in children living in residential care centers.

**Methods:** In this quasi-experimental, one group before-after study with time series design, all children aged 8 to 13 years, who qualified for the inclusion criteria and were living in governmental residential care centers of Isfaryen were selected, using the census method. The participants took part in yoga classes for 8 weeks. The HRQOL was assessed using Kids Screen Health-related Quality of Life Questionnaire (KS-HRQOLQ). The gleaned data were analyzed with SPSS21 using repeated measurements analysis.

**Results:** Changes in the total score of HRQOL obtained in five measurements were not statistically significant ( $P = 0.270$ ). Variations in the score of HRQOL in the dimensions of "mental well-being", "the relations with parents and self-autonomy", "social support and peers", and "school environment" were not significant before to one month after completion of interventions ( $P = 0.29$ ,  $P = 0.67$ ,  $P = 0.16$ ,  $P = 0.50$ , respectively). For the physical well-being dimension, the changes were significant from before to immediately after completion of interventions ( $P = 0.013$ ). Changes were not significant in the presence of personal and demographic variables ( $P = 0.45$ ,  $P > 0.05$ ).

**Conclusions:** This study indicated that yoga increases life quality only in the physical well-being dimension. Given that life quality reflects the wishes, expectations, and hopes of children and teenagers in relation to their present and future life and this feeling is time-related, culture-dependent, and context-oriented, it appears that life conditions of children in the current study and chronic continuous tension present in residential care centers probably made the effects of yoga different.

## INTRODUCTION

Children living in residential care centers are considered a vulnerable group, since living at these centers exposes them to unfavorable conditions and many social and health problems, which exert negative effects on the aspects of their health [1-4]. Numerous studies have revealed that the prevalence of chronic and acute

diseases and socio-educational problems are higher among children in residential centers so that more than 80% of these children experience health-related problems [5]. Living at these centers influences the life satisfaction rate and quality of life of these children. These children have considerably lower Health-Related

Quality of Life (HRQOL) [6-11], which is significantly correlated with negative consequences, such as suicide, drug abuse, alcohol abuse, high-risk sexual behaviors, inappropriate nutritional diets, physical conditions, educational subsidence or failure, and reduced self-confidence [1, 12, 13]. Furthermore, HRQOL is a practical and important concept, which is considered as a marker of mental health. This index emphasizes all aspects of health. It is a separate clear-cut category that is influenced by individual's experiences, beliefs, expectations, and feelings [14, 15]. In the recent years, researchers have paid special attention to the use of complementary treatments [16]. Yoga, which has exerted positive effects in the treatment of chronic pediatric diseases [17, 18] is an activity aimed at developing and maintaining a balance between physical and mental systems and consists of a series of regular calisthenics associated with respiration and concentration, the performance of which leads to psychosomatic health [19]. Moreover, yoga is not expensive and is a hazardless sport and a safe method for enhancing physical fitness, feelings of personal welfare, cognitive ability, and general health [20]. Although various studies on children have shown the positive effects of yoga exercises on physical health, cognitive and emotional performance, and self-esteem in children [21-23], the effects of yoga on the HRQOL of children living in residential care centers with different properties and experiences, who sustain risky conditions, have not been made clear yet and studies have mostly dealt with the effects of yoga exercises on various variables pertaining to HRQOL in children with an illness [24]. Also, the quality of these studies is low and the number of subjects is limited so that larger scale studies on different populations are required [25]. Regarding the lower HRQOL in children living in residential care centers compared to other children, and also the importance of fostering health promotion programs and preventing high risk behaviors in these children, this study aimed at determining the effects of an 8-week yoga exercise program on HRQOI and all subscales in parentless and mal-parented children at residential care centers.

## METHODS

This was a quasi-experimental before-after study, which used multiple tests time series. The study population included all children aged 8 to 13 years residing in governmental residential care centers of Esfarayen (2 separate centers for males and females) affiliated to the Northern Khorasan welfare organization (Esfarayen is a city in and the capital of Esfarayen County, North Khorasan Province in Iran. At the 2006 census its population was 120,513, in 36,519 families). The inclusion criteria were: no obvious physical disability, lack of mental disorder, no use of medications, not receiving any psychiatric services over the last 6 months, enjoying normal IQ, more than one-year residence in

