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and Their Children in Cambodia**

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Mental Health and Functioning in School Age Children of Female Entertainment Workers in Cambodia

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Abstract: Globally, approximately 10% - 20% of children and adolescents experience mental health problems and the majority of them are living in low- and middle-income countries. Children of female sex workers are often exposed to unsafe environments, traumatic experiences and a mentally ill parent, putting them at risk for developing mental health problems themselves. Research on the mental health and functioning of children of female sex workers during their school age is limited. This paper will explore the mental health and functioning of female sex workers' children. **Method:** The study included 160 female entertainment workers (FEWs) and 60 of their children from four provinces of Cambodia. FEW's mental health, and children's mental health and functioning were measured. **Result:** FEWs demonstrated high rates of depression (67%) and anxiety (61%), and 54.38% reported symptoms of post-traumatic stress disorder. Of the 60 children, the majority got their education at primary school (68%) and secondary school (25%). 46.7% of them reported symptoms of functional impairment, 18.33% suffered from psychological distress, and 36.67% have PTSD symptoms above the clinical threshold. Children's psychological distress was significantly predicted by mothers' early childhood traumatic experiences, mothers' current mental health problems, mothers' anxiety and PTSD. Mother's PTSD predicted children's psychological distress [$\beta = 0.282$, $R^2 = 0.079$] and functioning [$\beta = 0.285$, $R^2 = 0.081$]. **Conclusion:** **School age** children of FEWs have high rates of depression, anxiety and PTSD. Children's psychological problems impair their functioning at school and home. FEW's PTSD predicts their children's psychological distress and functioning. Further research on the mental health and functioning of FEW's children should be continued with a larger sample size. Mental health professionals and educators should provide mental health care for FEWs and their children, and develop evidence-based approaches to improving children's mental health and functioning.

Keywords: Children of Female Entertainment Worker, child mental health, functioning.

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1. Background

Globally, approximately 10% - 20% of children and adolescents experience mental health problems and the majority of them are living in low- and middle-income countries [1]. Emotional abuse has been reported in 20% of boys and 25% of girls. Sexual abuse has been reported in 5.6% of boys and 4.4% of girls.” [2]. Comparing to children who were not physically abused, abused children reported significantly more symptoms of mental health problems and suicidal thoughts [2]. Children of female sex workers are often exposed to unsafe environments, traumatic experiences and a mentally ill parent, putting them at risk for developing mental health problems themselves. Studies of this vulnerable group have found that more than 50 percent of both boys and girls have been victims of physical abuse at least one time before age 18 [2].

Sex work has been a public health concern in many countries in the world. HIV/AIDS transmission has been detected among injection drug users including women who work in the sex business [3]. Mental health problems have been addressed in many studies among entertainment workers. Rossler and colleagues in Zurich found that women sex workers have about a 63% lifetime prevalence of all types of mental illnesses [4]. An early study in Israel found psychosocial problems were very common among this population. Seventeen percent of respondents met criteria of posttraumatic stress disorder (PTSD) symptoms and 19% reported symptoms of depression [5]. In a study of 278 sex workers in Guangxi, China, 62% reported symptoms of severe depression. Depression severity was strongly correlated with riskier sexual behaviors in this study [6]. Mood disorders, anxiety disorders and substance abuse have also been found among female sex workers in Bangladesh [7].

2. Literature Review

2.1. Child mental health in Cambodia

Research indicates that many children in Cambodia have experienced abuse or exposure to violence. A study of adolescents in Battambang province found that 27.9% of male students and 21.5% of female students reported at least one incidence of physical abuse at home. Sexual abuse is common among children working as entertainment workers and garment factory workers [8] with 4.4% among female and 5.6% among male youth prevalence [9]. Witnessing community and family violence among female students was positively correlated with depressive symptoms [10]. Among girls, older age, lacking of daily food and having parents who have separated or passed away are risk factors for depression symptoms [11]. Adolescents 15 to 17 years old report exposure to domestic violence and neglect which are associated with risk of suicide among the population. Jegannathan and colleagues found depressed adolescents more often had suicidal plan which boys have been reported more time than girls. However, girl teens have been reported with more attempt suicide than their counterpart [12]. Tobacco, alcohol, and illicit drug abuse have also been found among

Cambodian adolescent during their school age in the last three-month period. From a study sample of 1943 students in eleven schools in Battambang the researchers found that there were 9.9% of them smoked, 47.4% have at least drunk a full glass of alcohol, and 2.6% abused illicit drug [13].

2.2. Mental health of female entertainment workers in Cambodia

Commercial sex workers have been defined as a vulnerable group [14]. Recently, Cambodian government institutes, non-governmental organizations and private sectors came to a consensus that Cambodian females working for the purpose of exchanging sex for money, goods, drugs and services are referred to as “entertainment workers” [15]. The term female entertainment workers (FEW) will be used throughout this article.

A recent study of FEWs in two of the biggest cities of Cambodia, Phnom Penh and Siem Reap, found a need for mental health treatment among workers in the entertainment sector. Of 657 entertainment workers in the identified hotspots (the venues where entertainment workers can be reached) in the study 43.2% are having general mental health distress. FEWs in this study report emotional and physical abuse in early childhood; 25.3% of respondents reported verbal abuse by family members and 26% reported physical abuse requiring medical care. Furthermore, self-reports of suicidal ideation (19.5%) and attempted suicide (7.3%) were found in this sample [16]. One small study examined rates and experiences of parenthood among FEWs in Cambodia (n=16). Among the interviewed FEWs all had children ranging from one to three years old. Although the children were not living with them, the mothers had a duty to provide regular financial support and pay regular visits every year to their children who were mostly living with grandparents. The study found that the mother-child relationship was not strong, likely due to the mother only visiting her children one or two times a year [17].

This study attempts to improve understanding of the mental health and functioning of FEWs and their children, and the inter-relationships among them.

3. Methods

This correlational study recruited FEWs and their children from four different provinces/cities in Cambodia, including Battambang, Siem Reap, Phnom Penh and Sihanouk Ville. In consideration of the challenges related to accessing and studying this population, a convenience sampling technique was used to maximize sample size.

There were forty FEWs randomly selected from each of the four identified sites for a total of 160 FEW participants. Inclusion criteria to recruit these particular study participants were: (1) Cambodian who can speak Khmer language appropriately, (2) biological female at least 24 years old, (3) having at least one child, (4) able to give voluntarily consent prior to the interview, and (5) has been working in the field of sex work for at least the last 3 months.

