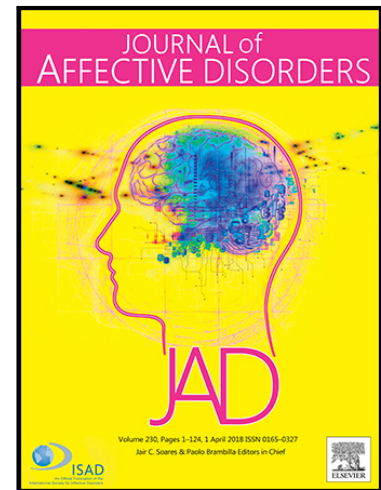


Accepted Manuscript

The mediating role of various types of social networks on psychopathology following adverse childhood experiences.

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PII: S0165-0327(18)30620-7
DOI: [10.1016/j.jad.2018.06.020](https://doi.org/10.1016/j.jad.2018.06.020)
Reference: JAD 9866



To appear in: *Journal of Affective Disorders*

Received date: 25 March 2018
Revised date: 20 May 2018
Accepted date: 4 June 2018

Please cite this article as: Margaret McLafferty , Siobhan O'Neill , Cherie Armour , Sam Murphy ,
Brendan Bunting , The mediating role of various types of social networks on psychopathology following
adverse childhood experiences., *Journal of Affective Disorders* (2018), doi: [10.1016/j.jad.2018.06.020](https://doi.org/10.1016/j.jad.2018.06.020)

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Highlights:

- Childhood adversities are associated with high levels of psychopathology
- Social networks can be protective following adverse childhood experiences
- Those who experience early adversity may fail to develop good social networks
- Family harmony is particularly important, helping to protect against mental illness
- Important implications for early prevention, intervention and treatment programs

The mediating role of various types of social networks on psychopathology following adverse childhood experiences.

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Abstract

Background: Adverse childhood events can have a very negative impact on psychopathology. Those with good social support networks may benefit from these relationships, with social networks protecting a person against the negative effect of childhood adversities. However, individuals who suffer early adversity may have lower levels of social networks due to these experiences. The primary aims of the current study were: 1) to examine the mediating effects of social networks on psychopathology following adverse childhood experiences and 2) to assess if childhood adversities impact on the development of social networks.

Method: Data was obtained from the Northern Ireland Study of Health and Stress (NISHS), conducted as part of the World Mental Health Survey Initiative, $n=1,986$, response rate 64.8%. The WMH-CIDI was used to assess mental health disorders along with risk and protective factors.

Results: Individuals who experienced childhood adversities had increased odds of psychopathology, especially those who experienced high levels of maltreatment. This was

partially mediated by various types of social networks, including family and friend support and family harmony. However, individuals who experienced adversity were less likely to have good social networks in the first instance.

Limitations: The cross-sectional nature of the study which is based on the population in Northern Ireland may limit the findings.

Conclusion: The study illustrates the importance of social networks following adverse childhood experiences. The findings provide support for initiatives to help children gain skills to develop and maintain social networks following childhood adversities, thereby reducing the negative mental health impact of such experiences.

Introduction

Early theorists proposed that social support can act as a buffer, protecting a person against the negative impact of stress (Cohen & Wills, 1985; Thoits, 1986).

When describing the buffering hypothesis, Cohen and Wills (1985) suggested that social support can help a person see the situation as less threatening, reduce the reaction to stress and help them cope more effectively. Social support can provide a person with a sense of stability, improve self-worth, and keep them occupied, and satisfied with life in general. If they do encounter stress, they are able to cope with it better as they may have a more positive outlook on life. Hyman et al. (2003) proposed that relationships with others can also build self-esteem which subsequently leads to a reduction in trauma symptoms.

In particular, research would suggest that social networks can play a very important role following exposure to childhood adversities. Social support has been found to be protective against the development of a range of mental health problems, including depression (Kaufman et al., 2004; Powers et al., 2009), PTSD (Hyman et al., 2003; Murphy et al., 2014) substance disorders (Canino et al, 2008) and suicidal behaviour (Joiner, 2005; O'Connor & Nock, 2014).

Sperry and Widom (2013) proposed that social support from a variety of support networks can help a child to deal with the adverse experience, buffering them from the negative consequences of adversity in relation to their long term mental health and wellbeing. Close relationships with primary caregivers are especially important (Auerbach et al., 2011; Werner, 2012; Tian et al., 2012), with a warm, supportive relationship helping the child cope with stressors. Unfortunately, often the perpetrator of adverse childhood experiences, especially those related to maladaptive family functioning, such as parental maladjustment and maltreatment, may be the primary caregiver(s).