residential youth care centers, and the required inclination for participation. The exclusion criteria were: absence in yoga sessions (even one absence), no inclination for continuing cooperation in the study, participating in any classes of psychological consultation, disease, and odds of hospitalization during the intervention. The sample was collected through the census method. Overall, 27 children out of 32 living at residential centers qualified to be included in the study. Two children refused to participate in the third and fourth sessions of intervention and discontinued their participation, thus, a total of 25 children remained in the study. The instruments were a demographic information questionnaire and Kid Screen Health-related Quality of Life Questionnaire (KS-HRQOLQ), which was developed using the European project "Screening and Promotion of HRQOL in Children and Teenagers", which covered 22296 children from 13 European countries [26]. This self-report instrument could be applied to healthy children and teenagers and those with chronic disease of 8 to 18 years duration. The 27-item questionnaire measures HRQOL in five subscales, including physical well-being (5 items), mental well-being (7 items), parental relations and self-autonomy (7 items), social supports and peers (4 items), and school environment (4 items). It is scored using a 5-point Likert scale ranging from never = 1 to always = 5. Using this instrument, the frequency of behavior or feeling, and intensity of attitude in the past week's framework is self-reported [27]. A greater score indicates a higher quality of life. This questionnaire has been translated to various languages around the world with acceptable reported validity and reliability [28], and has been used in various studies [29-31]. In 2012, the psychometric properties of this tool were surveyed on a population of Iranian students. Coefficients of confirmatory factor analysis revealed a good fit of the data in different subscales with a reported Cronbach's alpha coefficient of > 0.70 for all subscales except school environment. The test-retest correlation coefficients were reported to be strong for all subscales ( $P < 0.01$ ) [30].

In the present study, qualitative content validity was used to determine content validity using opinions of 10 experts and faculty members. The face validity was established by having 10 children living in residential care centers complete the questionnaire and Cronbach's alpha correlation coefficient for each subscale ranged from 0.71 to 0.84 with the total reliability of the whole questionnaire as  $\alpha = 0.90$ . The researcher was trained in pediatric yoga under the supervision of a pediatric yoga coach. The demographic questionnaires were completed by the researcher and the KS-HRQOLQ was completed by the participants before, during (the end of the fourth week of intervention), immediately after completion of the intervention (the end of the eighth week of intervention), one week after, and one month after completion of the intervention. Children were

trained in collective yoga exercises in sport centers of the residential centers by the first and second researchers. Additionally, illustrations pertaining to the method of performing yoga exercises were distributed among the participants and some pedagogic posters were installed on the walls of the sport centers. The participants took part in yoga classes for eight weeks; five days a week (2 sessions in the presence of a researcher and 3 sessions in the absence of a researcher for further training) and one session a day, each lasting 45 minutes, in which the boys were trained by the first and third authors and the girls by the first author. Under the advice of technical managers of the centers, the classes were held during 4 to 5 pm (even days for girls and odd days for boys). Each yoga session included 10 minutes of aerobic exercises, 15 minutes of slow soft physical exercises, 15 minutes of positioning exercises, and 5 minutes of bodily relaxation and the exercises grew in difficulty gradually (the third author established the program schedule). To investigate the yoga exercises, record sheets were used and the participants reported the date, time, and duration of yoga performance. The gleaned data were analyzed with SPSS 21, using mean, SD, frequency, and percentages. To make sure of normality of data

distribution, the Shapiro and Wilk test was used. Repeated measurements method was used to analyze life quality in children and the related subscales before, during, and after yoga interventions with P-value set at 0.05. Ethical considerations included voluntary participation in the study, obtaining informed written and oral consent of the participants and the technical managers, data anonymity and confidentiality, and voluntary lack of participation in the study at any stage. The study proposal was approved by the Committee of Ethics in Research at Shahid Beheshti University of Medical Sciences dated 3.8.2016, coded ir.sbmuphnm.1395.455, and registered in the Iranian Clinical Trial Center under no. IRCT201310059798N3.

**RESULTS**

Of the 25 children under study, 14 (56%) were girls and 11 (44%) were boys. Their mean (SD) age was 11.36 (1.41) years. The most frequent cause of entrance in the residential centers was parental incompetency (%64). Other demographic features of children are presented in [Table 1](#).

**Table 1:** Demographic Characteristics of Children in Governmental Residential Care Centers of Isfaryen, Iran

Category	Frequency (%)
<b>Gender</b>	
Males	14 (56)
Females	11 (44)
<b>Age (years)</b>	
8-10	8 (32)
11-13	17 (68)
<b>Duration of residential center stay (years)</b>	
1-3	15 (60)
4-6	9 (36)
7-9	1 (4)
<b>Sleep disorders</b>	
Yes	4 (16)
No	21 (84)
<b>Anxiety disorders</b>	
Yes	19 (76)
No	6 (24)
<b>Cause of entrance into the residential center</b>	
Father's death (mother's incompetency)	3 (12)
Parents' incompetency	16 (64)
Parents' divorce	6 (24)
<b>BMI M(+SD)</b>	77/27(10/38)