There were fifteen children of FEWs recruited from each of the site resulting in a total of 60 children in the study. Inclusion criteria for the children included: (1) age from 7 to 18 years old, (2) children of FEWs in the selected areas, (3) able to give voluntary assent to participant and consent for the child to participate in the study obtained from his/her mother, and (4) being in touch with mother on a regular basis, at least once a month, regardless of living close or far from their mother. This final criteria was included due to prior research indicating that many of the children of the FEWs do not live with their mothers (citation).

3.1. Measures for female entertainment workers

Questionnaires assessed participants' demographic information, self-reported mental health and the relationship between FEW mothers' and their children. Interviews were conducted with time sensitivity and with wording that was easily understood by the participants.

Measures used to assess the mother's mental health include the following: Patient Health Questionnaire (PHQ)-9 is used to assess symptom severity related to depression which was originated from the full version of the PHQ and was recommended to use in primary care setting with excellent internal reliability demonstrated by a Cronbach alpha of .89 [18]. All the items in the PHQ-9 rate symptoms in the last two weeks. The PHQ-9 has been translated into many languages, including Asian languages such as Japanese, Korean, Chinese, Malay, Thai, and Vietnamese [19]. In the current study, the PHQ-9 had a Cronbach alpha value of .868 which demonstrates excellent measurement reliability.

The Generalized Anxiety Disorder (GAD)-7 was used to assess symptom severity related to anxiety. GAD-7 is a screening tool which can be used within both clinical practice and research as it has good validity and efficiency properties [20]. Each of the items can be given a score of "0", "1", "2", or "3" which can be translated as "No/Minimal", "Mild", "Moderate", and "Severe" anxiety symptoms respectively [20]. GAD-7 internal consistency was strong with the alpha value of .87 among the HIV population in Zimbabwe [21]. The Cronbach alpha value in the current study is .847. This shows strong internal reliability and consistency of the administered measure to the respondents.

Post-traumatic stress disorder was assessed using PTSD Checklist (PCL)-5. The results from a validation study of the measure showed that PCL-5 has strong internal consistency, and good convergent, discriminant and structural validity [22]. A total score of more than 33 is considered to indicate clinically significant PTSD symptoms. [23]. The PCL-5 has been adapted for use in a variety of countries including Germany, Turkey and China. The Cronbach alpha value for the present study is very good with the alpha value of .946.

The ACE questionnaire was used to learn about the FEWs' traumatic experiences prior to age 18. The dichotomized 10-item self-report questionnaire has been widely used across different settings, nations and cultures to access three main areas of adverse experience in childhood; abuse (physical, emotional and sexual), neglect (physical and

emotional) and household dysfunction (violence, divorce/separation, substance misuse and incarceration). The total score can be obtained by summing up all the item scores [24]. A study among groups of women in community and clinical settings showed that the ACE questionnaire has a strong internal consistency with Cronbach alpha of .88 [25]. Another study done by Wingenfeld and colleagues also confirmed a strong reliability and consistency among the three different type of samples from the clinical setting [26]. In this study, the ACE items are groups into three different outcomes for further analysis. A group with “0” ACE score, another group with “0-3” ACE score and the last group with “ ≥ 4 ” ACE score. The value of the Cronbach’s alpha in the current study is .784 demonstrating adequate reliability.

3.2. Measures for children of female entertainment workers

The Khmer Children Functional Impairment Scale (K-CFIS) is used to assess the functioning of the children of the FEWs. The K-CFIS consists of three different categories of children’s daily functioning, including self-care, academics and family relations. Having a total score of “8” or above indicates that the respondent has functional impairment [27]. K-CFIS was validated among Cambodian school children from grades 4 to 9. From the reliability and validity analysis, the authors concluded that the K-CFIS is a suitable instrument to be used to assess the functional impairment of Cambodian children [27]. The Cronbach’s alpha value in this study shows excellent internal reliability of the measure with the $\alpha = .850$.

The Strength and Difficulties Questionnaire (SDQ) was used to assess the psychological distress of the FEW’s children. The SDQ consists of 25 items with five subscales of Emotional, Conduct, Hyperactivity/Inattention, Peer relationship problems and Prosocial behavior [28]. A large validation study in 2001 found the SDQ to have satisfactory reliability and validity and was deemed suitable for screening and clinical assessment purposes [29]. The SDQ has been used in more than forty countries including countries with a low- and middle-income economy. Across the world including Asia, the SDQ demonstrates valid psychometric properties [30]. In Cambodia, the SDQ has been adapted into Khmer (official language of Cambodia) by Dr. Bhoomikumar Jagannathan [31]. The value of the Cronbach’s alpha for the Total Difficulties scale in this study is .825.

Screening for posttraumatic symptoms was measured using the Child PTSD Symptom [32]. In a recent validation study by Foa and colleagues the CPSS demonstrated excellent internal consistency, good to excellent test-retest reliability and good convergent validity among children aged 8 to 18 years [33]. Item 18 which asks about prayers was removed for the present study as it is not appropriate to the Buddhist-Cambodian cultural context. Studies across the US have found the CPSS to have strong validity and reliability [34]. The Cronbach’s alpha in the current study is $\alpha = .933$.

3.3. Study procedure

All participants were identified and contacted to participate in the study through the large local NGO, Cambodian Women for Peace and Development. Three research assistants were recruited from the NGO branch office of each data collection site. Research assistants were trained on data collection, ethical principles in research and how to psychologically support and refer any participant with serious emotional problems for further support. An emotional support team was established at each site which included two Master's degree level psychologists. Participant interviews took place at each NGO site in a room with privacy. After the interview, each participant was given a small stipend to cover transportation and time spent on the interview which equivalent to 5 USD. Children were given a small kit with study materials which worth about 2 USD. The collected data was sent to Phnom Penh office which is located in the Royal University of Phnom Penh campus and kept confidential in a locked room. Data analysis included descriptive, correlational and regression analysis.

3.4. Ethical review

The present study was approved by the internal review board of Vietnam National University (VNU). At the local committee level, the study protocol was approved by the National Ethical Committee for Health Research in Cambodia with a reference number 054NECHR.