However, Fryers and Brugha (2013) suggest that having a close relationship with even one parent can help to foster resilience. Alternatively, close relationships may be formed with other family members such as grand-parents or siblings. Strong social networks among peers and within the community can also be very beneficial across the lifespan. Indeed, social support from friends may compensate for negative parenting practices (Tian et al., 2012; Petrowski et al., 2014) leading to reduced rates of mental health problems (Tian et al., 2012).

Even perceived social support has been found to lead to reduced trauma symptoms following adverse childhood events. For example, Powers et al. (2009)

found that perceived friend support was protective for females following childhood maltreatment. This is in line with other research which posits that females are more likely to form meaningful friendships which can help them cope in times of stress (Taylor et al., 2000; Rose & Rudolph, 2006). According to Evans et al. (2013), if a victim perceives that others are there to support them, they may believe that the trauma is less stressful and reappraise the trauma in a more adaptive way. Conversely, if the trauma is severe this may no longer apply.

Recent research would suggest that the benefits of social support on health and wellbeing are reciprocal. For example, Eisenberger (2013) reported that while receiving social support is beneficial, giving social support and pro-social behaviour can also enhance wellbeing, by reducing the stress response. This is based on the social exchange theory (Homans, 1958) which proposes that the foundation of social relationships is reciprocal reward. However, individuals who experience early adversity may be less likely to engage in strong reciprocal relationships.

Indeed, studies have found that the experience of adverse childhood events can prevent a person from developing close relationships with others (Sperry & Widom, 2013; Negri et al, 2015; Blanchard-Dallaire et al., 2014). For example, Negri et al. (2015) found that adolescents who had been maltreated had significantly less people in their social network than the comparison group. Hughes et al. (2016) also reported that those who experienced adverse childhood experiences were less likely to feel close to others.

A lack of strong social networks found in those who experienced early adversity may be due to a number of issues. If the adverse childhood experiences were a result of issues within the family, then these may be related to a lack of family support and

family harmony. These experiences may also impact on the formation and maintenance of relationships with friends and the wider community. For example, a child may withdraw from society. They may become fearful and mistrustful of others (Blanchard-Dallaire, & Hébert, 2014), especially if their trust has been broken due to past adverse events.

Alternatively, the child may use maladaptive coping strategies, such as poor emotion regulation, or they may become hostile or aggressive, resulting in the child being rejected by peers (Bolger & Patterson, 2001; Kim & Cicchetti, 2010) and others in the community. Additionally, following adverse childhood experiences people may engage in risky behaviour to reduce arousal associated with stress, such as taking drugs or alcohol, which in turn may undermine relationships (Umberson et al., 2014).

Having someone to talk to or to rely on when a person is worried, or has a problem, can minimise the impact of stress. However, social networks are complicated, and at times may contribute to the stress rather than alleviate it (Umberson & Montez, 2010). For example, friends and family can be demanding, and if relationships are strained it may lead to increased stress levels (Rose & Rudolph, 2006; Umberson & Montez, 2010), and poorer emotional health. Additionally, while a person can have a large network of family and friends, they may not be supportive. It is important therefore to distinguish between available social networks and actual social support when conducting research (Lakey & Cohen, 2000).

The primary aims of the current study were (1) to explore if various types of social networks mediate the impact of adverse childhood experiences on psychopathology in Northern Ireland (NI) while also considering the role of age and gender, and (2) to determine if childhood adversities are associated with fewer social

networks later in life. It is predicted that those who experience high levels of early adversity will have increased odds of developing a mental health disorder but that social networks will mediate the effect. It is also predicted, however, that individuals in the adversity classes may have fewer social networks as a result of their experiences.

Method

Sample

This study uses data obtained from the Northern Ireland Study of Health and Stress (NISHS), a nationally representative household survey of adults NI (response rate 68.4%). The study was conducted between 2004 and 2008 as part of the WHO World Mental Health (WMH) Survey Initiative (Kessler & Üstün, 2008), following ethical approval from the Ulster University Research Ethics Committee. Consent was obtained from all participants. Part 2 of the survey was completed by 1,986 participants including those with positive responses to the psychopathology screening questions, 50% of sub-threshold cases and 25% of those who did not meet either criterion, to allow for the calculation of weights. For a comprehensive overview of the sampling methodology employed please refer to Bunting et al., (2013).