The total HRQOL mean score increased immediately after the intervention compared to before, yet, there was a decrease in HRQOL during one week and one month after the intervention. The mean (SD) score of subscales and total score of HRQOL are presented in [Table 2](#). The findings of repeated measurements analysis indicated that the trend of changes in the total scores of HRQOL were not significant during the research process (P=0.270). Furthermore, in measuring trend of

changes in the five subscales of HRQOL, alterations in the dimensions of mental well-being, relation with parents and self-autonomy, social supporters and peers, and school environment were not significant (P > 0.05). Nevertheless, changes in the physical well-being during the intervention were significant (P = 0.013) ([Table 3](#) and [Fig 1](#)). In investigating changes in HRQOI, considering duration of presence, gender, sleep disorders, anxiety

disturbances, age, cause of entering the residential center, and Body Mass Index (BMI), the changes were not significant ( $P = 0.681$ ). Additionally, the results revealed that in this study, changes in the subscales of physical well-being, mental well-being, relations with parents and self-autonomy, social supporters and peers,

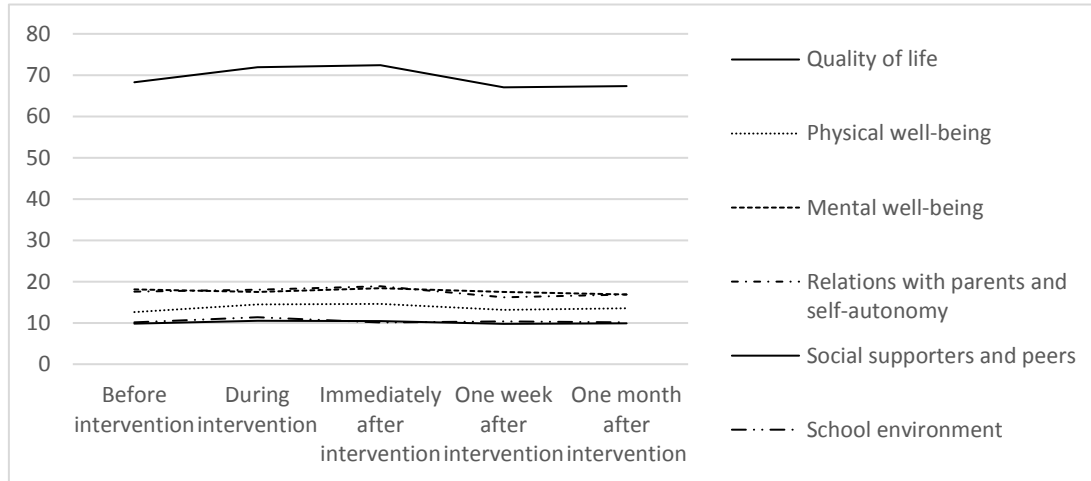
and school environment were not statistically significant considering duration of presence, gender, sleep disorders, anxiety disturbances, age, cause of entrance to residential centers, and BMI ( $P > 0.05$ ), and none of the reciprocal intergroup effects were significant (Table 4).

**Table 2:** Mean (SD) of Health-Related Quality of Life with its Five Subscales

Quality of life/subscales	Before intervention	During intervention	Immediately after intervention	One week after intervention	One month after intervention
Quality of life	68.30(16.25)	71.93(11.04)	72.41(13.78)	67.05(14.20)	67.35(18.37)
Physical well-being	12.62(4.21)	14.51(2.61)	14.60(2.49)	13.18(3.93)	13.51(3.69)
Mental well-being	18.10(3.48)	17.48(3.03)	18.40(3.73)	17.48(3.69)	16.88(4.38)
Relations with parents and self-autonomy	17.60(5.26)	18.07(4.79)	18.87(5.12)	16.20(5.04)	16.91(5.30)
Social supporters and peers	9.83(3.26)	10.51(2.89)	10.42(2.93)	9.77(3.17)	9.89(3.48)
School environment	10.13(3.59)	11.37(2.26)	10.10(2.82)	10.40(3.18)	10.13(3.75)

**Table 3:** Results of repeated Measurements Analysis for Health-Related Quality of Life and its Five Subscales

Quality of life and its Dimensions	Sum of squares	Degrees of freedom	Mean of sums	Test statistic	P-value
Health-related quality of life	661.40	2.67	247.69	1.34	0.270
Physical well-being	134.64	4	33.66	3.28	0.013
Mental well-being	63.89	2.99	21.39	0.80	0.500
Relations with parents and self-autonomy	192.75	2.90	66.44	1.74	0.169
Social supporters and peers	22.69	4	5.67	0.59	0.670
School environment	53.84	2.64	20.38	1.25	0.297