4. Results

4.1. Descriptive findings

The age range of FEW respondents was from 23 to 52 years old with a Mean age of 33.02 (SD = 4.89). The majority of participants were divorced or separated (n=71 or 44%). Thirty-two participants (20%) were married, 32 lived with a partner, and 25 FEWs were widowed. The majority of the FEW participants finished primary school (n=94 or 59%). Another 18% (n=28) completed secondary school and 4% (n=7) completed high school. Notably, 19% of participants never went to school at all (n=31). About a quarter of respondents (n=38 or 23.75%) reported working 3 to 5 years in the entertainment field; 31 (19.38%) reported working 5 to 8 years; 21 reported working 8 to 10 years; and 10 women stated they have worked more than 10 years (Table 1).

FEW's reported high rates of symptoms of depression (67%) anxiety (61%), and post-traumatic stress disorder (54.38%). Almost half of the total participants (n=76, or 47.5%) reported experiencing 4 or more adverse childhood experiences. 68 (42.5%) had an ACE score ranging from 1-3. Only 16 (10%) participants reported having never experienced adversity during childhood (Table 1).

Table 1. Descriptive Statistic of FEWs

Total N = 160			
n	%	Mean	SD

Demographic Information		
<i>Age</i>		33.02 4.89
<i>Marital Status</i>		
Married	32	20.00
Stay together	32	20.00
Divorced	61	38.00
Separated	10	6.00
Widower	25	16.00
<i>Education</i>		
Never go to school	31	19.00
Primary school	94	59.00
Secondary school	28	18.00
High school	7	4.00
<i>Years Working in FEW</i>		
1 - 12 months	17	12.64
>12 - 36 months	43	26.88
>3 - 5 years	38	23.75
>5 - 8 years	31	19.38
>8 - 10 years	21	13.13
>10 years	10	6.25
Mental Health Severity		
Depression	107	67.00
Anxiety	97	61.00
PTSD*	87	54.38
Adverse Childhood Experience		
ACE* score = 0	16	10.00
ACE score = 1-3	68	42.50
ACE score \geq 4	76	47.50

* SD = Standard Deviation, PTSD = Post-traumatic Stress Disorder, ACE = Adverse Childhood Experiences.

Children of FEWs. Sixty FEW's children (31 girls and 29 boys) participated in the study with ages ranging from 7 to 18 years (M = 10.55, SD = 2.64). Of the 60 respondents, majority 70% (n=41) of them have studied at the primary school while one-fourth others (n=15) have studied at the secondary school. Only one of them have studied at the high school level but noticeably 3 of them reported were not able to go to school at all. The children who participated reported high levels of mental health symptoms (Table 2). Reported Total Child Psychological distress of the total children is 11, emotional problems

is 10, conduct problems is 10, hyperactivity is 7 and peer relationship problems is 8 but 15 of them responded to pro-social behavior scale items.

Analyses showed that about one-third (n=22, or 36.67%) of participating children reported symptoms meeting criteria for PTSD. Further analysis of gender differences for the PTSD measure can be seen in Table 2. Mean scores among boys and girls show no gender differences (boys' Mean = 11.28, SD = 10.54 Vs. girls' Mean = 10.67, SD = 10.17) indicating that boys and girls experience similar rates of PTSD in this sample.

Almost half of the children (46.7%) meet criteria for impaired daily functioning. Further analysis shows that boys have a higher mean score than girls indicating that boys report more problems in their daily functioning more than girls (boys' Mean = 9.03, SD = 6.76 Vs. girls' Mean = 7.42, SD = 6.20) (Table 2).

Table 2. Descriptive Statistic of FEWs' Children

Total N = 60				
	n	%	Mean	SD
Demographic Information				
<i>Age</i>			10.55	2.64
<i>Gender</i>				
Male	29	48.33		
Female	31	51.67		
<i>Education</i>				
Never go to school	3	5.00		
Primary school	41	68.33		
Secondary school	15	25.00		
High school	1	1.67		
Mental Health Status				
<i>Strength & Difficulties</i>				
Total psychological distress	11	18.33		
Emotional problems	10	16.67		
Conduct problems	10	16.67		
Hyperactivity	7	11.67		
Peer relationships problems	8	13.33		
Prosocial Behavior	15	25.00		
<i>PTSD & PTSD by Gender</i>				
Total Above Clinical Threshold	22	36.67		
Total Below Clinical Threshold	38	63.33		

Boys Above Clinical Threshold	11	18.33	11.28	10.54
Girls Above Clinical Threshold	11	18.33	10.67	10.17
Functional Impairment				
Yes	28	46.70		
No	32	53.30		
Boys with functional impairment	29	48.33	9.03	6.76
Girls with functional impairment	31	51.67	7.42	6.20

* SD = Standard Deviation, PTSD = Post-traumatic Stress Disorder

4.2. Correlation and regression findings

In this section the relationship between the children's functioning and their mother's mental health problems and another relationship between the children's functional impairment and their mother's functional impairment have been analyzed. Correlational analyses demonstrate that children's level of functional impairment (K-CFIS) is significantly, positively related with mother's depression and PTSD symptoms; p value of 0.001 and 0.027 ($p < .05$). This findings indicates that the children's functional impairment increases as mother's depression and PTSD symptoms increase. The relationship between the child functioning and mother functioning is not statistically significant indicating that children's functioning is not related to mother's functioning (Table 3).

The simple linear regression analysis revealed the FEWs' PTSD significantly predicted the functioning of their children with $p = .008$. The positive beta value (.28) from the analysis indicates positive relationship between the mother's PTSD and the children's functioning. The value of $R^2(.081)$, for the mother's PTSD accounts of 8.1% of the variance in the children's functioning. Mother's PTSD significantly predicts the children's psychological distress with $p = .000$ ($p < .001$). The positive beta value (.28) from the analysis shows positive relationship between the mother's PTSD and the children psychological distress. The value of $R^2(.079)$, for the mother's PTSD accounts of 7.9% of the variance in the children's psychological distress.

