The moderating role of trajectories of family hardiness in the relationship between trajectories of economic hardship and mental health of mothers and children

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Abstract

Trajectories of perceived economic hardship are related to clinical levels of mental health issues in mothers and children from low-income families. Cross-sectionally, family hardiness has been found to have a moderating effect on the relationship between stressors and mental health severity. Recent advances in family resilience theory highlight the importance of considering trajectories of family resilience. Trajectories of family hardiness and their moderating effect on the relationship between trajectories of perceived economic hardship and symptoms of depression and anxiety in low-income mothers and children were investigated in 511 mother–child dyads in Singapore. Three trajectories of family hardiness were delineated, namely the high stable, low rapidly increasing and moderate increasing group. The trajectories of family hardiness were found to moderate the relationship between trajectories of perceived economic hardship and symptoms of mental health in low-income mothers and children. The same moderation effect was not found when perceived economic hardship and family hardiness were investigated cross-sectionally. These findings highlight the importance of considering the family's trajectory of hardiness over time when working with low-income families. In addition, given that different trajectories of family hardiness were protective for different aspects of mental health, further studies to understand these relations are necessary.

Keywords Family Hardiness Trajectories · Economic Hardship Trajectories · Mental Health · Mothers and Children · Low-Income Families

Introduction

Low-income families face multiple stressors such as dangerous environments, challenging work situations, lack of necessities and amenities, and isolation from information and support (Murali & Oyebode, 2004). Poverty has been shown to be associated with common mental health issues such as depression and anxiety in adults (Ridley et al., 2020; Sareen et al., 2011) and children (Assing-Murray & Lebrun-Harris, 2020; Pascoe et al., 2016) from low-income backgrounds. Furthermore, longitudinal trajectories of poverty provide information on the histories of poverty experienced, and have been found to predict the mental health of mothers and children from low-income families (Comeau & Boyle, 2018; Pryor et al., 2019; Wickham et al., 2017). Previous studies have underscored the importance of subjective indicators of poverty in predicting mental health outcomes in comparison to objective indicators of poverty (Ahnquist & Wamala, 2011; Chung et al., 2018). Wen et al. (2022), previously found that trajectories of perceived family economic hardship predicted clinical levels of mother's depression, mother's anxiety and child's anxiety in low-income families. High stable economic hardship was found to predict a greater likelihood of clinical levels of mother's depression, mother's anxiety and child's anxiety as compared to low stable economic hardship, while moderate decreasing economic hardship predicted a greater likelihood of clinical levels of mother's anxiety as compared to low stable economic hardship. However, there is a lack of studies investigating how trajectories of perceived family economic hardship impact symptoms of less severe, non-clinical levels of common mental health issues such as depression and anxiety in mothers and children.

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In addition to the literature describing the relations between economic hardship and mental health outcomes in low-income families, a body of research also describes the concept of resilience, which shifts the focus from crisis to coping. Individual resilience refers to the strengths found in individuals who are able to overcome challenging circumstances (Walsh, 1996). As described by Kobasa (1985), resilience refers to an individual's commitment to activities in his/her life, expectancy of change as an exciting challenge and the belief that he/she can control events in his/her experience. Individual resilience has been found to buffer the relationship between stress and multiple outcomes. For example, individual hardiness moderated the relationship between negative life events and coping self-efficacy in undergraduate students, such that when hardiness was low, higher levels of negative life events led to lower coping self-efficacy but not when hardiness was high (Abbasi et al., 2020). Individual hardiness was also shown to moderate the relationship between stress and depression in undergraduate students, such that individuals with high hardiness had similar depression scores regardless of their stress scores, while in individuals with low hardiness, high stress individuals had higher depression scores than low stress individuals (Pengilly & Dowd, 2000). Individual hardiness also moderated the relationship between stress and illness in low-income women such that stress related increases in illness were reduced in the individuals high in hardiness as compared to individuals low in hardiness (Williams & Lawler, 2001).

Resilience research also points to the importance of a systemic view where the family is viewed as a functional unit (Walsh, 1996). The concept of family resilience provides a lens to understand how to help families promote positive adaptation to adversity. It expands on the concept of individual resilience and applies it to the family as a system to identify and foster key processes that enable families to cope more effectively and emerge stronger from crises or persistent stresses (Walsh, 1996). Building family resilience strengthens the family as a functional unit and enables the family to foster resilience in all its members (Walsh, 1996). One such measure of family resilience is family hardiness, which refers to the collective attitude of the family to be resilient under pressure (Maddi, 2016). Family hardiness is defined as the family's ability to work together cohesively as they combat stressors and find solutions to their problems for positive family functioning (McCubbin et al., 1995). It is characterized by commitment, challenge and control, which refer to the family's joint cooperation to stress, confidence in their ability to adapt to stressful situations and sense of control over life respectively (McCubbin

et al., 1995). Blgbee (1992) found that family hardiness had a stress-moderating effect on the relationship between negative life events and seriousness of physical and mental health. Adults with high negative life events and low hardiness had the highest mean physical and mental illness scores. Interestingly, the mentioned study investigated the moderating effect of family hardiness cross-sectionally at one time point.

