



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Contents lists available at ScienceDirect

Journal of Affective Disorders

journal homepage: www.elsevier.com/locate/jad

Research paper

Association between family financial decline due to COVID-19 and generalized anxiety disorder among Korean adolescents

Yun Hwa Jung^{a,b}, Bich Na Jang^{a,b}, Minah Park^{a,b}, Eun-Cheol Park^{b,c,*}^a Department of Public Health, Graduate School, Yonsei University, Seoul, Republic of Korea^b Institute of Health Services Research, Yonsei University, Seoul, Republic of Korea^c Department of Preventive Medicine, Yonsei University College of Medicine, Seoul, Republic of Korea

ARTICLE INFO

Keywords:

COVID-19
Adolescent
Financial challenges
Income
Mental health
Anxiety disorders

ABSTRACT

Background: COVID-19 has had a worldwide economic impact. A decline in family financial level can adversely affect adolescents' mental health. This study examined the association between perceived family financial decline due to COVID-19 and generalized anxiety disorder (GAD) among South Korean adolescents.

Methods: Data from 54,948 middle and high school students from the 2020 Korea Youth Risk Behavior Survey were collected in this cross-sectional study. The effect of the perceived family financial decline due to COVID-19 related to GAD was analyzed using binary and multinomial logistic regression.

Results: The relationship between perceived family financial decline due to COVID-19 and GAD was linear with increasing odds ratios and confidence intervals (the possibility of GAD, no financial decline: OR 1.00, mild: OR 1.11, CI 1.05–1.17, moderate: OR 1.30, CI 1.22–1.39, severe: OR 1.48, CI 1.34–1.63). Girls, low-income class, and living with family were vulnerable to GAD. GAD levels of mild, moderate, and severe were most likely to occur in each case of mild, moderate, and severe financial decline, respectively.

Limitations: As this is a cross-sectional study, causality is unknown. Because this study data was self-reported by adolescents, they may have been overestimated or underestimated.

Conclusion: GAD in adolescents is closely related to perceived decreased family finances due to COVID-19. The dose-response of GAD according to financial decline became gradually severe. Anxious adolescents were afraid of uncertain and adverse outcomes affecting them or their families. Therefore, there is a vital need to care for financially affected adolescents.

1. Introduction

COVID-19 emerged as novel coronavirus pneumonia in December 2019. The World Health Organization declared COVID-19 a pandemic in March 2020. By June 2021, the cumulative number of confirmed cases in Korea was 156,961, accounting for about 0.30% of the total population (Korea Ministry of Health and Welfare, 2021; Korea Ministry of the Interior and Safety, 2021). It is estimated that Korea lost 460,000 jobs in the past year due to the COVID-19 crisis, and its annual GDP growth rate fell by 3.7% (Kang et al., 2021).

COVID-19 has wreaked havoc across affected countries, causing financial crises and affecting many social institutions. Family is one such

social institution, wherein the members attempt to maintain social continuity by fulfilling their financial, psychological, and biological needs. However, unexpected and uncontrollable events can cause familial hardship (Uzun et al., 2021). COVID-19 has resulted in unprecedented situations for millions of families worldwide, with individuals experiencing tremendous financial and psychological suffering (James Riegler et al., 2020). Previous studies have suggested that aspects such as loss of income and parenting, and illness burden due to parental unemployment, can adversely affect adolescents' mental health (Gassman-Pines et al., 2020; McKee-Ryan et al., 2005).

While financial problems are convincing sources of stress for any family, they could be more detrimental to poverty-stricken households,

Abbreviations: GAD, Generalized Anxiety Disorder; KYRBS, Korea Youth Risk Behavior Survey; KDCA, Korea Disease Control and Prevention Agency; OR, Odds Ratio; CI, Confidence Interval; VIF, variance inflation factor.

* Corresponding author at: Department of Preventive Medicine & Institute of Health Services Research, Yonsei University College of Medicine, 50 Yonsei-ro, Seodaemun-gu, Seoul 03722, Republic of Korea.

E-mail address: ECPARK@yuhs.ac (E.-C. Park).