Table 3. Correlational Analysis Between Children's Functioning and Mother's Mental Health and Functioning

	1	2	3	4	5	6
Children's Functioning on K-CFIS	---					
Mother's Depression Score	.406**	---				
Mother's Anxiety Score	.249	.677**	---			

Mother's PTSD* Score	.285*	.787**	.692**	---		
Mother's ACE* Score	.168	.435**	.483**	.518**	---	
Mother's Functioning on SF-12	-.064	-.436**	-.250	-.346**	-.099	---

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

* PTSD = Post-traumatic Stress Disorder, ACE = Adverse Childhood Experiences

The Enter method from the regression analysis revealed both anxiety and PTSD of the FEWs significantly predicted the conflict relationship with their children. Having a closer look at the beta value, anxiety of FEWs ($b = .314$) provide a slightly stronger prediction on the outcome variable more than the PTSD of FEWs ($b = .305$). The further analysis indicates anxiety of the FEWs significantly and stronger predicted the conflict relationship with their children with $p = 0.000$ ($p < .001$). The positive beta value (.314) from the analysis suggests positive relationship between the mother's anxiety and the conflict relationship with children. The value of R^2 (.325), for the mother's anxiety accounts of 32.5% of the variance in the children conflict relationship (see Table 4).

Table 4. Result of multiple linear regression analyses predicting children's functioning & mental health

	Children of FEWs (n=60)			
	β	S.E	p-Value	R2
Children's Functioning				0.081
Mother's PTSD	0.285	1.726	0.008	
Children's Psychological Distress				0.079
Mother's PTSD	0.282	1.343	<0.001	
Children's Relationship-Conflict				0.325
Mother's Anxiety	0.314	0.251	0.042	
Mother's PTSD	0.305	0.059	0.048	

5. Discussion

Study findings improve knowledge regarding the mental health of FEWs, their children and the relationship they have with their children. Female entertainment workers in the current study report high levels of mental health problems, indicating that 67% of the women experience severe levels of depression, 61% report severe anxiety, and 54% have severe levels of PTSD symptoms. These rates are significantly higher than the general Cambodian population and are higher than found in previous studies of FEWs. A recent study of the general Cambodian population found the prevalence of depression to be 27.4% [35], much lower than the 67% found in the current study. A study of female street workers in Miami, USA found the prevalence of depression to be 53% [36], still much lower than found in the current study where rates are more comparable to a clinical sample found in China which found 72% prevalence of depression [37].

The current study's finding of anxiety level of 61% among FEWs is much higher than found (a) among the Cambodian general population (16.7%, [35]) (b) among sex worker samples in Miami (37.4%; [36]) and (c) compared to sex worker in India (42%; [38]). This is likely due to high levels of risk and stress associated with Cambodian FEWs' lives. Interviews with FEWs in the current study indicate that debt and responsibility to family expenses are important sources of stress in their lives. Cambodian FEWs are often victims of physical and sexual violence [39] and are at high-risk of abuse from husbands/partners, customers, entertainment owners and sometimes police officers [40]. They have also experienced high rates of early childhood stress and trauma as indicated by In the current study, FEWs reported high rates of early childhood exposure to traumatic and adverse events, with 47.5% of the FEWs reporting 4 or more traumatic events in childhood. These factors contribute to the development of generalized anxiety symptoms as well as post-traumatic stress disorder (PTSD). The current study finds higher rates of clinically concerning PTSD symptoms in 54.4% of FEWs. This is far higher than that found within the Cambodian general population (7.6%; [35]). However, in a study of FEWs in Miami, the US, Surratt and colleagues report 69.2% of stress based sex worker for symptoms related to acute traumatic stress (69.2%). And it is comparable to findings from a study of street-based sex workers in Australia which found clinically concerning PTSD symptoms in 47% of their sample [41].

In the current study, half of the FEWs' children (46.7%) have functional impairment and with boys reporting higher levels of impairment than girls. This is much higher than the 20% rate of functional impairment found in a community sample of children in Vietnam [42]. One possible explanation for this difference may be different measures used across the two studies. Dang and colleagues used a standardized measure known as the Brief Impairment Scale (BIS) while the current study used the Khmer-Functional Impairment Scale, a measure previously validated in Cambodian context. Furthermore, the sample size in Dang's study was much larger and can be represent the total population of the children in Vietnam while there are only 60 children participants in the current study.

In the current study, FEWs' PTSD symptoms statistically predict their children's functioning and produces positive beta value (.28) indicating that high levels of FEWs' PTSD are associated with high levels of functionally impaired symptoms in the children. The current finding is consistent with previous studies. In their final conclusion, McFarlane

and colleagues addressed that mother with certain psychiatric disorders such as depression and PTSD contribute to worsen their children behavioral functioning [43]. Another finding from Levendosky and colleagues indicated that the functioning of the children impaired by their mother's mental health problems especially those who were suffered from depressive and traumatic symptoms [44].

6. Conclusion

School age children children of FEWs have high rates of PTSD and functional impairment. Children's psychological problems impair their functioning at school and home. FEW's PTSD predicts their children's psychological distress and functioning. Further research on the mental health and functioning of FEW's children should be continued with a larger sample size. Mental health professionals and educators should provide mental health care for FEWs and their children, and develop evidence-based approaches to improving children's mental health and functioning. Something about how child mental health, particularly the most vulnerable children such as those in this study, must be a public health priority. The current health and well-being of vulnerable children must be cared for if we are to insure that all children are able to achieve success in school and become physically and emotionally healthy adults.

Mental Health in Children of Female Entertainment Workers in Cambodia

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Abstract

Background: Female sex workers are at high risk for mental health problems and substances abuse. Children of female sex workers may be exposed to unsafe environments, traumatic experiences and a parent with a mental illness, putting children at risk for developing mental health problems themselves. Research on the mental health of children of female sex workers is limited. This paper will explore the mental health of female sex workers' children, including factors impacting their mental health. **Method:** The study selected 160 female entertainment workers (FEWs) and 60 of their children from four provinces of Cambodia. FEW's mental health, mother-children relationship and children's mental health were measured. **Result:** FEW's demonstrated high rates of depression (67%) and anxiety (61%) and 54.38% reported symptoms meeting criteria for Post-traumatic Stress Disorder. Of 60 children, 46.7% reported symptoms of functional impairment, 18.33% with psychological distress, and 36.67% have clinically PTSD symptoms. Early childhood traumatic experiences and current mental health problems of the FEWs, FEWs' anxiety and PTSD and their children's psychological distress were found having statistically significant relationship. Mother's PTSD predicted children's psychological distress [$\beta = 0.282$, $R^2 = 0.079$] and functioning [$\beta = 0.285$, $R^2 = 0.081$] and mother's anxiety predicted child-mother conflict [$\beta = 0.314$, $R^2 = 0.325$]. **Conclusion:** Female entertainment workers experience high levels of mental health problems. Children of FEWs have high rates of PTSD. Children's psychological problems impair their functioning. FEW's PTSD predicts children's psychological distress and functioning. FEW with anxiety have more conflict relationship with their children. Further research on the mental health needs of FEW's children is needed. Mental health care for FEWs and their children and developing approaches to prevention of mental health problems in these vulnerable groups are needed.