Diagnostic assessment

Mental health problems were assessed using the World Mental Health (WMH) Survey Initiative version of the WHO Composite International Diagnostic Interview (WMH-CIDI). This reliable and well validated instrument consists of two parts. Part 1 is made of up of screening sections for core mental health problems and diagnostic assessments along with demographic information. Part 2 consists of diagnostic sections

related to non-core disorders along with risk and protective factors for psychopathology. For the purpose of this study, the focus will be on Part 2 since it contains questions related to childhood adversities and social networks. Mental health problems examined are any anxiety, mood or substance disorders.

Childhood adversities assessment

Using latent class analysis to identify co-occurrence of adverse childhood experiences, McLafferty et al. (2018) identified three underlying mutually exclusive profiles of childhood adversity in the Northern Ireland population; a low risk, a medium risk and a high risk class, as shown in figure 1. Adversity types examined included those related to maladaptive family functioning (parental mental illness, substance disorder, criminality, family violence, physical abuse, sexual abuse, neglect and physical punishment). The baseline or low risk class represented 87.9% of the sample ($n=1,774$), who endorsed low levels of all types of adversity. The medium risk class which was characterised by moderate levels of adversities, particularly those related to physical punishment, family violence and parental maladjustment, represented 7.9% of the sample ($n=125$). The high risk class, representing 4.2% of the sample ($n=87$) endorsed a high probability of experiencing adversities related to maltreatment, physical punishment and parental maladjustment. See McLafferty et al. (2018) for further details on the childhood adversity classes identified.

Figure 1 approx. here

Social networks assessment

A number of questions are included in the WMH-CIDI to examine participant's social networks. The current study utilises 10 questions related to family support and harmony and friend support and harmony. The overall reliability of the scale was .619. These include 3 questions related to family support ($\alpha = .650$) and 3 related to friend support ($\alpha = .769$). The support questions enquire about the frequency of contact, how much they rely on others if they have a serious problem and if they can open up to the people in their network. Additionally, the instrument contains 2 questions related to family harmony ($\alpha = .626$) and 2 related to friend harmony ($\alpha = .586$). Questions enquire about frequency of demands and frequency of arguments. The reliabilities found in the Northern Ireland study are similar to those reported by Canino et al., (2008) in another WMH survey. Likert scales are used for all questions. The support items were reverse scored for the purpose of this study resulting in higher scores on all questions indicating increased family or friend support and harmony.

Data Analysis

Mediation.

A predictor variable (x) may directly influence a criterion variable (y). The effect of x on y is known as the total effect. However, another variable may mediate or influence the outcome indirectly (MacKinnon et al., 2007). The impact of x on y is likely to be lower when the mediator is included as there is less to explain and the path gets weaker, suggesting that the mediator is having an indirect effect on the outcome. If the path is still significant after the inclusion of the mediator partial mediation has occurred. Full mediation occurs when a path which was formally significant becomes non-significant. Baron and Kenny (1986) proposed that a number of steps should be used when conducting mediation analyses. Recent analyses however use a single test to

examine indirect effects (Preacher & Hayes, 2004; 2008). Often MPlus (Muthén & Muthén, 1998-2012) is utilised, as was the case in the current study, since it can test multiple pathways simultaneously and latent variables may be included.

In the current study, the three category childhood adversity classes identified by McLafferty et al. (2018) were dummy coded. The baseline or reference group was the low risk class. The two dummy coded independent variables were the high risk and a medium risk classes. The covariates age and gender were controlled for. In order to determine if social networks mediate the relationship between adversity profiles and mental health problems a number of models were tested. The mediation model is depicted in Figure 2.

Figure 2 approx. here

The analyses were conducted in three stages.

1. Regression models estimated the direct effects (c paths) between the dummy coded independent variables (high risk and medium risk classes) and the dichotomous dependent variables (any anxiety, mood or substance disorders). The pathways of the covariates (age and gender) and the mediators (family support, family harmony, friend support, friend harmony) were fixed to zero.
2. The covariates, age and gender were included in the model and the direct effects were estimated, while the pathways to and from the mediators remained at zero.
3. The pathways to and from the social networks mediators were freed. Direct effects and indirect effects of childhood adversities, age and gender on psychopathology through the mediators were estimated. Direct pathways (*a*

paths) from the adversity classes to the social networks mediators were also estimated.

All analyses in the current study were conducted using SPSS version 22 and Mplus version 7.31, (Muthén&Muthén, 1998-2012)utilising the robust maximum likelihood (MLR) estimator and Monte Carlo integration. All WMH surveys use hot deck imputations on missing values (Kessler &Üstün, 2008). Weights were computed for the NISHS based on 2001 census figures to account for sample selection, non-responses and post-stratification factors, as well as differential selection into part 2 of the survey (Bunting et al., 2013). Part 2 weights, stratification and cluster units were included in the current study.