<https://doi.org/10.1016/j.jad.2022.04.154>

Received 29 July 2021; Received in revised form 13 March 2022; Accepted 26 April 2022

Available online 30 April 2022

0165-0327/© 2022 Elsevier B.V. All rights reserved.

facing more serious mental health issues. Risk factors for mental health include insufficient income, low socioeconomic status, conflicts with neighbors, and stress (Attar et al., 1994; McLoyd, 1998; Wadsworth et al., 2008). For adolescents, deteriorating mental health due to financial decline should be taken seriously. This is because the part of the brain responsible for social activities that develop during adolescence may not have developed. Early in adolescent development, the role of the parents dominates, while later, the peer environment is ascendant (Nelson et al., 2016). However, poverty can lead to problem parenting and stress on material aspects like food and school supplies for parents. Adolescents may find it difficult to form bonds with their peers due to lack of leisure activity funds, isolation, and anxiety. In addition, a previous study has found that pressure from poverty-related stress is the most detrimental for adolescents compared with other age groups (Santiago et al., 2011). Anxiety is also one of the most common mental disorders among adolescents (Pine et al., 1998). Therefore, it is necessary to understand adolescent anxiety over family financial decline.

Anxiety is a negative emotion experienced in response to fear, fight, or flight induced by a stressful or threatening event (Vine et al., 2012). Individuals usually experience anxiety for two reasons. First, it helps prevent or minimize the impact of adverse events in the future. Second, anxiety results in an increased sense of control over the situation. This feeling helps individuals develop solutions. In sum, it is an emotion that helps us prepare for danger (Freston et al., 1994). While short-term anxiety can be beneficial for the abovementioned reasons, experiencing a constant feeling of anxiety in the long-term can translate into generalized anxiety disorder (GAD). GAD is a chronic disorder and can be comorbid with other psychiatric disorders (Brawman-Mintzer et al., 1993; Dugas, 2000; Keller et al., 1992). Adolescents are particularly vulnerable to psychosocial problems causing anxiety disorders (Jackson and Goossens, 2020); since this developmental phase is critical for their brain maturation, any catastrophic trauma experienced during this time can have long-lasting psychological effects (Bolton et al., 2000).

Previous adolescent-related studies have assessed the anxiety levels of adolescents due to the pandemic and their families' financial conditions. However, studies on GAD in adolescents whose families have been hit by pandemic-related financial constraints are lacking. Therefore, this study aims to explore association between GAD in adolescents and financial threat to their families due to COVID-19. We investigated which items in the GAD-7 questionnaire were more affected by the perceptions of familial financial issues among adolescents, due to COVID-19. We also examined the degree of adolescents' GAD severity according to their families' changing financial situations. The hypothesis of this study was that perceived financial decline caused by COVID-19 in families, acted as a risk factor for GAD in adolescents.

2. Method

2.1. Data

This study used data from the 16th Korea Youth Risk Behavior Survey (KYRBS) 2020, an annual nationwide cross-sectional survey of the Korean representative adolescent population, conducted by the Korea Disease Control and Prevention Agency (KDCA) since 2005. The survey is an anonymous, self-reported online survey of middle school and high school students. The survey for our study was conducted from August to November 2020. The population was stratified by 39 regional and school type variables, and samples underwent cluster stratification by school and class (Hong et al., 2014). In addition, the survey covered socioeconomic status and health-related behaviors, conducted via health interviews and health-related assessments through 103 questions (Lee et al., 2016).

2.2. Participants

The population of this study was based on 2,631,888 middle and

high school students nationwide in Korea. The response rate of the survey target students was 94.9%, excluding 2977 non-participants. Reasons for non-participation were the heavy workload of teachers in charge of this survey and the inability to use computer labs during the COVID-19 period to conduct the assessment. No participants were excluded since there was no missing data. This may be attributed to the fact that the online survey did not move on to the next question until the respondent answered the current one. The final participants included 54,948 students in 400 middle and 400 high schools, comprising 28,353 men and 26,595 women. This study did not require approval or prior consent from an Institutional Review Board since the KYRBS was a secondary dataset available in the public domain and consisted of already de-identified data (Fig. 1).

2.3. Variables

The independent variable was the perceived family financial decline due to COVID-19. The KYRBS assessed economic decline through the question, "Do you think your family's finances are more difficult than before due to COVID-19?" Respondents were categorized as "no financial decline," "mild," "moderate," and "severe" by four ordinal options from strongly agree to strongly disagree.