Keywords: Children of Female Entertainment Worker, child psychological distress, mental health problems.

BACKGROUND

Working in a sex business is taking risks not only with physical health problems but also mental health problems. HIV/AIDS transmission has been detected among injection drug users including women who work in the sex business (Burack, Bangsberg, 1998). Mental health problems have been addressed in many studies among entertainment workers. Rossler and colleagues in Zurich found that women sex workers have about a 63% lifetime prevalence of all types of mental illnesses (Rossler et al., 2010). Another study in Israel found psychosocial problems were very common among this population. Seventeen percent of respondents met criteria of posttraumatic stress disorder (PTSD) symptoms and 19% reported symptoms of depression (Chudakov, Ilan, and Belmaker, 2002). Of 278 sex workers who were in a study in Guangxi, China, 62% reported symptoms of severe depression. Depression severity was strongly correlated with riskier sexual behaviors in this study (Hong, Li, Fang, and Zhao, 2007). Mood disorders, anxiety disorders and substance abuse have also been found among female sex workers in Bangladesh (Hengartner, Islam, Haker, and Rossler, 2015).

Approximately 10% - 20% of Children in low- and middle-income countries are found having experience with mental health problems (WHO, UNPF, 2005). Emotional abuse has been reported in 20% of boys and 25% of girls. Sexual abuse has been reported in 5.6% of boys and 4.4% of girls.” (UNICEF, 2014). Comparing to children who were not physically abused, abused children reported significantly more symptoms of mental health problems and suicidal thoughts (UNICEF, 2014). Children of female sex workers are often exposed to unsafe environments, traumatic experiences and a parent with mental health problem, putting them at risk for developing mental health problems themselves. Studies of this vulnerable group have found that more than 50 percent of both boys and girls have been victims of physical abuse at least one time before age 18 (UNICEF, 2014).

LITERATURE REVIEW

Mental Health of Female Entertainment Workers in Cambodia

Sex workers have been defined as one of a vulnerable group (WHO, 2010). Cambodian government institutes, non-governmental organizations and private sectors came to a consensus that Cambodian females working for the purpose of exchanging sex for money, goods, drugs and services are referred to as “entertainment workers” (NCHADS, 2013). The term female entertainment workers (FEW) will be used throughout this article.

An up-to-date study in two of the largest cities of Cambodia, Phnom Penh and Siem Reap, found a need for mental health treatment among workers in the entertainment sector. Of 657 entertainment workers in the study 43.2% are having general mental health distress. FEWs in this study report emotional and physical abuse in early childhood; 25.3% of respondents reported verbal abuse by family members and 26% reported physical abuse

requiring medical care. Furthermore, self-reports of suicidal ideation (19.5%) and attempted suicide (7.3%) were found in this sample (Brody et al., 2016).

Another study but with smaller sample size (n=16) tried to examine rates and experiences of parenthood among FEWs in Cambodia. Among the interviewed FEWs all had children ranging from one to three years old. Although the children were not living with them, the mothers had a duty to provide regular financial support and pay regular visits every year to their children who were mostly living with grandparents. Relationship between mother and their children was found not so bonding likely due to the mother only visiting her children one or two times a year (Ministry of Education, Youth and Sports, 2012).

Child Mental Health in Cambodia

Many of children in Cambodia have experienced abuse or exposure to violence. A study of adolescents in Battambang province found that 27.9% of male students and 21.5% of female students reported at least one incidence of physical abuse at home. Another form of abuse, sexual abuse, is common among children working as entertainment workers and garment factory workers (UNICEF, 2009) with 4.4% among female and 5.6% among male youth prevalence (Sumner et al, 2015). Witnessing community and family violence among female students was positively correlated with depressive symptoms (Yi et al., 2013). Among older age girls lacking of daily food and having parents who have separated or passed away are risk factors for depression symptoms (Ong et al., 2015). Adolescents 15 to 17 years old report exposure to domestic violence and neglect which are associated with risk of suicide among the population. Depressed adolescents more often had suicidal plan which boys have been reported more time than girls but girl teens have been reported with more attempt suicide than their counterpart (Jegannathan, Kullgren, 2011). Illicit drug misuse such as tobacco, alcohol, and street drug have also been found among Cambodian adolescent students in the last three-month period. Of 1943 students in eleven schools in Battambang province, the researchers found that there were 9.9% of them smoked, 47.4% have at least drunk a full glass of alcohol, and 2.6% abused illicit drug (Yi et al., 2011).

Scientific paper on the mental health of female sex workers and their children in Cambodia is not sufficient. This study attempts to improve understanding of the mental health of the children of the FEWs and possible statistically relationship between the mother's and children's mental health.

METHODOLOGY

The study recruited FEWs and their children from four provinces/cities, one in the central part, two in the northern part and another one in the southern part of Cambodia. A convenience sampling technique was used to maximize sample size.

Forty FEWs randomly selected from each of the province/city for a total of 160 FEW participants. Inclusion criteria to recruit these particular study participants were: (1)

Cambodian who can speak Khmer language appropriately, (2) biological female at least 24 years old, (3) having at least one child, (4) able to give voluntarily consent prior to the interview, and (5) has been working in the field of sex work for at least the last 3 months.

Fifteen children of FEWs were recruited from each of the province/city resulting in a total of 60 children. Inclusion criteria for the children included: (1) age from 7 to 18 years old, (2) children of FEWs in the selected areas, (3) able to give voluntary assent to participant and consent for the child to participate in the study obtained from his/her mother, and (4) being in touch with mother on a regular basis, at least once a month, regardless of living close or far from their mother. This final criteria was included due to prior research indicating that many of the children of the FEWs do not live with their mothers (Ministry of Education, Youth and Sports, 2012, Yi et al., 2011).

Measures for Female Entertainment Workers

The questionnaires were reviewed in a focus group discussion among Cambodian psychologists and psychiatrists who have been working in the field. The questionnaires assessed participants' demographic information, self-reported mental health and the relationship between FEW mothers' and their children. Interviews were conducted with time sensitivity and with wording that was easily understood by the participants.