Results

Social networksdescriptives

The questions in each subscale of the social networks questionnaire were totalled and divided by the number of questions in each subscale (3 for support items and by 2 for harmony items), resulting in 4 total scores for social networks; family support, family harmony, friend support and friend harmony. The mean scores for the social networks variables were; family support 3.53 ($SD = 0.78$), family harmony 3.33 ($SD = 0.72$), friend support 3.29 ($SD = 0.89$), and friend harmony 3.50 ($SD = 0.56$).

Mediation analysis

A range of model fit indices were assessed in order to determine the adequacy of the models, including AIC (Akaike Information Criterion), BIC (Bayesian Information Criterion), and SSABIC (sample size adjusted BIC), with lower scores indicative of the best fitting model as presented in table 1. Chi-square tests were also conducted to determine the best fitting model using log-likelihood values and scaling correction factors obtained from the MLR estimation. Model 3 was determined to be significantly superior.

Table 1 approx. here

Stage 1 The direct effects between the independent variables, the high risk and medium risk classes, and the dependent variables were all significant as shown in tables 2, 3 and 4, with those who experienced adversities having much greater odds of having a range of mental health problems when compared to those in the low risk class. Individuals in the high risk class had odds ranging from 3.586 for mood disorders to 6.253 for anxiety disorders. Individuals in the medium risk class had odds ranging from 4.041 for substance disorders to 6.072 for anxiety disorders. The odds of experiencing a mental health problem was greater for the high risk group than the medium risk group with the exception of mood disorders.

Stage 2 When the covariates age and gender were included in the model the direct effect of the childhood adversity indicators remained significant. Age did not predict psychopathology. However, gender was a significant predictor, with females more likely to experience mood and anxiety disorders. Males however were much more likely to have substance disorders ($OR = 4.446$). Chi square tests show significant improvements in the second model following the addition of the covariates ($\chi^2 = 128.37, df = 8, p < .001$).

Stage 3 Chi square tests show significant improvements in model 3 following the inclusion of the social networks mediators ($\chi^2 = 274.07, df=32, p < .001$). In the full mediation model, when the social networks mediators were introduced, the direct pathways between the adversity classes and covariates which were significant in the previous models remained significant, but the odds reduced considerably, indicating that partial mediation occurred. Various types of social networks also impacted directly on a range of disorders. Those with high levels of family support were less likely to have an anxiety disorder ($OR=0.652$). High levels of family harmony were related to lower levels of all disorders. High levels of friend support were related to lower levels of mood disorders ($OR=0.658$).

Indirect Effects

A number of significant indirect effects were revealed for childhood adversities and gender via the social network mediators and psychopathology. The indirect pathways from the high risk class and from gender through family support to anxiety were significant. The indirect pathway from the medium risk class through family harmony was significant for all disorders. Furthermore, the indirect pathway from the high risk class and gender through friend support was significant for mood disorders. However, no significant indirect effects were found through friend harmony.

Impact of childhood adversities on social networks (a paths)

In addition, a number of significant direct effects of childhood adversities on social networks were revealed (*a* paths). Family support was predicted by membership of the high risk class ($\beta=-0.684$, $SE=0.169$, $p<.001$), suggesting that in contrast to the baseline class those in the high risk class were less likely to have elevated levels of family support. Family harmony was predicted by membership of the medium risk class ($\beta=-0.515$, $SE = 0.072$, $p<.001$), suggesting that in contrast to the baseline class those in the medium risk class were less likely to have elevated levels of family harmony. Friend support was predicted by membership of the high risk class ($\beta=-0.665$, $SE= 0.173$, $p<.001$) and the medium risk class ($\beta= -0.345$, $SE= 0.165$, $p<.05$). This would suggest that in contrast to the baseline class those in the high risk class and those in the medium risk class were less likely to have high levels of friend support. Furthermore, gender predicted levels of family support ($\beta= -0.444$, $SE=0.054$, $p<.001$), friend support ($\beta=0.194$, $SE=0.051$, $p<.001$) and friend harmony ($\beta=0.102$, $SE=0.036$, $p<.01$). Males were significantly less likely to have high levels of family support but more likely to have better friend support and friend harmony than females.