**Figure 1:** Change in Health-Related Quality of Life and its Five Subscales

**DISCUSSION**

The present study aimed at determining the effect of yoga as a complementary therapy on life quality of derelicts and mal-parented children. This study indicated that eight weeks of performing yoga, five days a week and one session per day, induced statistically significant changes in physical well-being of HRQOL indicating the efficacy of yoga in increasing this dimension during the intervention. In this respect, the findings are consistent with the results of the study by

Saraf and Emami (2008), which indicated that 10-week performance of yoga exercises improved the components of power and physical activities [32]. Moreover, another study (2016) carried out on 20 children with cystic fibrosis demonstrated that though a 10-week performance of yoga exercises for 6 sessions per week a positive significant effects on joint pain and the rate of anxiety was found immediately after completion of exercises compared to before the intervention; it did not specifically cause any significant effects on disease-related quality of life in these children yet this could

indirectly enhance the physical well-being of the participants as was the case in the current study. Furthermore, the positive effects of yoga on respiratory

and gastrointestinal problems and also the physical dimension of quality of life in children was not statistically significant [33].

**Table 4:** Results of repeated Measurements Analysis in the Presence of Demographic Variables for Health-Related Quality of Life and its Five Subscales

Dimensions of life quality/sources of changes	Quality of life	Physical well-being	Mental well-being	Relations with parents and self-autonomy	Social Supporters and peers	School environment
	P-value	P-value	P-value	P-value	P-value	P-value
Yoga and duration of attendance	0.397	0.564	0.322	0.449	0.503	0.807
Yoga and gender	0.785	0.221	0.813	0.691	0.950	0.969
Yoga and anxiety disorders	0.857	0.964	0.902	0.747	0.934	0.970
Yoga and sleep disorders	0.548	0.385	0.660	0.713	0.940	0.280
Yoga and age	0.731	0.801	0.728	0.601	0.871	0.668
Yoga and cause of entrance into the center	0.356	0.098	0.977	0.474	0.191	0.205
Yoga and BMI	0.817	0.380	0.371	0.911	0.978	0.995

This inconsistency of results may be attributed to the low number of yoga sessions in the above-mentioned study compared to the current study. On the other hand, the variables were not measured during the interventions in the mentioned study, which could influence the results negatively. Moreover, the differences in the study population and specific characteristics of children in residential care centers, who are experiencing mental and emotional problems [34, 35], should not be ignored. Inconsistent with the current findings, the results of the study by Hartmann et al. (2010) carried out in two provinces of Switzerland showed that performing school-based physical activities had no significant positive effect on physical aspect of quality of life in first grade primary school children, or on the psycho-social and physical aspects of quality of life in fifth grade primary school children. Their findings only indicated the positive effect of intervention on the psychosocial quality of life in children in the presence of variables of place of residence and fatness in the first grade of primary school [36]. The cause of inconsistency of the results of the above-mentioned study with the current findings may be attributed to the type of intervention. Nonetheless, there are some studies, which delved into a comparative study of the effect of yoga, exercises, and physical activities, and occasionally have compared the effects of these two methods in various groups [22]. However, Covindarai et al. (2016) demonstrated that although the physical component of yoga with bodily exercises may be similar to yoga itself, there are important differences between the two regarding type of respiration regulation, care, and attention to maintaining the present status, which could differentiate the yoga effects [37].

The results of the study by Culver et al. (2014) were consistent with the current findings with respect to the inefficacy of yoga on mental well-being of HRQOL in children in residential care centers. Their findings showed that although the total score of emotional and behavioral problems was smaller in the yoga group compared to the control group, the difference was not

statistically significant [38]. Additionally, in Hartmann et al.'s (2010) study, the psychosocial quality of life of children aged 10 to 12 years was not affected by physical activity [36]. Inconsistent with the current findings, another study in southern Australia showed that yoga was more effective in reducing tension, anxiety, and improving the health status of the participants compared to the relaxation method [19]. This inconsistency of results may be attributed to individual characteristics and life conditions of these children before and after entering the centers. Moreover, Feelings of emotional insecurity and lack of social development are more common among parentless children compared to those, who enjoy living with their biologic family [39, 40], which may have affected the results of the present study. Bruce et al. (2009) showed that disturbances in the order and integrity of neural physiology, especially hormonal imbalance pertaining to the hypothalamic-pituitary and adrenal axis are observed in residential care children [41]. This may diminish the effects of interventions like yoga. This imbalance may predispose patients to increased vulnerability to stressors, which, in its own turn, may aggravate negative consequences [42]. Trend of changes in parental relations and self-autonomy of HRQOL were not significant in the present study indicating inefficiency of yoga in this dimension. The current findings are not consistent with the results of the qualitative study by Moeenifar and Janfada (2012), in which they interviewed 40 females. They stated that relaxation and tranquility in critical situations induced by yoga helps resolve tension in the family environment [43]. Differences in the age range of the study units could be one causes of this inconsistency. On the other hand, lack of uniform models of dependence, absence of bilateral warm intimate relations, shortage of environmental stimuli, and collective life of these children in residential care centers compared to those living in their biologic families may lead to detrimental damages in children of varying ages [44], which may affect the results of the study.