Patient Health Questionnaire (PHQ)-9 is used to assess symptom severity related to depression which was originated from the full version of the PHQ and was recommended to use in primary care setting with excellent internal reliability demonstrated by a Cronbach alpha of .89 (Kroenke, Spitzer, Williams, 2001). Cutoff scores for the PHQ-9 have been established as 5, 10, 15 and 20 which can be translated as "Mild", "Moderate", "Moderately Severe", and "Severe" severity of respectively. The PHQ-9 has been translated into many languages, including Asian languages such as Japanese, Korean, Chinese, Malay, Thai, and Vietnamese (Julian, 2016). In the current study, the PHQ-9 had a Cronbach alpha value of .868 which demonstrates excellent measurement reliability.

Generalized Anxiety Disorder (GAD)-7 was used to assess symptom severity related to anxiety. GAD-7 is a screening tool which can be used within both clinical practice and research as it has good validity and efficiency properties (Spitzer, Kroenke, Williams, 2006). To score the GAD-7, all item scores are summed up to get a total score. Each of the items can be given a score of "0", "1", "2", or "3" which can be translated as "No/Minimal", "Mild", "Moderate", and "Severe" anxiety symptoms respectively (Spitzer et al., 2006). GAD-7 internal consistency was strong with the alpha value of .87 among the HIV population in Zimbabwe (Chibanda et al., 2016). The Cronbach alpha value in the current study is .847. This shows strong internal reliability and consistency of the administered measure to the respondents.

Post-traumatic stress disorder was assessed using PTSD Checklist (PCL)-5. The results from a validation study of the measure showed that PCL-5 has strong internal consistency, and good convergent, discriminant and structural validity (Blevins, Weathers, Davis, Witte, & Domino, 2016). PCL-5 consists of 20 items rated on a 5-point Likert scale of “Not at all”, “A little bit”, “Moderately”, “Quite a bit,” and “Extremely”. Item scores range from 0 to 4. Items are summed for a total score which ranges from 0-80. A total score of more than 33 is considered to indicate clinically significant PTSD symptoms (National Center for Post-traumatic Stress Disorder, 2015). The PCL-5 has been adapted for use in a variety of countries including Germany, Turkey and China. The Cronbach alpha value for the present study is very good with the alpha value of .946.

Adverse Childhood Experience (ACE) questionnaire was used to learn about the FEWs’ traumatic experiences prior to age 18. The dichotomized 10-item self-report questionnaire has been widely used across different settings, nations and cultures to access three main areas of adverse experience in childhood; abuse (physical, emotional and sexual), neglect (physical and emotional) and household dysfunction (violence, divorce/separation, substance misuse and incarceration). The total score can be obtained by summing up all the item scores (Felitti et al., 1998).

A study among groups of women in community and clinical settings showed that the ACE questionnaire has a strong internal consistency with Cronbach alpha of .88 (Murphy et al., 2014). Another study done by Wingenfeld and colleagues also confirmed a strong reliability and consistency among the three different type of samples from the clinical setting (Wingenfeld et al., 2001). In this study, the ACE items are groups into three different outcomes for further analysis. A group with “0” ACE score, another group with “0-3” ACE score and the last group with “ ≥ 4 ” ACE score. The value of the Cronbach’s alpha in the current study is .784 demonstrating adequate reliability.

Measures for Children of Female Entertainment Workers

The Khmer Children Functional Impairment Scale (K-CFIS) is used to assess the functioning of the children of the FEWs. The K-CFIS is a Likert scale instrument with responses options including “Not at all”, “A little bit”, “Quite a bit” and “Extremely.” The K-CFIS consists of three different categories of children’s daily functioning, including self-care, academics and family relations. Having a total score of “8” or above indicates that the respondent has functional impairment (van Domburgh et al., 2016). K-CFIS was validated among Cambodian school children from grades 4 to 9. From the reliability and validity analysis, the authors concluded that the K-CFIS is a suitable instrument to be used to assess the functional impairment of Cambodian children (van Domburgh et al., 2016). The Cronbach’s alpha value in this study shows excellent internal reliability of the measure with the $\alpha = 8.50$.

The Strength and Difficulties Questionnaire (SDQ) was used to assess the psychological distress of the FEW's children. The SDQ consists of 25 items with five subscales of Emotional, Conduct, Hyperactivity/Inattention, Peer relationship problems and Prosocial behavior (Goodman, 1997). A large validation study in 2001 found the SDQ to have satisfactory reliability and validity and was deemed suitable for screening and clinical assessment purposes (Goodman, 2001). The SDQ has been used in more than forty countries including countries with a low- and middle-income economy. Across the world including Asia, the SDQ demonstrates valid psychometric properties (Du, Kou, and Coghill, 2008). In Cambodia, the SDQ has been adapted into Khmer (official language of Cambodia) by Dr. Bhoomikumar Jagannathan ("Youthinmind, 2014"). The value of the Cronbach's alpha for the Total Difficulties scale in this study is .825.

The Child PTSD Symptom Scale (CPSS) was used to screen for posttraumatic symptoms among children (Foa, Johnson, Feeny, 2001). Foa and colleagues the CPSS demonstrated excellent internal consistency, good to excellent test-retest reliability and good convergent validity among children aged 8 to 18 years (Foa, Asnaani, Zang, Capaldi and Yeh, 2017). The CPSS has 24 items rated using a four-point Likert scale. Responses range from "Not at all" with "0" score to "5 or more times a week" with "3" score. Item 18 which asks about prayers was removed for the present study as it is not appropriate to the Buddhist-Cambodian cultural context. The CPSS has been used in research and clinical settings across various populations both in high-income and low- and middle-income countries. Studies across the US have found the CPSS to have strong validity and reliability (Gudino and Rindlaub, 2018). The Cronbach's alpha in the current study is $\alpha = .933$.

Study Procedure

Study participants were identified and contacted to participate in the study through a big and well-known local NGO which is working with Cambodian female entertainment workers. Three research assistants were recruited from the NGO provincial office of each data collection site. Research assistants were trained on data collection, ethical principles in research and how to psychologically support and refer any participant with serious emotional problems for further support. An emotional support team was established at each site which included two Master's degree level psychologists. Participant interviews took place at each NGO site in a room with privacy. After the interview, each participant was given a small stipend to cover transportation and time spent on the interview which equivalent to 5 USD. Children were given a small kit with study materials which worth about 2 USD. The collected data was sent to Phnom Penh office which is located in the Royal University of Phnom Penh campus and kept confidential in a locked room. Data analysis included descriptive, correlational and regression analysis.