Tables 2, 3 & 4 approx. here

Discussion

The results of the current study clearly indicate that childhood adversities are very significant risk factors for psychological problems. However, the study also revealed that various types of social networks can mediate this impact, leading to lower levels of psychopathology. Individuals who experienced both high and moderate rates of adversity during childhood displayed significantly increased odds of having a psychological disorder later in life. This is in accordance with numerous studies which explore the negative impact of childhood adversities on mental health (Kessler et al., 2010; Slopen et al., 2010). The inclusion of the socio-demographic variables, age and gender, made significant improvements to the model. In accordance with other studies, females were found to be more likely to have mood or anxiety disorders, while males were more likely to have substance disorders (Eaton et al., 2012).

When the social network mediators were included in the final model, a number of significant direct and indirect effects were revealed. The odds of having a mental health disorder reduced following early adverse experiences when compared to the previous models. The impact of gender on the development of mental health problems also reduced. However, the odds remained significant, suggesting that social networks, when available at least partially mediate the impact of adverse childhood events and gender. An elevated level of family support was related to lower levels of anxiety disorders, while friend support was related to lower levels of mood disorders. Family harmony was particularly important, playing a pivotal role, as it was associated with reductions in all mental health disorders. The findings of the study highlight the importance of developing good social networks with both family and friends (Tian et al., 2012; Petrowski et al., 2014), in order to help a person cope following adverse events.

Conversely, those who experienced childhood adversities had significantly poorer levels of social networks. This is in accordance with previous studies which found that those who experience adverse childhood events were less likely to engage in close relationships (Sperry & Widom, 2012; Negri et al., 2015; Hughes et al., 2016). Individuals in the high risk class had lower levels of both family and friend support, suggesting that high levels of childhood adversities can have a very negative impact on the formation of support networks. Furthermore, individuals in the medium risk class had lower levels of family harmony. This may be related to the fact that individuals in this class endorsed elevated levels of adversities related to parental maladjustment which may lead to a reduction in levels of harmony among the family.

Previous studies have found that females are more likely to form strong friendships than males (Taylor et al., 2000). However, the current study revealed that females had lower levels of friend support and friend harmony than males, which may partially account for the high rates of internalising disorders, such as mood and anxiety problems revealed in the present study. The study also found that males were more likely to have a substance disorder. This could in part be related to their relationships with friends as revealed in previous research (Rose & Rudolph, 2006; Umberson & Montez, 2010), and may warrant further research.

While no significant direct or indirect effects were revealed for friend harmony, the findings from the study highlight the importance of harmony within the family setting on future mental health and suicidality. Significant indirect effects were found for family and friend support, with support partially mediating the impact of early adversities. Such findings provide backing for theories that advocate the importance of social networks following adverse experiences.

It was particularly enlightening to uncover the role of different types of social networks as protective factors against various mental health problems. The findings from the current study would suggest that social networks can reduce the negative impact of early adversity on mental health and wellbeing. However, the finding that individuals who experience early adversity are less likely to have strong social networks is concerning, since they are likely to benefit from such relationships (Petrowski et al., 2014). Therefore, children who experience adversity are at a disadvantage in that adversities can affect them directly and also indirectly through their impact on the development of good social networks. It is important therefore to address these issues at an early age.

Resilience building programmes which encompass the development of social networks are of utmost importance to help alleviate the impact of early adverse events. The findings offer support for initiatives which may help children form close relationships with others following adversities, such as peer mentoring or group support programmes. Furthermore, the findings from the current study have important implications for policy makers, clinical practitioners, and those involved in designing and implementing programmes to assist children who have experienced dysfunction within the family.

Limitations and future directions

The findings from the current research should be considered in light of a number of limitations. The cross-sectional nature of the study precludes causal inference, with the study relying on retrospective recall of events which occurred during childhood. Additionally, those who may be at a high risk of psychopathology and possibly fewer social networks, such as non-English speakers, people with learning disabilities and those residing in prisons,

military barracks and hospitals were excluded from the study, as is common practice in all WMH surveys.

Despite these limitations, the results clearly demonstrate the important role of social networks following childhood adversities. While many previous studies have considered the impact of an overall social support measure, the current study explores the impact of four types of social networks on different types of mental health disorders, with variations between disorders revealed. Additionally, while social networks may mediate the impact of adversities on mental health, the study also shows that adverse experiences can impact on the development of strong relationships. Further longitudinal research in this area would be particularly beneficial.