Recent advances in family resilience theory highlight the importance of considering trajectories of family resilience over time (Henry et al., 2015). Indeed, resilience is traditionally conceptualized as a static characteristic in families. However, it can also be conceptualized as a pathway that a family follows over time in response to a stressor (Hawley, 2000). Based on this perspective, it is important to outline the path a family follows in response to a stressor and the expected route of reorganization. Pathways of resilience are unique to each family and each family follows a distinct pathway towards positive adaptation (Whitchurch & Constantine, 1993). Viewing pathways of family resilience has the advantage of providing an understanding of family functioning that is contextualized in time, showing the family's ability to recover from adversity, which would not be revealed when the family is viewed at only one point of time.

In the present study, we sought to delineate trajectories of family hardiness across time. In addition, we sought to investigate if the trajectories of economic hardship previously delineated in the same sample (Wen et al., 2022) would predict less severe, non-clinical levels of depression and anxiety in mothers and children. We hypothesized that the latent classes of economic hardship trajectories would be associated with symptoms of depression and anxiety in both mothers and children. In addition, we sought to investigate if the trajectories of family hardiness would moderate the relation between trajectories of economic hardship and mental health of mothers and children. We hypothesized that the trajectories of family hardiness would moderate the relation between the trajectories of economic hardship and mental health of mothers and children. Lastly, we sought to observe if the moderation effect of family hardiness trajectories on the relationship between economic hardship trajectories and mental health of mothers and children would be found when investigated cross-sectionally. A previous study by Blgbee (1992) found that family hardiness had a stress-moderating effect on the relationship between negative life events and seriousness of physical and mental health. However, there is a lack of studies investigating whether within a low-income context, family hardiness would moderate the relationship between economic hardship and mental health of mothers and

children when observed cross-sectionally. Thus, in an exploratory analysis, we investigated if family hardiness at a particular time point would moderate the relationship between economic hardship and mental health of mothers and children at the same time point.

Methods

Participants

Mother–child dyads were recruited for a study on low-income families in Singapore (Goh et al., 2019). The study recruited mother–child dyads whose families 1) were receiving government financial aid at the time of recruitment or had previously received financial aid at one point during the three years before the time of recruitment; and 2) had a child between 7 and 12 years. Government financial aid provided temporary financial support to low-income individuals or families who were temporarily unable to work, were looking for a job or were earning a low income and required assistance. Government financial aid was provided to households who have a total monthly household income of $1,900 Singapore dollar (approximately US$1,380) and below, or a per capita income of $650 Singapore dollar (approximately US$470) and below. This is in contrast to the median total monthly household income of $9,425 Singapore dollar (approximately US$7,107) and the median per capita income of $2,500 Singapore dollar (approximately US$1,885) as reported in Singapore at the time of recruitment (Department of Statistics Singapore, 2021). Wave 1, wave 2 and wave 3 of the study were conducted from June 2019 to August 2019, December 2019 to February 2020, and June 2020 to October 2020, comprising of 511, 480 and 462 mother–child dyads respectively.

Paper and pencil surveys were conducted at the participants' houses for wave 1 and wave 2. Due to the national visitation restrictions imposed due to COVID-19 during the time of data collection, paper and pencil surveys for wave 3 were conducted virtually through video call instead of physically at the participants' houses. Participants were couriered a copy of the survey booklet and surveyors would call the participants, ask them for their responses and fill them up on the surveyor's copy of the survey booklet. We obtained informed consent from mother and child assent from the child. Each family who participated in the study received a token of $60 Singapore dollar (approximately $40 USD) at wave 1, $80 Singapore dollar (approximately $60 USD) at wave 2 and $110 Singapore dollar (approximately $80 USD) at wave 3. This study included 1) 4 major ethnic groups: Chinese, Malay, Indian and Others; and 2) male and female children.

Measures

Economic hardship questionnaire

The Economic Hardship Questionnaire (EHQ) (Lempers et al., 1989) was administered to mothers at wave 1, wave 2 and wave 3 to assess perceived economic hardship experienced by the family. The EHQ is a 10-item questionnaire that focuses on changes in a household's style of living. Participants answer questions using a 4-point Likert scale from 0 (never having to cut back due to financial concerns) to 3 (having had to cut back very often). Item scores are summed up and can range from 0 to 30. Higher scores reflect greater perceived economic hardship. The EHQ has demonstrated good internal consistency in the present study at wave 1 (Cronbach's alpha = 0.81), wave 2 (Cronbach's alpha = 0.84) and wave 3 (Cronbach's alpha = 0.80).