In the present study, trend of changes in the social support dimension pertaining to life quality were not significant. In a study (2009), 8-week yoga exercises were performed by 12 first-grade primary school mentally deficient boys aged 7 to 10 years in one case and one control group. The results demonstrated that the mean scores of each of social interaction dimensions were significantly higher in the intervention group [45]. Loss of parents is one of the factors contributing to the absence of social and emotional development of teenagers, who live in such institutes and facilities. These young children are less successful in making intimate friends and support networks for themselves after leaving the centers; hence, they will suffer from their inability in decision-making in difficult situations due to the loss of parents when they enter the community and start their independent life facing problems in adaptation, compatibility, and social optimization [44]. This issue may be the cause of inconsistency of the results, especially with respect to the social support aspect of quality of life in the study above. On the other hand, the small sample volume in the study above may hinder the generalizability of the results to other conditions. In the present study, changes in the school environment subscale pertaining to the quality of life during the intervention and after it were not significant. Moreover, none of the reciprocal interclass effects were significant. In this regard, the current results are not consistent with the findings of the study by Brands et al. (2011) carried out on 20 children with Irritable Bowel Syndrome (IBS) and abdominal pain, who were aged 8 to 18 years. The results demonstrated that a 12-week yoga program not only decreased significantly the frequency and intensity of pain in the abdominal pain group, yet also led to an improvement in the quality of life, specifically in peers and classmates domains [17]. It seems that promotion of life quality pertaining to school environment demands multi-factorial measures in this group of children. Petrenko et al. (2011) emphasized on the prevalence of educational failure in children under the coverage of residential centers and believed that these teenagers had less peer support at schools and 84% of them did not receive services related to their educational needs [46]. This could serve as a source of stress and social seclusion reducing their satisfaction with the school environment.

Generally, the trend of changes in the total score of HRQOL from before to the end of one month after completion of intervention indicated that yoga exercises had no significant effect on HRQOL of children living in residential care centers. Since there was no other study similar to the present study, these findings were compared and contrasted with the results of other studies in the field of yoga. A study in 2015 suggested that yoga exerted some positive effects on increasing life quality and decreasing the frequency of bleedings in 27 hemophilic children [23]. Factors that may alter the

results of yoga effects, include type of yoga and the number of exercise sessions [47]. In the study above, duration of yoga performance was longer than that in the current study, which may influence the results. Scientific evidence speculates that yoga exercises may exert some positive effects on individual's flexibility against life stresses [38], and promotion of health and welfare [48] and also increase life quality and general feeling of physical health [49]. The findings indicated that yoga increases life quality only in the physical well-being dimension. Given that life quality reflects the wants and wishes, expectations, and hopes of children and teenagers in relation to their present and future life [50] and this feeling is time-related, culture-dependent, and context-oriented, it appears that life conditions of children in the current study and chronic continuous tension present in residential care centers [51], probably make yoga effects different. The results are further consistent with the findings of another study carried out as integration with a convergent parallel design (2017). In the mentioned study, like the current research, the implementation of a 6-week yoga program decreased anxiety and symptoms of post-traumatic stress disorder in 18 psychotic patients, yet, it could not exert any positive effects on promotion of quality of life in these patients [52]. Regarding the heterogeneous results of this study and others, the authors of this paper recommend that larger scale studies should be carried out with more control on moderator variables using greater sample volumes and longer time of intervention. This study was carried out on children in governmental residential care centers, thus the results may not be generalized to other children with different age groups in non-governmental residential care centers. On the other hand, the data were collected by self-reporting questionnaires, which may be a limitation of this study. Regarding the heterogeneous results of this study and others, the authors of this paper recommend larger scale studies with more control on moderator variables using greater sample volumes and longer time of intervention.

## CONCLUSIONS

Yoga positively affects health-related quality of life of children residing in residential care centers, yet, this effect diminished one week and one month after completion of intervention and changes in the physical well-being of life quality were not significant one month after the intervention compared to before the intervention in the presence of demographic variables.

## Ethical Consideration

Permission for this study was through the Ethical Committee of Shahid beheshti University of Medical Sciences. All children and their supporters were informed of the purpose and design of the study. Participants signed a written consent for their participation.

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## Conflicts of Interests

The authors declare no conflicts of interests.