Ethical Review

The present study was approved by the internal review board of Vietnam National University (VNU). At the local committee level, the study protocol was approved by the

National Ethical Committee for Health Research in Cambodia with a reference number 054NECHR.

RESULTS

1.1 Descriptive Findings

The age range of FEW respondents was from 23 to 52 years old with a Mean age of 33.02 (SD = 4.89). The majority of participants were divorced or separated (n=71 or 44%). Thirty-two participants (20%) were married, 32 lived with a partner, and 25 FEWs were widowed. The majority of the FEW participants finished primary school (n=94 or 59%). Another 18% (n=28) completed secondary school and 4% (n=7) completed high school. Notably, 19% of participants never went to school at all (n=31). About a quarter of respondents (n=38 or 23.75%) reported working 3 to 5 years in the entertainment field; 31 (19.38%) reported working 5 to 8 years; 21 reported working 8 to 10 years; and 10 women stated they have worked more than 10 years (Table 1).

FEW's reported high rates of symptoms of depression (67%) anxiety (61%), and post-traumatic stress disorder (54.38%). Almost half of the total participants (n=76, or 47.5%) reported experiencing 4 or more adverse childhood experiences. 68 (42.5%) had an ACE score ranging from 1-3. Only 16 (10%) participants reported having never experienced adversity during childhood (Table 1).

Table 1. Descriptive Statistic of FEWs

		Total N = 160		
		n	%	Mean SD
Demographic Information				
<i>Age</i>				33.02 4.89
<i>Marital Status</i>				
	Married	32	20.00	
	Stay together	32	20.00	
	Divorced	61	38.00	
	Separated	10	6.00	
	Widower	25	16.00	
<i>Education</i>				
	Never go to school	31	19.00	
	Primary school	94	59.00	
	Secondary school	28	18.00	
	High school	7	4.00	
<i>Years Working in FEW</i>				
	1 - 12 months	17	12.64	
	>12 - 36 months	43	26.88	

>3 - 5 years	38	23.75
>5 - 8 years	31	19.38
>8 - 10 years	21	13.13
>10 years	10	6.25
Mental Health Severity		
Depression	107	67.00
Anxiety	97	61.00
PTSD*	87	54.38
Adverse Childhood Experience		
ACE* score = 0	16	10.00
ACE score = 1-3	68	42.50
ACE score \geq 4	76	47.50

**SD = Standard Deviation, PTSD = Post-traumatic Stress Disorder, ACE = Adverse Childhood Experiences*

Children of FEWs. Sixty FEW's children (31 girls and 29 boys) participated in the study with ages ranging from 7 to 18 years ($M = 10.55$, $SD = 2.64$). Of the 60 respondents, majority 70% ($n=41$) of them have studied at the primary school while one-fourth others ($n=15$) have studied at the secondary school. Only one of them have studied at the high school level but noticeably 3 of them reported were not able to go to school at all. The children who participated reported high levels of mental health symptoms (Table 2). Reported Total Child Psychological distress of the total children is 11, emotional problems is 10, conduct problems is 10, hyperactivity is 7 and peer relationship problems is 8 but 15 of them responded to pro-social behavior scale items.

Analyses showed that about one-third ($n=22$, or 36.67%) of participating children reported symptoms meeting criteria for PTSD. Further analysis of gender differences for the PTSD measure can be seen in Table 2. Mean scores among boys and girls show no gender differences (boys' Mean = 11.28, $SD = 10.54$ Vs. girls' Mean = 10.67, $SD = 10.17$) indicating that boys and girls experience similar rates of PTSD in this sample.

Almost half of the children (46.7%) meet criteria for impaired daily functioning. Further analysis shows that boys have a higher mean score than girls indicating that boys report more problems in their daily functioning more than girls (boys' Mean = 9.03, $SD = 6.76$ Vs. girls' Mean = 7.42, $SD = 6.20$) (Table 2).

Table 2. Descriptive Statistic of FEWs' Children

	Total N = 60			
	n	%	Mean	SD
Demographic Information				
Age			10.55	2.64
Gender				

	Male	29	48.33		
	Female	31	51.67		
<i>Education</i>					
	Never go to school	3	5.00		
	Primary school	41	68.33		
	Secondary school	15	25.00		
	High school	1	1.67		
Mental Health Status					
<i>Strength & Difficulties</i>					
	Total psychological distress	11	18.33		
	Emotional problems	10	16.67		
	Conduct problems	10	16.67		
	Hyperactivity	7	11.67		
	Peer relationships problems	8	13.33		
	Prosocial Behavior	15	25.00		
<i>PTSD & PTSD by Gender</i>					
	Total Above Clinical Threshold	22	36.67		
	Total Below Clinical Threshold	38	63.33		
	Boys Above Clinical Threshold	11	18.33	11.28	10.54
	Girls Above Clinical Threshold	11	18.33	10.67	10.17
Functional Impairment					
	Yes	28	46.70		
	No	32	53.30		
	Boys with functional impairment	29	48.33	9.03	6.76
	Girls with functional impairment	31	51.67	7.42	6.20

**SD = Standard Deviation, PTSD = Post-traumatic Stress Disorder*

1.2 Correlation and Regression Findings

In this section the relationship between the children's mental health and their mother's mental health problems and another relationship between the children's functional impairment and their mother's functional impairment have been analyzed. The result indicates significantly positive relationship between children's psychological distress and mother's anxiety and PTSD; p value of 0.038 and 0.029 ($p < .05$). The correlational analyses also demonstrate that children's level of functional impairment (K-CFIS) is significantly, positively related with mother's depression and PTSD symptoms; p value of 0.001 and 0.027 ($p < .05$). This findings indicates that the children's functional impairment increases as mother's depression and PTSD symptoms increase. The relationship between the child functioning and mother functioning is not statistically significant indicating that children's functioning is not related to mother's functioning (Table 3).