Family hardiness index

The Family Hardiness Index (FHI) (McCubbin et al., 1995) was administered to mothers to assess perceived family hardiness at wave 1, wave 2 and wave 3. Family hardiness is described as a stress resistance and adaptation resource in families. The 20 questions in this scale focus on the individual's perception of the family's hardiness. Nine items are reverse-scored and responses are scored on a 4-point Likert-type scale from 0 (*false*) to 3 (*true*). A total score was calculated by summing up the responses, giving a possible score range between 0 and 60. A higher score reflects higher family hardiness. Internal consistency for the overall FHI score in this study is good with a Cronbach's alpha of 0.82, 0.79 and 0.81 at wave 1, wave 2 and wave 3 respectively.

Depression, anxiety stress scale-21

The Depression Anxiety Stress Scale 21 (DASS-21) was administered to mothers at wave 3 to measure the mother's emotional distress in three subcategories (Lovibond & Lovibond, 1995) of depression (e.g., loss of self-esteem/incentives and depressed mood), anxiety (e.g., fear and anticipation of negative events), and stress (e.g., persistent state of overarousal and low frustration tolerance). It was a self-report questionnaire with 21 items (seven items for each category) based on a four-point rating scale (ranging from "did not apply to me at all" = 0, to "applied to me very much or most of the time" = 3). To calculate comparable scores with full DASS, each seven-item scale was multiplied by two which ranges from 0 to 21. Higher scores indicate more psychological distress. The present study focused on the mother's depression and anxiety. Within the current study,

the depression scale and anxiety scale demonstrated excellent internal consistency with Cronbach's alpha values of 0.88 and 0.82 respectively at wave 3.

Child behavior checklist 6–18

The Child Behavior Checklist 6–18 (CBCL 6–18) was administered to mothers at wave 3 to assess the emotional and behavioural problems of the children (Achenbach & Rescorla, 2001). The CBCL contains 113 items that were rated on a 3-point scale: 0 (not true), 1 (somewhat or sometimes true), and 2 (very true or often true). The CBCL contains two empirically derived broadband scales and eight syndrome scales. The present study investigated depression and anxiety in children based on the withdrawn/depressed syndrome scale and the anxious/depressed syndrome scale respectively. Raw scores for both the withdrawn/depressed and anxious/depressed scales were used for the current analysis, ranging from 0 to 16 and 0 to 26 respectively, where higher scores reflect more psychological distress. Within the current study, the withdrawn/depressed scale and anxious/depressed scale demonstrated good internal consistency with Cronbach's alpha values of 0.74 and 0.78 respectively at wave 3.

Statistical analysis

Latent Class Growth Analysis (LCGA) was used to identified distinct trajectories of family hardiness (latent classes) during the three waves of the study (Jung & Wickrama, 2008). The models were conducted using Mplus 8.5 which uses maximum likelihood estimation as default to handle data that are missing at random by using all available data. The time difference, in terms of the number of days between each wave of data collection for each participant was accounted for in the model. The number of classes was set to a single class in the initial model and follow up models were conducted with increasing the number of expected latent classes by one at a time to identify the model that best fit data.

Longitudinal main effect model

We previously defined trajectories of perceived economic hardship in another paper (Wen et al., 2022). Three groups of economic hardship trajectories were previously delineated (Fig. 1), the low stable group ($n = 169$), high stable group ($n = 18$) and moderate decreasing group ($n = 264$). These groups of economic hardship trajectories were utilized in the present study to predict the levels of depression and anxiety in mothers and children at wave 3. Multiple linear regression was utilized to compare the groups of economic hardship trajectories on mental health outcomes, where the groups of economic hardship were
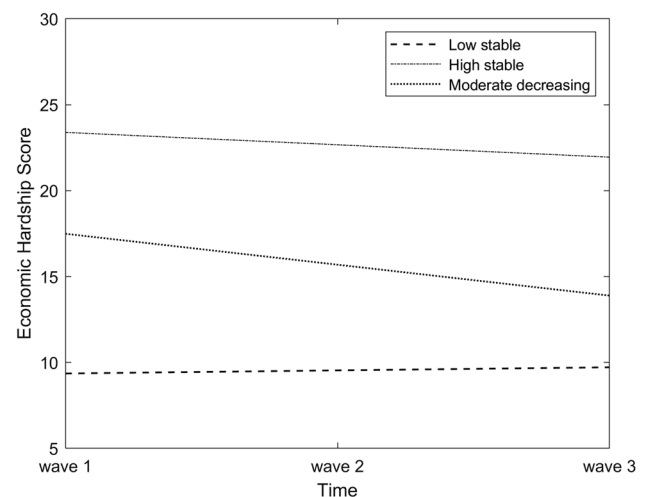

Fig. 1 Trajectories of economic hardship across three waves

dummy coded as predictors. Given that White's test for heteroscedasticity was found to be significant ($p < 0.05$) in some of the models, the heteroscedasticity consistent inference HC0 (White, 1980) was utilized in the linear regression using the RLM macro (Darlington & Hayes, 2017) in SPSS 28. HC0 has been found to perform well with large sample sizes (Long & Ervin, 2000).