GAD is the dependent variable, measured by GAD-7, known for its high validity and reliability (Williams, 2014). GAD-7 was a self-report questionnaire consisting of 7 items about "Over the last 2 weeks, how often have you been bothered by the following problems?" The items were: "feeling nervous, anxious, or on edge," "not being able to stop or control worrying," "worrying too much about different things," "trouble relaxing," "being so restless that it's hard to sit still," "becoming easily annoyed or irritable," and "feeling afraid as if something awful might happen." We scored each item on a 4-point Likert scale: not at all (0 points), several days (1 point), more than half the days (2 points), and nearly every day (3 points). The total score on the GAD-7 was accorded the following categorization: 0–4 points (normal), 5–9 points (mild anxiety), 10–14 points (moderate anxiety), and 15–21 points (severe anxiety) (Spitzer et al., 2006).

The covariates were demographic variables (sex and school grade), socioeconomic variables (household income, financial support, family status, academic level, and having one's own room), a COVID-19-related variable (COVID-19 infected city), a mental health-related variable (perceived stress), and health behavior variables (practicing exercise, smartphone dependence). Financial support means material or financial assistance such as meals, school supplies, uniforms, and tuition from individuals or organizations. Regions with high COVID-19 infection rates were Daegu, Seoul, Gyeongsangbuk-do, and Gyeonggi-do, where the proportion of confirmed cases to the local population exceeded 0.05% in November 2020. Regions with lower infected rates included Jeju, Ulsan, Jeonbuk, and Gyeongsangnam-do, where the proportion of confirmed cases to the region's population was less than 0.02%. The other areas were classified as having mid-infection rates (Korea Ministry of Health and Welfare, 2021; Korea Ministry of the Interior and Safety, 2021).

2.4. Statistical analysis

To examine the association between family financial decline due to COVID-19 and GAD, the general characteristics of the study population was conducted as a primary analysis in Table 1. Then, binary and multinomial logistic regression analyses were conducted with PROC SURVEYLOGISTIC, including weight, cluster, and strata (binary logistic regression: Table 2, Table 3, and Fig. 1; multinomial: Table 4). Results were indicated as Odds Ratios (ORs) and 95% Confidence Intervals (CIs). No multicollinearity was detected in either variable using the variance inflation factor (VIF). We conducted a trend test to identify the relationship between the independent and dependent variables. We set the significance level at $p \leq 0.05$. Statistical analyses were performed

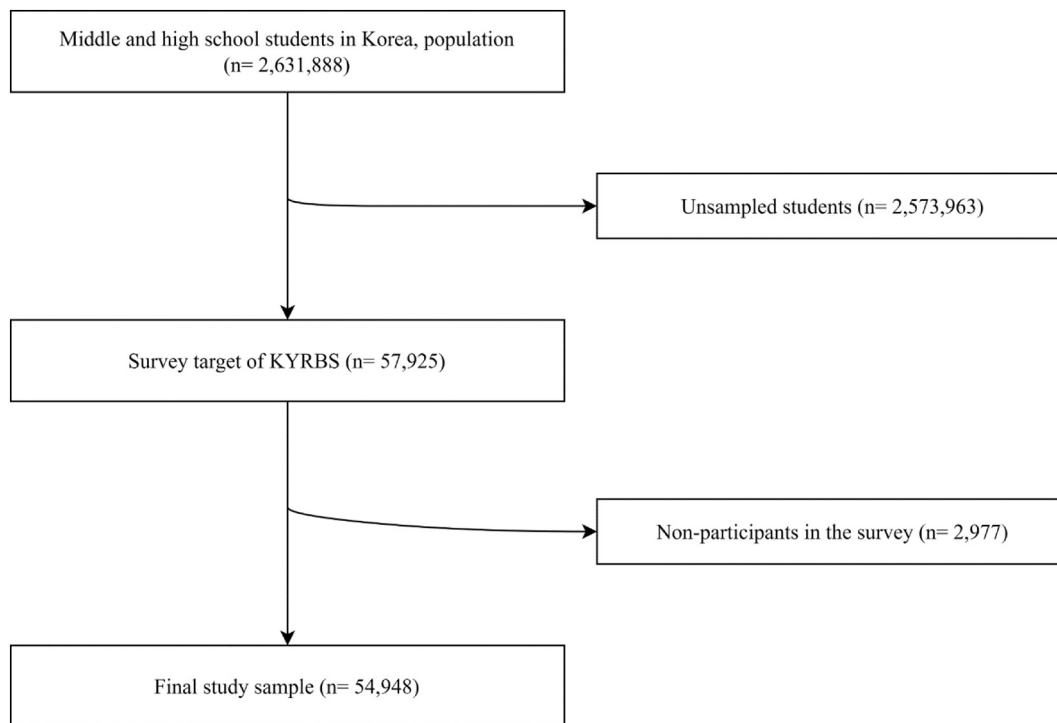


Fig. 1. Flow chart for study participants.

using SAS, version 9.4 (SAS Institute Inc.; Cary, North Carolina).