Conclusion

The current adult population-based study expands on previous research since it considers the mediating role of various types of social support on psychopathology and suicidal behaviour following childhood adversities, and also demonstrates the detrimental impact of childhood adversities on the development of social networks in the first instance. The findings provide support for initiatives which aim to reduce the impact of negative early childhood experiences on psychopathology. Early intervention programmes which endeavour to develop strong social networks, within the family and beyond, would be particularly advantageous. It would also be beneficial to promote and develop effective coping strategies and resilience building in those most at risk from an early age.

Conflict of interest

None.

Acknowledgements

We would like to thank the staff of the WMH Data Collection and Data Analysis Coordination Centres for assistance with instrumentation, fieldwork and consultation on data analysis.

Role of Funding Source

The survey was carried out in conjunction with the World Health Organization WMH Survey Initiative, which is supported by the National Institute of Mental Health (NIMH; R01 MH070884), the John D. and Catherine T. MacArthur Foundation, the Pfizer Foundation, the US Public Health Service (R13-MH066849, R01-MH069864, and R01 DA016558), the Fogarty International Center (FIRCA R03-TW006481), the Pan American Health Organization, Eli Lilly and Company, Ortho-McNeil Pharmaceutical, GlaxoSmithKline, and Bristol-Myers Squibb. The NISHS was supported by a grant from the Research and Development (R&D) Division in NI. The authors have support from the Commission for Victims and Survivors in Northern Ireland (CVSNI) for the submitted work; they have no relationships with the R&D Division NI or CVSNI that might have an interest in the submitted work. None of the funders had any role in the design, analysis, interpretation of results or preparation of this paper.

Contributors

Dr Margaret McLafferty contributed to the development of the theoretical rationale of the study, conducted literature searches, carried out analyses, interpreted the results and wrote the first draft of this manuscript. Professor Brendan Bunting was the PI of the NISHS and supervised the analyses. Professor Siobhan O'Neill, Professor Cherie Armour and Dr Sam Murphy were involved in the design, supervision and editing of the final paper. All the aforementioned authors contributed to the paper and approved the final manuscript.

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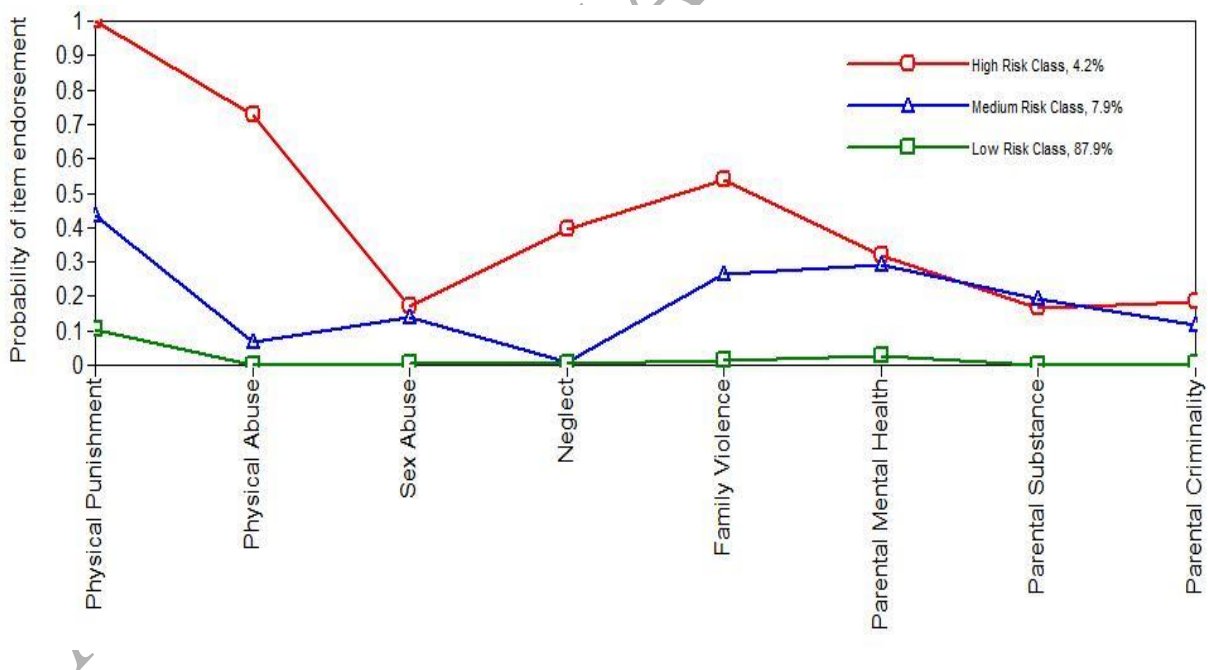