## References

- James S. What works in group care? A structured review of treatment models for group homes and residential care. *Child Youth Serv Rev.* 2011;33(2):308-21.
- Vafaie M, Roshani M, Hassanabadi H, Masoudian Z, Afruz G. Risk and protective factors for residential foster care adolescents. *Child Youth Serv Rev.* 2011;33(1):1-15.
- Schneiderman JU, Smith C, Palinkas LA. The Caregiver as Gatekeeper for Accessing Health Care for Children in Foster Care: A Qualitative Study of Kinship and Unrelated Caregivers. *Child Youth Serv Rev.* 2012;34(10):2123-30. doi: 10.1016/j.chilcyouth.2012.07.009 pmid: 23139436
- Bayat M, Nazari-Jeyrani M, Shahsavari A, Miri M, Naderifar M. Frequency of Physical Problem among 7-11 Years Old Children in Foster Care Center. *Iran J Nurs.* 2010;23(63):8-17.
- Brown K. Foster care: State practices for assessing health needs, facilitating service delivery, and monitoring childrens care. USA: DIANE Publishing; 2009. 9-26 p.
- Rajmil L, Palacio-Vieira JA, Herdman M, Lopez-Aguila S, Villalonga-Olives E, Valderas JM, et al. Effect on health-related quality of life of changes in mental health in children and adolescents. *Health Qual Life Outcomes.* 2009;7:103. doi: 10.1186/1477-7525-7-103 pmid: 20030835
- Damnjanovic M, Lakic A, Stevanovic D, Jovanovic A, Jancic J, Jovanovic M, et al. Self-assessment of the quality of life of children and adolescents in the child welfare system of Serbia. *Vojnosanit Pregl.* 2012;69(6):469-74. pmid: 22779290
- Jozefiak T, Sonnichsen Kayed N. Self- and proxy reports of quality of life among adolescents living in residential youth care compared to adolescents in the general population and mental health services. *Health Qual Life Outcomes.* 2015;13(1):104. doi: 10.1186/s12955-015-0280-y pmid: 26197764
- Carbone JA, Sawyer MG, Searle AK, Robinson PJ. The health-related quality of life of children and adolescents in home-based foster care. *Qual Life Res.* 2007;16(7):1157-66. doi: 10.1007/s11136-007-9227-z pmid: 17616839
- Van Damme-Ostapowicz K, Krajewska-Kulak E, Wronska I, Szczepanski M, Kulak W, Lukaszuk C, et al. Quality of life self-assessment of children living in a children's home, based on own research conducted in the Podlaskie Province. *Adv Med Sci.* 2007;52 Suppl 1(Suppl 1):44-50. pmid: 18229631
- Nelson TD, Kidwell KM, Hoffman S, Trout AL, Epstein MH, Thompson RW. Health-related quality of life among adolescents in residential care: description and correlates. *Am J Orthopsychiatry.* 2014;84(3):226-33. doi: 10.1037/h0099812 pmid: 24827017
- Courtney M E. Describing the problem: Outcomes for older youth exiting the foster care system in the U.S. In: Kerman B, Maluccio AB, Freundlich MM, Editors. *Achieving permanence for older children and youth in foster care.* New York: Columbia University; 2009.
- Phuphaibul R, Thanooruk R, Leucha Y, Sirapo N, Kanobdee C. The impact of immune of life for teen's module application on the coping behaviors and mental health of early adolescents. *J Pediatr Nurs.* 2005;20(6):461-8.