Longitudinal moderation effect model

To investigate whether the family hardiness trajectories moderated the relation between economic hardship trajectories and levels of depression and anxiety in mothers and children at wave 3, we conducted a moderation analysis using multiple linear regression. Given that White's test for heteroscedasticity was found to be significant ($p < 0.05$) in some of the models, the heteroscedasticity consistent inference HC0 (White, 1980) was utilized in the linear regression using the PROCESS macro (Hayes, 2013) in SPSS 28.

Cross-sectional moderation effect model

Lastly, to investigate whether family hardiness at wave 3 moderated the relation between economic hardship at wave 3 and levels of depression and anxiety in mothers and children at wave 3, we conducted a moderation analysis using multiple linear regression. Given that White's test for heteroscedasticity was found to be significant ($p < 0.05$) in some of the models, the heteroscedasticity consistent inference HC0 (White, 1980) was utilized in the linear regression using the PROCESS macro (Hayes, 2013) in SPSS 28.

Table 1 Fit statistics for the one to four class latent class growth analysis models

| Number of latent classes	Log likelihood	df	BIC	Entropy	LMR-LRT *p*-value
1	-4969.56	5	9970.31	-	-
2	-4841.41	8	9732.72	0.69	0.005
3	-4794.12	11	9656.96	0.74	0.023
4	-4785.64	14	9658.60	0.69	0.098

Confounding variables

This study considered variables that could potentially account for differences in the mental health of mothers and children. In the analyses involving the outcome variable of mother's depression or anxiety, age of mother at wave 1 and mother's ethnicity were included as common covariates. In the analysis involving the outcome variable of child's depression or anxiety, age of child at wave 1, child's ethnicity and child's gender were included as common covariates.

Results

Identification of trajectories of family hardiness

To determine the optimal number of latent growth classes for trajectory of family hardiness from wave 1 to wave 3, various Latent Class Growth Analysis (LCGA) models were estimated. Five hundred and eleven participants were involved in this analysis. The one-class, two-class, three-class and four-class models were compared to identify which model fit the data best. Table 1 presents the results of these analyses. The BIC values indicated that the three-class model fit the data the best as the BIC was lowest for this model. The LMR-LRT *p*-value was also significant, indicating that the three-class model fit the data better than the two-class model. Inspection of the growth parameters indicated that the three-class model yielded the most interpretable trajectories with reasonable class sizes. Furthermore, there was an increase in the entropy value from the two class to three class model (i.e., 0.69 to 0.74) suggesting that the three-class model had better classification than the two-class model. Lastly, the average predicted probabilities for class membership for the three classes ranged from 0.85 to 0.89.

Figure 2 presents the fitted growth curve based on the estimated means for the three latent classes. Class 1 (High stable) had a mean intercept of 47.84 and a slope of 0.00,[1] Class 2 (Low rapidly increasing) had a mean

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[1] Rounded off to 2 decimal places.
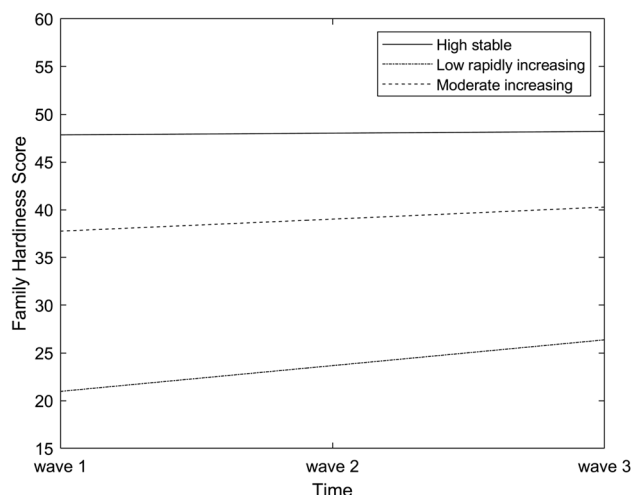
Fig. 2 Trajectories of family hardiness across three waves

intercept of 20.97 and a slope of 0.02 and Class 3 (Moderate increasing) had a mean intercept of 37.76 and a slope of 0.01. Two hundred and eighty-nine families had high initial family hardiness that remained stable over time (class 1), 13 families had low initial family hardiness that rapidly increased over time (class 2) and 209 families had moderate initial levels of family hardiness that increased over time (class 3).