Figure 1

Source: McLafferty et al., (2018). *Latent profile plot of childhood adversity indicators*

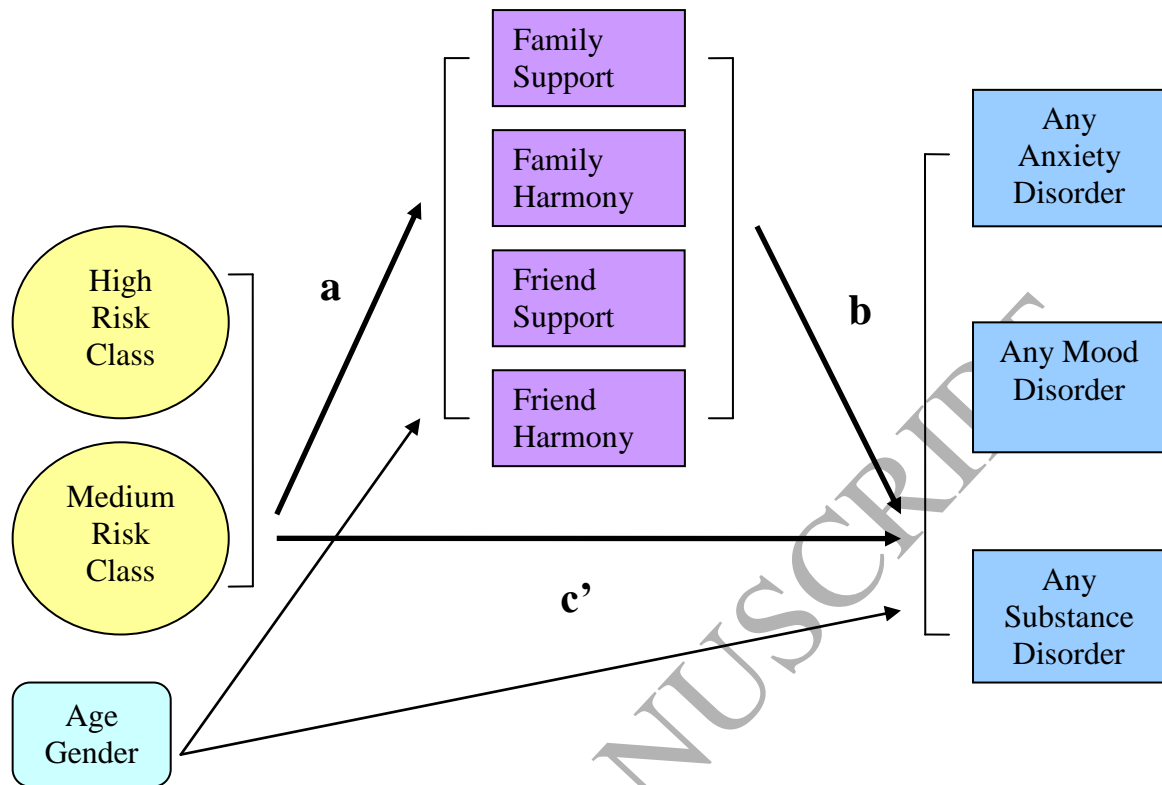


Figure 2.

Multiple mediator model of direct and indirect effects of social networks

Table 1

Fit indices among mediation models

Model	Log-Likelihood	# Free Parameters	AIC	BIC	SSABIC
Model 1	-9043.662	20	18127.323	18239.201	18175.660
Model 2	-8960.865	28	17977.730	18134.358	18045.401
Model 3	-8734.755	60	17589.511	17925.144	17734.521

Note: AIC = Akaike information criterion; BIC = Bayesian information criterion;

SSABIC =

sample size adjusted BIC

Table 2

Odds ratios and confidence intervals for direct and indirect effects of childhood adversities on Any Anxiety disorder via social networks with gender and age