- Wilson IB, Cleary PD. Linking clinical variables with health-related quality of life. A conceptual model of patient outcomes. *JAMA.* 1995;273(1):59-65. pmid: 7996652
- Sawatzky R. The measurement of quality of life and its relationship with perceived health status in adolescents. USA: University of British Columbia; 2007.
- Najafi Dolatabad S, Noureyan K, Najafi Dolatabad A, Mohebbi Z. The effect of Yoga techniques on quality of life among women with Multiple Sclerosis. *Med J Hormozgan Univ.* 2012;16(2):143-50.
- Brands MM, Purperhart H, Deckers-Kocken JM. A pilot study of yoga treatment in children with functional abdominal pain and irritable bowel syndrome. *Complement Ther Med.* 2011;19(3):109-14. doi: 10.1016/j.ctim.2011.05.004 pmid: 21641514
- Yurtkuran M, Alp A, Yurtkuran M, Dilek K. A modified yoga-based exercise program in hemodialysis patients: a randomized controlled study. *Complement Ther Med.* 2007;15(3):164-71. doi: 10.1016/j.ctim.2006.06.008 pmid: 17709061
- Smith C, Hancock H, Blake-Mortimer J, Eckert K. A randomised comparative trial of yoga and relaxation to reduce stress and anxiety. *Complement Ther Med.* 2007;15(2):77-83. doi: 10.1016/j.ctim.2006.05.001 pmid: 17544857
- Kaplan LJ. *The Experience of Yoga on Children with Anxiety.* Minneapolis, Minnesota, United States: St. Catherine University, 2013.
- Geyer R, Lyons A, Amazeen L, Alishio L, Cooks L. Feasibility study: the effect of therapeutic yoga on quality of life in children hospitalized with cancer. *Pediatr Phys Ther.* 2011;23(4):375-9. doi: 10.1097/PEP.0b013e318235628c pmid: 22090079
- Telles S, Singh N, Bhardwaj AK, Kumar A, Balkrishna A. Effect of yoga or physical exercise on physical, cognitive and emotional measures in children: a randomized controlled trial. *Child Adolesc Psychiatry Ment Health.* 2013;7(1):37. doi: 10.1186/1753-2000-7-37 pmid: 24199742
- Beheshtipoor N, Bagheri S, Hashemi F, Zare N, Karimi M. The effect of yoga on the quality of life in the children and adolescents with haemophilia. *Int J Commun Based Nurs Midwifery.* 2015;3(2):150.
- Galantino ML, Galbavy R, Quinn L. Therapeutic effects of yoga for children: a systematic review of the literature. *Pediatr Phys Ther.* 2008;20(1):66-80. doi: 10.1097/PEP.0b013e31815f1208 pmid: 18300936
- Birdee GS, Yeh GY, Wayne PM, Phillips RS, Davis RB, Gardiner P. Clinical applications of yoga for the pediatric population: a systematic review. *Acad Pediatr.* 2009;9(4):212-20 e1-9. doi: 10.1016/j.acap.2009.04.002 pmid: 19608122
- Robitail S, Ravens-Sieberer U, Simeoni MC, Rajmil L, Bruil J, Power M, et al. Testing the structural and cross-cultural validity of the KIDSCREEN-27 quality of life questionnaire. *Qual Life Res.* 2007;16(8):1335-45. doi: 10.1007/s11136-007-9241-1 pmid: 17668291
- Group. TK. Translation and validation procedure guidelines and documentation Berlin: The KIDSCREEN Group.; 204 [cited 2011]. Available from: [www.kidscreen.org](http://www.kidscreen.org).