Descriptive statistics

Out of the 511 participants involved in the analyses for the identification of family hardiness trajectories, 49 participants dropped out of the study between wave 1 and wave 3 and 14 multivariate outliers were found based on the mahalanobis distance ($p < 0.001$) of mother's depression and anxiety, child's depression and anxiety, economic hardship and family hardiness at wave 3. Thus, the resulting sample size for the subsequent analyses was 448, with 264 participants in class 1, 9 participants in class 2 and 175 participants in class 3. Table 2 shows the descriptive statistics of the total sample and the participants in each class and the correlation matrix of all the variables in the total sample. An examination of the bivariate correlations revealed significant correlations that were in the expected directions.

Longitudinal main effects of economic hardship trajectories on mental health

Linear regression models were utilized to investigate whether the economic hardship trajectory classes predicted the levels of depression and anxiety in mothers and children at wave 3 (Table 3). Mothers who had high stable economic hardship did not have significantly higher levels of depression

Table 2 Descriptive statistics of study variables represented as mean (standard deviation) and correlation of study variables in total sample

Variable	Total sample (N=448)	High stable group (n=264)	Low rapidly increasing group (n=9)	Moderate increasing group (n=175)	Correlation matrix								
					1	2	3	4	5	6	7	8	9
1 Family hardiness score (Wave 1)	43.2 (8.0)	48.0 (5.2)	21.2 (7.7)	37.1 (4.9)									
2 Family hardiness score (Wave 2)	45.0 (7.0)	48.9 (4.8)	27.9 (5.4)	40.0 (5.0)	.54**								
3 Family hardiness score (Wave 3)	44.9 (7.3)	48.5 (5.3)	30.6 (4.8)	40.2 (6.3)	.57**	.57**							
4 Mother's depression (Wave 3)	6.1 (6.9)	3.9 (4.7)	19.3 (10.5)	8.8 (7.6)	-.38**	-.43**	-.55**						
5 Mother's anxiety (Wave 3)	6.9 (6.9)	5.4 (6.0)	15.1 (10.6)	8.7 (7.3)	-.22**	-.31**	-.34**	.72**					
6 Child's depression (Wave 3)	1.9 (2.1)	1.4 (1.8)	2.0 (2.7)	2.5 (2.3)	-.24**	-.19**	-.34**	.40**	.35**				
7 Child's anxiety (Wave 3)	3.0 (2.9)	2.4 (2.5)	4.1 (3.6)	3.8 (3.3)	-.21**	-.21**	-.29**	.42**	.42**	.64**			
8 Economic hardship score (Wave 3)	12.4 (5.7)	11.9 (5.5)	14.6 (8.4)	12.9 (5.7)	-.08	-.08	-.14**	.16**	.21**	.10*	.13**		
9 Mother's age (Wave 1)	38.6 (6.0)	38.7 (6.0)	39.1 (6.4)	38.4 (6.0)	.06	.02	.01	-.03	-.02	-.05	.00[1]	.08	
10 Child's age (Wave 1)	11.0 (1.4)	11.0 (1.4)	10.3 (1.3)	11.2 (1.4)	.02	-.01	-.04	.06	.05	.11*	-.03	-.04	.20**

* Correlation is significant at the 0.05 level

** Correlation is significant at the 0.01 level

[1] Correlation coefficient rounded off to 2 decimal places

($B = 4.71$, $p = 0.058$) as compared to mothers who experienced low stable economic hardship. However, mothers with moderate decreasing economic hardship had higher levels of depression ($B = 1.90$, $p = 0.002$) than mothers with low stable economic hardship. Mothers with high stable economic hardship experienced greater levels of anxiety ($B = 4.88$, $p = 0.030$) as compared to mothers who experienced low stable economic hardship. Mothers with moderate decreasing economic hardship experienced more anxiety ($B = 2.56$, $p < 0.001$) than those with low stable economic hardship.

In children, those who experienced high stable economic hardship did not have higher levels of depression ($B = 0.53$, $p = 0.314$) than those with low stable economic hardship. Children with moderate decreasing hardship had higher levels of depression ($B = 0.43$, $p = 0.031$) than those with low stable economic hardship. Children with high stable economic hardship did not experience greater levels of anxiety ($B = 0.91$, $p = 0.210$) than those with low stable economic hardship. However, children with moderate decreasing economic hardship experienced greater levels of anxiety ($B = 1.19$, $p < 0.001$) than those with low stable economic hardship.

Longitudinal moderation effect of family hardiness trajectories on the relationship between economic hardship trajectories and mental health

Linear regression models were utilized to investigate whether the trajectories of family hardiness moderated the relationship between trajectories of economic hardship and mental health. The family hardiness trajectory moderated the relationship between economic hardship trajectory and mother's depression ($F = 10.48$, $p < 0.001$; Table 3). For the high stable family hardiness trajectory, mothers experiencing high stable economic hardship did not have more depression ($t = -0.53$, $p = 0.597$; Fig. 3) than mothers experiencing low stable economic hardship. Similarly, mothers experiencing moderate decreasing economic hardship did not have more depression ($t = -0.83$, $p = 0.408$) than mothers who experienced low stable economic hardship. For the low rapidly increasing family hardiness trajectory, mothers in the high stable economic hardship group had higher levels of depression ($t = 12.20$, $p < 0.001$) than those in the low stable group. However, mothers in the moderate decreasing economic hardship group did not experience greater depression ($t = 1.58$, $p = 0.116$) than those in the low stable group. For the moderate increasing family hardiness trajectory, mothers in the high stable economic hardship group did not experience greater depression ($t = 1.31$, $p = 0.191$) than those in the low stable group. Mothers in the moderate decreasing group experienced greater depression ($t = 2.61$, $p = 0.009$) than those in the low stable group.