Variable	Direct effects			Indirect effects			
	Stage 1 OR (95% CI)	Stage 2 OR (95% CI)	Stage 3 OR (95% CI)	Family Support β (SE)	Family Harmony β (SE)	Friend Support β (SE)	Friend Harmony β (SE)
CA High Risk	6.253*** (3.13- 12.51)	6.948*** (3.61- 13.73)	4.167*** (1.98-8.76)	0.292 (0.128)*	0.094 (0.073)	0.184 (0.110)	0.064 (0.078)
CA Med Risk	6.072*** (3.99- 9.25)	5.964*** (3.95- 9.01)	4.409*** (2.78- 6.99)	0.076 (0.052)	0.224 (0.106)*	0.097 (0.077)	0.022 (0.032)
Gender (female)	-	0.520*** (0.38- 0.71)	0.397*** (0.27-0.58)	0.190 (0.078)*	-0.041 (0.025)	0.054 (0.035)	0.026(0.027)
Age (continuous)	-	0.999 (0.99- 1.01)	1.000 (0.99-1.01)	0.000 (0.001)	-0.001 (0.001)	0.000 (0.000)	0.000(0.000)
Family Support	-	-	0.652** (0.47-0.89)	-	-	-	-
Family Harmony	-	-	0.647* (0.44-0.95)	-	-	-	-
Friend Support	-	-	0.756 (0.54-1.05)	-	-	-	-
Friend Harmony	-	-	0.772 (0.45-1.33)	-	-	-	-

Note: OR = odds ratio; CI = confidence interval; β = beta coefficient; SE = standard error, *** $p < .001$; ** $p < .01$; * $p < .05$

Table 3

Odds ratios and confidence intervals for direct and indirect effects of childhood adversities on Any Mood disorder via social networks with gender and age

Variable	Direct effects			Indirect effects			
	Stage 1 OR (95% CI)	Stage 2 OR (95% CI)	Stage 3 OR (95% CI)	Family Support β (SE)	Family Harmony β (SE)	Friend Support β (SE)	Friend Harmony β (SE)
CA High Risk	3.586*** (2.07-6.21)	3.824*** (2.27-6.43)	2.195* (1.14-4.21)	0.228 (0.128)	0.151 (0.098)	0.274 (0.105)*	0.021 (0.068)
CA Med Risk	4.397*** (3.01-6.43)	4.282*** (2.97-6.38)	2.770*** (1.67-4.61)	0.060 (0.047)	0.357 (0.103)**	0.144 (0.088)	0.007 (0.025)
Gender (female)	-	0.598*** (0.49-0.74)	0.484*** (0.37-0.64)	0.148 (0.080)	-0.066 (0.038)	0.081 (0.032)*	0.009 (0.027)
Age (continuous)	-	0.999 (0.99-1.01)	1.001 (0.99-1.01)	0.000 (0.000)	-0.001 (0.001)	0.000 (0.001)	0.000 (0.000)
Family Support	-	-	0.716 (0.51-1.01)	-	-	-	-
Family Harmony	-	-	0.499*** (0.37-0.68)	-	-	-	-
Friend Support	-	-	0.658** (0.49-0.88)	-	-	-	-
Friend Harmony	-	-	0.919 (0.54-1.55)	-	-	-	-

Note: OR = odds ratio; CI = confidence interval; β = beta coefficient; SE = standard error, *** $p < .001$; ** $p < .01$; * $p < .05$

Table 4

Odds ratios and confidence intervals for direct and indirect effects of childhood adversities on Any Substance Disorder via social networks with gender and age

Variable	Direct effects			Indirect effects			
	Stage 1 OR (95% CI)	Stage 2 OR (95% CI)	Stage 3 OR (95% CI)	Family Support β (SE)	Family Harmony β (SE)	Friend Support β (SE)	Friend Harmony β (SE)
CA High Risk	5.523*** (2.77-11.02)	5.648*** (2.55-12.52)	4.529** (1.88-10.94)	0.226 (0.137)	0.073 (0.052)	-0.097 (0.118)	0.058 (0.071)
CA Med Risk	4.041*** (2.34-6.99)	5.296*** (2.98-9.42)	4.542*** (2.68-7.70)	0.059 (0.051)	0.172 (0.079)*	-0.051 (0.063)	0.021 (0.030)
Gender (female)	-	4.446*** (3.40-5.81)	4.095*** (2.78-6.03)	0.147 (0.085)	-0.032 (0.024)	-0.029 (0.035)	0.024 (0.024)
Age (continuous)	-	1.000 (0.99-1.01)	1.000 (0.99-1.01)	0.000 (0.000)	-0.001 (0.001)	0.000 (0.000)	0.000 (0.000)
Family Support	-	-	0.719 (0.50-1.03)	-	-	-	-
Family Harmony	-	-	0.715* (0.54-0.94)	-	-	-	-
Friend Support	-	-	1.161 (0.83-1.62)	-	-	-	-
Friend Harmony	-	-	0.789 (0.52-1.21)	-	-	-	-

Note: OR = odds ratio; CI = confidence interval; β = beta coefficient; SE = standard error, *** $p < .001$; ** $p < .01$; * $p < .05$