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Study design: Elahe lal kheirkhah and Manijeh Nourian; Statistical analysis of data: Elahe lal kheirkhah and Farzane Ahmadi, revision of the Manuscript: Manijeh Nourian and Kiarash

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28. Ravens-Sieberer U, Herdman M, Devine J, Otto C, Bullinger M, Rose M, et al. The European KIDSCREEN approach to measure quality of life and well-being in children: development, current application, and future advances. *Qual Life Res.* 2014;23(3):791-803. doi: [10.1007/s11136-013-0428-3](https://doi.org/10.1007/s11136-013-0428-3) pmid: 23686556
29. Rajmil L, Palacio-Vieira JA, Herdman M, Lopez-Aguila S, Villalonga-Olives E, Valderas JM, et al. Effect on health-related quality of life of changes in mental health in children and adolescents. *Health Qual Life Outcomes.* 2009;7(1):103. doi: [10.1186/1477-7525-7-103](https://doi.org/10.1186/1477-7525-7-103) pmid: 20030835
30. Nik-Azin A, Nainian M, Shairi M. Validity and Reliability of Health Related Quality of Life Questionnaire "KIDSCREEN-27" in a Sample of Iranian Students. *Iranian J Psychiat Clin Psychol.* 2013;18(4):310-21.
31. Urzúa A, Cortés E, Vega S, Prieto L, Tapia K. Propiedades psicométricas del cuestionario de auto reporte de la calidad de vida KIDSCREEN-27 en adolescentes chilenos; Psychometric properties of the quality of life questionnaire KIDSCREEN-27 adapted to Chilean adolescents. *Ter Psicol.* 2009;27(1):83-92.
32. Javadian Sarraf N, Imami T. The effects of aerobic and Yoga training modes on physical self-description components of female university students. *J Ment Health.* 2008;10(39):221-30. doi: [10.22038/jfmh.2008.1695](https://doi.org/10.22038/jfmh.2008.1695)
33. McNamara C, Johnson M, Read L, Vander Velden H, Thygeson M, Liu M, et al. Yoga Therapy in Children with Cystic Fibrosis Decreases Immediate Anxiety and Joint Pain. *Evid Based Complement Alternat Med.* 2016;2016:9429504. doi: [10.1155/2016/9429504](https://doi.org/10.1155/2016/9429504) pmid: 28077950
34. Doyle JJ. Causal effects of foster care: An instrumental-variables approach. *Childr Youth Serv Rev.* 2013;35(7):1143-51. doi: [10.1016/j.childyouth.2011.03.014](https://doi.org/10.1016/j.childyouth.2011.03.014)
35. Warburton WP, Warburton RN, Sweetman A, Hertzman C. The Impact of Placing Adolescent Males into Foster Care on Education, Income Assistance, and Convictions. *Can J Econom Revue.* 2014;47(1):35-69. doi: [10.1111/caje.12064](https://doi.org/10.1111/caje.12064)
36. Hartmann T, Zahner L, Puhse U, Puder JJ, Kriemler S. Effects of a school-based physical activity program on physical and psychosocial quality of life in elementary school children: a cluster-randomized trial. *Pediatr Exerc Sci.* 2010;22(4):511-22. pmid: 21242601
37. Govindaraj R, Karmani S, Varambally S, Gangadhar BN. Yoga and physical exercise - a review and comparison. *Int Rev Psychiatry.* 2016;28(3):242-53. doi: [10.3109/09540261.2016.1160878](https://doi.org/10.3109/09540261.2016.1160878) pmid: 27044898
38. Culver K. Evaluation of an Eight-week Yoga Program for Children Living in Orphanages in Haiti: A Preliminary Study of Child Mental Health. North Carolina, USA: Duke university; 2014.
39. Molazadeh A. Derelict and mal-parented children and the method of personnel's performance towards them. *Peyvand Educ Train Monthly.* 2013(285-286-287):74-85.
40. Fayaz A, Kiani Z. Survey of mental health of teenagers in Shahid Dastgheib and Namazi Residential Care Centers in Shiraz. *Psychol Except Individ.* 2011;1(2):19-48.
41. Bruce J, Fisher PA, Pears KC, Levine S. Morning cortisol Levels in preschool-aged foster children: differential effects of maltreatment type. *Dev Psychobiol.* 2009;51(1):14-23. doi: [10.1002/dev.20333](https://doi.org/10.1002/dev.20333) pmid: 18720365
42. Healey CV, Fisher PA. Children in Foster Care and the Development of Favorable Outcomes. *Child Youth Serv Rev.* 2011;33(10):1822-30. doi: [10.1016/j.childyouth.2011.05.007](https://doi.org/10.1016/j.childyouth.2011.05.007) pmid: 21987598
43. Moeenifar HA, Janfada N. Effects of yoga exercises on individuals' familial relations (A case study: Sports clubs in Yazd). *J Sport Manage.* 2012;4(13):81-97.
44. Soleimanifard S. Comparison of rate of social skills in derelict youths living in residential care centers to those living with case replacement families in Tehran. Tehran, Iran: University of Well-being and Rehabilitative Sciences; 2010.
45. Qanbari Hashemabadi BA, Saadat M. An investigation of the effects of rhythmic yoga exercises on social interactions of mentally deficient boys at the primary schools of Sangam in Khaf, Iran. *J Soc Psychol Stud.* 2010;11(1):171-88. doi: [10.22067/fe.v11i1.1075](https://doi.org/10.22067/fe.v11i1.1075)
46. Petrenko CH, Culhane SE, Garrido EF, Tausig HN. Do youth in out-of-home care receive recommended mental health and educational services following screening evaluations? *Child Youth Serv Rev.* 2011;33:1911-8.
47. Javadian Sarraf N, Imami T. Comparison of the effect of number of aerobic and yoga training modes on physical self-description components of Female students. *J Dev Motor Learn.* 2009;2:127-45.
48. Ferrara P, Romani L, Bottaro G, Ianniello F, Fabrizio GC, Chiaretti A, et al. The physical and mental health of children in foster care. *Iran J Public Health.* 2013;42(4):368-73. pmid: 23785675
49. Parshad O. Role of yoga in stress management. *West Indian Med J.* 2004;53(3):191-4. pmid: 15352751
50. Yaghmaei F, Aminzadeh S, Alavi-Majd H, Rasouli M, Nourian M. Translation and study of psychometric features of the questionnaire "Kindel's Health-related Quality of Life in Children. *Payesh J.* 2012;11(6):841-7
51. Sargent K, Brien K. The emotional and behavioral difficulties of looked after children. *Adopt Foster.* 2004;28:31-7.
52. Brown JLC, Eubanks C, Keating A. Yoga, quality of life, anxiety, and trauma in low-income adults with mental illness: A mixed-methods study. *Soc Work Ment Health.* 2017;15(3):308-30. doi: [10.1080/15332985.2016.1220441](https://doi.org/10.1080/15332985.2016.1220441)