Table 3 Longitudinal main effects, longitudinal moderation effects and cross-sectional moderation effects on mother's depression, mother's anxiety, child's depression and child's anxiety

	Mother's depression	Mother's anxiety	Child's depression	Child's anxiety
Longitudinal main effect model				
Low stable vs High stable economic hardship trajectory	$B = 4.71, p = .058$	**$B = 4.88, p = .030$**	$B = 0.53, p = .314$	$B = 0.91, p = .210$
Low stable vs Moderate decreasing economic hardship trajectory	**$B = 1.90, p = .002$**	**$B = 2.56, p < .001$**	**$B = 0.43, p = .031$**	**$B = 1.19, p < .001$**
Longitudinal moderation model				
Economic hardship trajectory x Family hardiness trajectory	**$F = 10.48, p < .001$**	**$F = 32.46, p < .001$**	$F = 0.88, p = .477$	**$F = 6.08, p < .001$**
Cross-sectional moderation model				
Economic hardship x Family hardiness	$B = -0.01, p = .383$	$B = -0.00^{1}, p = .566$	$B = -0.00^{1}, p = .507$	$B = -0.00^{1}, p = .586$

Significant results are bolded

[1]Unstandardized regression coefficient rounded off to 2 decimal places

The trajectories of family hardiness moderated the relationship between economic hardship trajectory and mother's anxiety ($F = 32.47$, $p < 0.001$). For the high stable family hardiness trajectory, mothers experiencing high stable economic hardship did not have more anxiety ($t = 0.81$, $p = 0.420$; Fig. 3) than mothers experiencing low stable economic hardship. However, mothers experiencing moderate decreasing economic hardship experienced more anxiety ($t = 2.99$, $p = 0.003$) than mothers who experienced low stable economic hardship. For the low rapidly increasing family hardiness trajectory, mothers in the high stable economic hardship group had higher levels of anxiety ($t = 22.00$, $p < 0.001$) than those in the low sable group. Similarly, mothers in the moderate decreasing economic hardship group experienced greater anxiety ($t = 3.61$, $p < 0.001$) than those in the low stable group. For the moderate increasing family hardiness trajectory, mothers in the high stable economic hardship group did not experience greater anxiety ($t = 1.08$, $p = 0.282$) than those in the low stable group. Mothers in the moderate decreasing group did not experience greater anxiety ($t = 1.70$, $p = 0.090$) than those in the low stable group.

The trajectories of family hardiness did not moderate the relationship between trajectories of economic hardship and children's depression ($F = 0.88$, $p = 0.477$).

However, the trajectories of family hardiness moderated the relationship between trajectories of economic hardship and children's anxiety ($F = 6.09$, $p < 0.001$; Fig. 3). For the high stable family hardiness trajectory, children experiencing high stable economic hardship did not have more anxiety ($t = -0.87$, $p = 0.385$) than children experiencing low stable economic hardship. However, children experiencing moderate decreasing economic hardship experienced more anxiety ($t = 3.52$, $p < 0.001$) than children who experienced low stable economic hardship. For the low rapidly increasing family hardiness trajectory, children in the high stable economic hardship group had higher

levels of anxiety ($t = 6.73$, $p < 0.001$) than those in the low stable group. Similarly, children in the moderate decreasing economic hardship group experienced greater anxiety ($t = 3.19$, $p < 0.001$) than those in the low stable group. For the moderate increasing family hardiness trajectory, children in the high stable economic hardship group did not experience greater anxiety ($t = 0.71$, $p = 0.476$) than those in the low stable group. Children in the moderate decreasing group did not experience greater anxiety ($t = 1.95$, $p = 0.052$) than those in the low stable group.

Cross-sectional moderation of family hardiness on the relationship between economic hardship and mental health

Linear regression was utilized to investigate if the longitudinal moderation effect of family hardiness trajectories on the relationship between economic hardship trajectories and mental health would be repeated when investigated cross-sectionally. As such, the cross-sectional moderation effect of family hardiness at wave 3 on the relationship between economic hardship at wave 3 and mental health outcomes at wave 3 was investigated. Family hardiness did not moderate the relationship between economic hardship and the depression and anxiety of both mothers and children (all $p > 0.05$; Table 3) when investigated cross-sectionally.