Table 3. Correlational Analysis Between Children's Mental Health and Mother's Mental Health

	1	2	3	4	5	6	7
Children's Functioning on K-CFIS	---						
Children's Psychological Distress Score	.594**	---					
Mother's Depression Score	.406**	.253	---				
Mother's Anxiety Score	.249	.269*	.677**	---			
Mother's PTSD* Score	.285*	.282*	.787**	.692**	---		
Mother's ACE* Score	.168	.143	.435**	.483**	.518**	---	
Mother's Functioning on SF-12	-.064	-.162	-.436**	-.250	-.346**	-.099	---

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

* PTSD = Post-traumatic Stress Disorder, ACE = Adverse Childhood Experiences

The simple linear regression analysis revealed the FEWs' PTSD significantly predicted the functioning of their children with $p = .008$. The positive beta value (.28) from the analysis indicates positive relationship between the mother's PTSD and the children's functioning. The value of $R^2(.081)$, for the mother's PTSD accounts of 8.1% of the variance in the children's functioning. Mother's PTSD significantly predicts the children's psychological distress with $p = .000$ ($p < .001$). The positive beta value (.28) from the analysis shows positive relationship between the mother's PTSD and the children psychological distress. The value of $R^2(.079)$, for the mother's PTSD accounts of 7.9% of the variance in the children's psychological distress. The Enter method from the regression analysis revealed both anxiety and PTSD of the FEWs significantly predicted the conflict relationship with their children. Having a closer look at the beta value, anxiety of FEWs ($b = .314$) provide a slightly stronger prediction on the outcome variable more than the PTSD of FEWs ($b = .305$). The further analysis indicates anxiety of the FEWs significantly and stronger predicted the conflict relationship with their children with $p = 0.000$ ($p < .001$). The positive beta value (.314) from the analysis suggests positive relationship between the mother's anxiety and the conflict relationship with children. The value of $R^2(.325)$, for the mother's anxiety accounts of 32.5% of the variance in the children conflict relationship (see Table 4).

Table 4. Result of Multiple Linear Regression Analyses Predicting Children's Mental Health and Relationship with Mother

	Children of FEWs (n=60)			
	β	S.E	p-Value	R2
Children's Functioning				0.081

	Mother's PTSD	0.285	1.726	0.008	
Children's Psychological Distress					0.079
	Mother's PTSD	0.282	1.343	<0.001	
Children's Relationship-Conflict					0.325
	Mother's Anxiety	0.314	0.251	0.042	
	Mother's PTSD	0.305	0.059	0.048	

DISCUSSION

Findings from the current study improve knowledge regarding the mental health of the children and their mother, FEW, and the relationship they both have. Female entertainment workers in this study report high levels of mental health problems, indicating that 67% of the women experience severe levels of depression, 61% report severe anxiety, and 54% have severe levels of PTSD symptoms. These rates are significantly higher than the general Cambodian population and are higher than found in previous studies of FEWs. A recent study of the general Cambodian population found the prevalence of depression to be 27.4% (Seponski, Lahar, Khann, Kao and Schunert, 2018), much lower than the 67% found in the current study. A study of female street workers in Miami, USA found the prevalence of depression to be 53% (Surratt, Kurtz, Weaver, Inciardi, 2005), still much lower than found in the current study where rates are more comparable to a clinical sample found in China which found 72% prevalence of depression (Hong et al., 2007).

Anxiety level of 61% among FEWs in the current study is much higher than found (a) among the Cambodian general population (16.7%) (Seponski et al., 2018) (b) among sex worker samples in Miami (37.4%) (Surratt et al., 2005) and (c) compared to sex worker in India (42%) (Pandiyani, Chandrasekhar, Madhusudhan, 2009). This is likely due to high levels of risk and stress associated with Cambodian FEWs' lives. Interviews with FEWs in the current study indicate that debt and responsibility to family expenses are important sources of stress in their lives. Cambodian FEWs are often victims of physical and sexual violence (Drughon Moret et al., 2016) and are at high-risk of abuse from husbands/partners, customers, entertainment owners and sometimes police officers (International HIV/AIDS Alliance, 2008). They have also experienced high rates of early childhood stress and trauma as indicated earlier. In the current study, FEWs reported high rates of early childhood exposure to traumatic and adverse events, with 47.5% of the FEWs reporting 4 or more traumatic events in childhood. These factors contribute to the development of generalized anxiety symptoms as well as post-traumatic stress disorder (PTSD). The current study finds higher rates of clinically concerning PTSD symptoms in 54.4% of

FEWs. This is far higher than that found within the Cambodian general population (7.6%) (Seponski et al., 2018). However, in a study of FEWs in Miami, the US, Surratt and colleagues report 69.2% of stress based sex worker for symptoms related to acute traumatic stress (69.2%). And it is comparable to findings from a study of street-based sex workers in Australia which found clinically concerning PTSD symptoms in 47% of their sample (Roxburgh, Degenhardt, Copeland, 2006).

Half of the FEWs' children (46.7%) in the current study have functional impairment and with boys reporting higher levels of impairment than girls. This is much higher than the 20% rate of functional impairment found in a community sample of children in Vietnam (Dang, Weiss, Trung, 2016). One possible explanation for this difference may be different measures used across the two studies. Dang and colleagues used a standardized measure known as the Brief Impairment Scale (BIS) while the current study used the Khmer-Functional Impairment Scale, a measure previously validated in Cambodian context. Furthermore, the sample size in Dang's study was much larger and can be represent the total population of the children in Vietnam while there are only 60 children participants in the current study.

FEWs' PTSD symptoms statistically predict their children's functioning and produces positive beta value (.28) indicating that high levels of FEWs' PTSD are associated with high levels of functionally impaired symptoms in the children. The current finding is consistent with previous studies. In their final conclusion, McFarlane and colleagues addressed that mother with certain psychiatric disorders such as depression and PTSD contribute to worsen their children behavioral functioning (McFarlane, Symes, Binder, Maddoux, and Paulson, 2014). Finding from Levendosky and colleagues indicated that the functioning of the children impaired by their mother's mental health problems especially those who were suffered from depressive and traumatic symptoms [44] (Levendosky, Huth-Bocks, Shapiro, and Semel, 2003).

CONCLUSION

Female entertainment workers experience high levels of mental health problems. Children of FEWs have high rates of PTSD. Children's psychological problems impair their functioning. FEW's PTSD predicts children's psychological distress and functioning. FEW with anxiety have more conflict relationship with their children. Further research on the mental health needs of FEW's children is needed. Mental health care for FEWs and their children and developing approaches to prevention of mental health problems in these vulnerable groups are needed.