3. Results

The primary analysis included descriptive statistics of the respondents' general characteristics, according to whether the GAD-7 classified their points as normal or anxious. Of the 54,948 participants, 18,237 had mild, moderate, or severe anxiety, and 36,711 had a normal state. In proportion with GAD, there was a significant positive association between the diagnosis of GAD and the degree of perceived family financial decline due to COVID-19 (Participants with GAD, no financial decline: 26.9%; mild: 32.9%; moderate: 38.6%; severe: 44.1%). Other than the “own room” variable, all other variables showed a statistically significant association with the GAD-7 scores.

The main analysis indicated the results of the binary regression analysis for GAD prevalence. The students with GAD had increased ORs and CIs on the COVID-19-related financial decline item (no financial decline: OR 1.00; mild: OR 1.11, CI 1.05–1.17; moderate: OR 1.30, CI 1.22–1.39; severe: OR 1.48, CI 1.34–1.63). The results of the linear hypothesis test were significant ($p < 0.0001$).

We performed a subgroup analysis by stratifying the level of family financial decline caused by COVID-19. In general, the worse the family financial situation, the more likely the participants had GAD. Boys were vulnerable to GAD when they perceived financial decline compared to when there was no financial decline (mild financial decline: OR 1.10, CI 1.01–1.19; moderate: OR 1.22, CI 1.12–1.33; severe: OR 1.34, CI 1.17–1.53). And girls were more vulnerable to GAD than boys (mild financial decline: OR 1.13, CI 1.05–1.22; moderate: OR 1.39, CI 1.27–1.51; severe: OR 1.67, CI 1.45–1.93). The low-income class was the most adversely affected by COVID-19 (mild financial decline: OR 1.18, CI 0.95–1.47; moderate: OR 1.31, CI 1.06–1.62; severe: OR 1.73, CI 1.38–2.17), followed by the middle- and high-income. In cases of severe financial decline, GAD was more prominent among adolescents living with their families (OR 1.49, CI 1.35–1.65) than those without (OR 1.30, CI 0.87–1.96).

In addition, we performed a subgroup analysis for each item of the GAD-7 scale. All items were more likely to report emotional disturbance

when the family finances declined due to COVID-19 than when they were stable. Among the responses, the answer to the item “Being so restless that it is hard to sit still” was prominent (mild financial decline: OR 1.14, CI 1.07–1.22; moderate: OR 1.32, CI 1.23–1.43; severe: OR 1.58, CI 1.41–1.76). In the item “Feeling afraid as if something awful might happen,” the response of being disturbed also gradually increased with the degree of financial decline (mild financial decline: OR 1.11, CI 1.04–1.18; moderate: OR 1.35, CI 1.27–1.45; severe: OR 1.56, CI 1.40–1.73) (Fig. 2).

Based on multinomial regression, we investigated the family financial decline due to COVID-19 and GAD levels. As the financial decline worsened, the likelihood of anxiety levels as measured by the GAD-7 became progressively more detrimental. Mild anxiety usually accompanied cases of mild financial decline (mild anxiety: OR 1.16, CI 1.09–1.23). Moderate anxiety was most likely present in cases of moderate financial decline (moderate anxiety: OR 1.42, CI 1.27–1.59). Finally, severe anxiety was most likely present in cases of extreme financial decline (severe anxiety: OR 2.07, CI 1.70–2.53).

4. Discussion

This study confirmed that increased severity of perceived family financial decline caused by COVID-19, indicated higher risk of GAD in adolescents. Worrying is primarily a realistic and cognitive event that involves thinking rather than imagining (Borkovec and Inz, 1990). Adolescents can recognize and consider a sudden loss of parental income due to the occurrence of COVID-19. Students may become anxious to avoid negative consequences or disappointment in the future, especially in terms of reduced resources available relative to their desires. Alternatively, children may struggle to control and find solutions to unforeseen financial decline.

Girls and low socioeconomic status are risk factors for generalized anxiety disorder along with adversity in adolescence (Stein and Sareen, 2015). In the United States, the prevalence of GAD in women is about twice that of men (Kessler and Wang, 2008). In a Netherlands cohort study, GAD symptoms were more observed in girls over time, whereas they were less observed in boys (Hale et al., 2008). Family poverty was a

Table 1
General characteristics of the study population.