Discussion

In the present study, we delineated three distinct trajectories of family hardiness in low-income families, namely the high stable, low rapidly increasing and the moderate increasing trajectory of family hardiness. We found that differences in previously defined trajectories of perceived family economic hardship were associated with differences in the symptoms
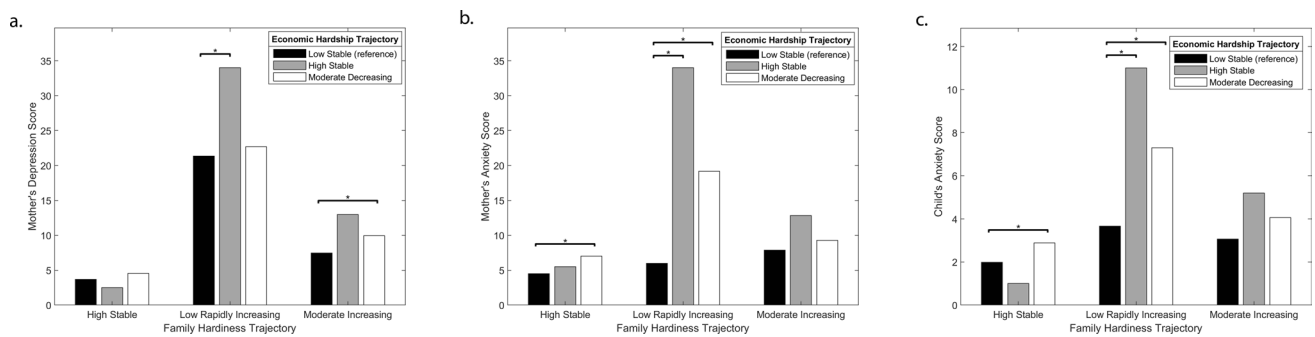
Fig. 3 Moderation effect of trajectory of family hardiness on relationship between economic hardship trajectory and (**a**) mother's depression, (**b**) mother's anxiety and (**c**) child's anxiety

of mothers' and children's depression and anxiety. Furthermore, the trajectories of family hardiness were found to moderate the association between trajectories of economic hardship and mother's depression, mother's anxiety and child's anxiety. Lastly, cross-sectional analysis revealed that family hardiness at wave 3 did not moderate the relationship between economic hardship at wave 3 and mental health of mothers and children at wave 3.

Trajectories of perceived family hardiness

The delineation of three distinct trajectories of family hardiness over 1.5 years suggests that in the low-income context, families experience different pathways in terms of their ability to work together to find solutions to their problems in response to stress. The high stable trajectory of family hardiness could represent families that are working well together consistently over time. The low rapidly increasing trajectory of family hardiness could represent families that are struggling to find ways to work together to cope with their situation and are desperately trying to enhance their ability to work together. Lastly, the moderate increasing trajectory of family hardiness could represent families who are working together moderately well, and are improving in their ability to work together in response to challenges. These varying trajectories of family hardiness, highlight the unique pathway each family takes to respond to the challenges faced in their economic situation (Whitchurch & Constantine, 1993).

Relationship between trajectories of economic hardship and mother's and child's mental health symptoms

We found that previously defined trajectories of perceived family economic hardship were associated with the mental health outcomes of mothers and children. Compared to low stable economic hardship, moderate decreasing economic hardship was associated with greater levels of mother's depression,

mother's anxiety, child's depression and child's anxiety. Similarly, compared to low stable economic hardship, high stable economic hardship was associated with greater levels of mother's anxiety. These results indicate that the overall level of mother's and child's depression and anxiety were higher in the moderate decreasing group than the low stable group. Similarly, the overall level of mother's anxiety was higher in the high stable group than low stable group. We previously found that high stable as compared to low stable economic hardship was associated with a greater likelihood of clinical levels of mother's depression, mother's anxiety and child's anxiety, whereas moderate decreasing as compared to low stable economic hardship was associated with a greater likelihood of clinical levels of mother's anxiety (Wen et al., 2022). Taken together, these findings indicate that the high stable group when compared to the low stable group present with more clinical levels of severe mental health issues in mothers in children, whereas the moderate decreasing group when compared with the low stable group present with more general levels of mental health symptoms in mothers and children. Interestingly, mother's anxiety was found to be elevated when considered as a continuous variable (i.e., original score) and a binary variable (i.e., clinical and non-clinical groups), when both high stable and moderate decreasing economic hardship was compared with low stable economic hardship. This suggests that the varying trajectories of economic hardship exert a consistent effect on mother's anxiety, both when considered both clinically and non-clinically.