Variables	Generalized anxiety disorder (GAD-7 ≥ 5)						p-Value
	Total		Yes		No		
	N	%	N	%	N	%	
Total (N = 54,948)	54,948	100.0	18,237	33.2	36,711	66.8	
Perceived family financial decline due to COVID-19							<0.0001
No decline	16,268	29.6	4374	26.9	11,894	73.1	
Mild decline	21,841	39.7	7186	32.9	14,655	67.1	
Moderate decline	13,583	24.7	5240	38.6	8343	61.4	
Severe decline	3256	5.9	1437	44.1	1819	55.9	
Sex							<0.0001
Men	28,353	51.6	7473	26.4	20,880	73.6	
Women	26,595	48.4	10,764	40.5	15,831	59.5	
School grade							<0.0001
7th grade	10,005	18.2	2821	28.2	7184	71.8	
8th grade	9564	17.4	2997	31.3	6567	68.7	
9th grade	9392	17.1	3071	32.7	6321	67.3	
10th grade	8907	16.2	2918	32.8	5989	67.2	
11th grade	8907	16.2	3223	36.2	5684	63.8	
12th grade	8173	14.9	3207	39.2	4966	60.8	
Household income							<0.0001
Low	7212	13.1	3282	45.5	3930	54.5	
Mid	26,397	48.0	8676	32.9	17,721	67.1	
High	21,339	38.8	6279	29.4	15,060	70.6	
Financial support							<0.0001
Yes	5563	10.1	2299	41.3	3264	58.7	
No	49,385	89.9	15,938	32.3	33,447	67.7	
Family status							<0.0001
Living with family	52,332	95.2	17,273	33.0	35,059	67.0	
Living without family	2616	4.8	964	36.9	1652	63.1	
Academic level							<0.0001
Low	18,217	33.2	6849	37.6	11,368	62.4	
Mid	16,585	30.2	5181	31.2	11,404	68.8	
High	20,146	36.7	6207	30.8	13,939	69.2	
Having one's own room							0.5145
Yes	45,288	82.4	15,003	33.1	30,285	66.9	
No	9660	17.6	3234	33.5	6426	66.5	
COVID-19 infected city							0.0047
Low	9194	16.7	3035	33.0	6159	67.0	
Mid	20,155	36.7	6534	32.4	13,621	67.6	
High	25,599	46.6	8668	33.9	16,931	66.1	
Perceived stress							<0.0001
Less	11,907	21.7	753	6.3	11,154	93.7	
Much	43,041	78.3	17,484	40.6	25,557	59.4	
Practicing exercise							<0.0001
Yes	42,875	78.0	13,653	31.8	29,222	68.2	
No	12,073	22.0	4584	38.0	7489	62.0	
Smartphone dependence							<0.0001
Normal	41,173	74.9	11,036	26.8	30,137	73.2	
Potential risk group	12,142	22.1	6093	50.2	6049	49.8	
High risk group	1633	3.0	1108	67.9	525	32.1	

consistent predictor of anxiety among adolescents in Australia (Najman et al., 2010). Since girls value peer approval and fall prey to social comparison, they could be more sensitive to the decline in family finances caused by COVID-19 (Rudolph, 2002). A financial decline in low- and middle-income families may reduce parents' investment in their children. Children generally receive direct and indirect investments from their parents in the form of material resources, care, and financial and social resources of the family environment (Hewlett, 2000). Therefore, reduced investment can lead to unmet needs.

With the severe financial decline, adolescents living with their families were at higher risk of GAD. In the COVID-19 pandemic, the use of face-to-face services such as transportation, catering, exercise, and leisure services has decreased due to the implementation of physical distancing. Some stores that can only be used by people who have been vaccinated against COVID-19 have been created. On the other hand, stores visited by confirmed patients were stigmatized or avoided. Parents who have experienced unexpected and severe poverty due to COVID-19 can focus on finding new sources of income rather than raising their children. They may also feel helpless or increased conflict

with family members due to job loss, pay cuts. Adolescents living with their parents are at risk of sympathizing with their parents' anxieties while in close contact with them. Adolescents whose parents had anxiety disorders were about seven times more likely to have anxiety than those who did not (Turner et al., 1987). In addition, school closures and avoidance of face-to-face contact reduce communication with peers. This may lead to maintaining or exacerbating the anxiety without relieving the stress or tension caused by the family from the outside.