Moderation effect of family hardiness trajectories on the relationship between economic hardship trajectories and mental health of mothers and children

The trajectories of family hardiness were found to moderate the relationship between trajectories of economic hardship and mother's depression, mother's anxiety and

child's anxiety. For the moderation effect of family hardiness trajectories on the relationship between economic hardship trajectories and mother's depression, the high stable family hardiness trajectory was found to be protective such that high stable and moderate decreasing economic hardship was not associated with higher levels of mother's depression when compared to low stable economic hardship. Conversely, for the moderation effect of family hardiness trajectories on the relationship between economic hardship trajectories and mother's anxiety and child's anxiety, moderate increasing family hardiness was found to be protective such that high stable and moderate decreasing economic hardship was not associated with higher levels of mother's anxiety and child's anxiety when compared to low stable economic hardship.

This suggests that different trajectories of family hardiness are protective for different aspects of mental health. One possibility is that having a consistently high trajectory of family hardiness confers a sense of stability to mothers, which protects them from feeling depressed in response to a more challenging trajectory of economic hardship. This corroborates with studies that have found that greater stability of the family environment is associated with lower depression in adults (Israel et al., 2002; Ivanova & Israel, 2005). On the other hand, having a moderate increasing trajectory of family hardiness, where the family's ability to overcome challenges is moderately high but seems to be improving over time, buffers mothers and children from feeling anxious in response to a more challenging trajectory of economic hardship. Indeed, facets of the family environment such as cohesion, interparental conflict and stressful family environments have been associated with an increased risk of anxiety (Hudson & Rapee, 2008; Turner et al., 2003). In the present study, families who experience improvements in the sense of cohesion in their family environment could be protected from the effect of more challenging trajectories of economic hardship on their levels of anxiety. Lastly, the low rapidly increasing trajectory of family hardiness appeared to be the least protective for the effect of different trajectories of economic hardship on mental health in mothers and children. Perhaps the low levels of family resilience and the rapid change in terms of the family's ability to respond to challenges is unhelpful for the mental health of mothers and children from low-income families. This is supported be evidence showing that household chaos, defined by environmental confusion in the family, lack of family routines and absence of predictability and structure in daily activities was associated with socioemotional problems in both mothers and children (Marsh et al., 2020).

Limitations of cross-sectional moderation findings

We did not find that family hardiness moderated the relationship between economic hardship and mental health of mothers and children when the analysis was conducted cross-sectionally. Family hardiness at one time point did not moderate the relationship between economic hardship and mental health of mothers and children at the same time point. Although the study by Blgbee (1992) found family hardiness as a moderator of the relationship between negative life events and seriousness of physical and mental health when examined cross-sectionally, the study was conducted on a sample that was not specifically low-income. Furthermore, the stressor of negative life events for individuals who are not from low-income backgrounds may not be similar to the economic hardship faced by individuals from low-income backgrounds. However, based on the results of the present study in low-income families, the histories of family hardiness altered the relationship between the histories of economic hardship and mental health outcomes. This suggests that the moderation effect is only applicable to longitudinal trajectories of economic hardship and family hardiness.

Implications

Practitioners working with low-income families, instead of collecting information about how their family is working together at a single time point, could assess families' history of resilience across time. This could be more indicative of whether the family's efforts to work together are protective for their mental health. Furthermore, different trajectories of family hardiness appear to be protective for different aspects of mental health. High stable family hardiness appears to be protective for mother's depression while moderate increasing family hardiness appears to be protective for mother's anxiety and child's anxiety. Further studies are necessary to understand how these different trajectories of family hardiness contribute as protective factors for the different aspects of mental health. In-depth qualitative studies could explore these relations further.

Strengths and limitations

The present study utilized a relatively large sample of mother–child dyads ($n = 511$ at wave 1) to delineate the trajectories of family hardiness. One aspect of this study that is unique, is the delineation of distinct trajectories of family hardiness. In addition, measures of mental health of both mothers and children were utilized. Nevertheless, our measure or family hardiness was based on the mother's report given that this measure was intended for report by an adult.

Future studies incorporating both mother's and child's perceptions of family hardiness could yield interesting findings.

Conclusion

Three distinct trajectories of family hardiness were delineated in the present study, namely the high stable, low rapidly increasing and moderate increasing trajectories. We found that the trajectories of family hardiness moderated the relationship between trajectories of economic hardship and mental health of mothers and children. The same moderation effect of family hardiness on the relationship between economic hardship and mental health of mothers and children was not found cross-sectionally. These findings highlight the importance of considering the family's history of working together to see if it is protective for the long-term effect of economic hardship on mental health.

Data availability The datasets generated during and analysed during the current study are not publicly available due to the sensitive nature of the population.

Code availability Code for the analyses conducted are not available.

Declarations

Ethics approval The study was approved by the University Institutional Review Board (IRB number: S-18–003) and is in line with the 1964 Declaration of Helsinki and its later amendments.

Consent to participate Mother and child dyads were surveyed in this study. We obtained informed consent from the mother and child assent from the child.

Consent for publication Mothers provided informed consent to participate in the research study and for their data to be published.

Conflicts of interest/Competing interests The authors have no conflicts of interest to declare that are relevant to the content of this article.

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