In the relationship between financial decline and GAD-7, we focused on the items “fear that something terrible will happen,” “anxiety makes it hard to stay still,” and “easily angered or neurotic.” Adolescents who witnessed a financial decline within their families, may have viewed COVID-19 as an unexpected and uncontrollable “terrible thing.” A sudden decline in the standard of livelihood may have affected their leisure activities such as friendships, usage of smartphones, or academic activities such as school or study materials purchase. In addition, parent-child disagreements may increase, or parental discouragement may cause the child to worry. Trauma can easily upset adolescents and make it difficult to calm down. Due to the prolonged COVID-19 period and its

Table 2
Results of factors associated with generalized anxiety disorder.

Variables	Generalized anxiety disorder (GAD-7 ≥ 5)	
	OR	95% CI
Perceived family financial decline due to COVID-19 ^a		
No decline	1.00	
Mild decline	1.11	(1.05–1.17)
Moderate decline	1.30	(1.22–1.39)
Severe decline	1.48	(1.34–1.63)
Sex		
Men	1.00	
Women	1.56	(1.49–1.64)
School grade		
7th grade	1.00	
8th grade	1.01	(0.93–1.09)
9th grade	1.01	(0.93–1.08)
10th grade	1.03	(0.95–1.12)
11th grade	1.13	(1.05–1.23)
12th grade	1.31	(1.21–1.42)
Household income		
Low	1.00	
Mid	0.72	(0.68–0.77)
High	0.73	(0.68–0.79)
Financial support		
Yes	1.13	(1.05–1.22)
No	1.00	
Family status		
Living with family	1.00	
Living without family	1.12	(1.00–1.26)
Academic level		
Low	1.00	
Mid	0.86	(0.82–0.91)
High	0.94	(0.89–0.99)
Having one's own room		
Yes	1.00	
No	0.95	(0.90–1.01)
COVID-19 infected city		
Low	0.92	(0.85–0.99)
Mid	0.91	(0.86–0.96)
High	1.00	
Perceived stress		
Less	1.00	
Much	8.45	(7.79–9.18)
Practicing exercise		
Yes	1.04	(0.99–1.09)
No	1.00	
Smartphone dependence		
Normal	1.00	
Potential risk group	2.33	(2.21–2.44)
High risk group	4.76	(4.22–5.37)

^a A trend test was conducted to identify the relationship between the family financial decline due to COVID-19 and GAD. The p for trend result was very significant as <0.0001.

Table 3
Results of subgroup analysis stratified by independent variable.^a

Variables	Generalized anxiety disorder (GAD-7 ≥ 5)							
	Perceived family financial decline due to COVID-19							
	No decline		Mild decline		Moderate decline		Severe decline	
	OR		OR	95% CI	OR	95% CI	OR	95% CI
Sex								
Men	1.00		1.10	(1.01–1.19)	1.22	(1.12–1.33)	1.34	(1.17–1.53)
Women	1.00		1.13	(1.05–1.22)	1.39	(1.27–1.51)	1.67	(1.45–1.93)
Household income								
Low	1.00		1.18	(0.95–1.47)	1.31	(1.06–1.62)	1.73	(1.38–2.17)
Mid	1.00		1.17	(1.07–1.27)	1.38	(1.26–1.52)	1.56	(1.34–1.82)
High	1.00		1.07	(0.99–1.15)	1.24	(1.12–1.37)	1.18	(0.98–1.43)
Family status								
Living with family	1.00		1.11	(1.05–1.18)	1.30	(1.22–1.38)	1.49	(1.35–1.65)
Living without family	1.00		1.10	(0.84–1.44)	1.39	(1.05–1.83)	1.30	(0.87–1.96)

^a Adjusted for other covariates.

associated uncertainty, the mental anguish can result in a vicious cycle for adolescents.

Anxiety levels results according to the perceived intensity of family financial decline due to the COVID-19 were as follows: adolescents were most likely to have mild anxiety when they felt that they were in mild financial decline, moderate anxiety was most likely to exist when they experienced a moderate financial decline, and severe anxiety was most likely to be experienced in extreme financial decline. This dose-response relationship leads us to speculate that GAD is highly related to the family financial decline due to COVID-19. Considering that the recommended standard for GAD diagnosis is moderate anxiety or higher (GAD-7 scores ≥ 10), it is necessary to take additional care of children whose mental health has been impacted due to financial decline.

It is essential to safeguard the mental health of adolescents against anxiety. We emphasize this finding because adolescents under stress may exhibit increased anxiety-related behaviors that continue into adulthood. For example, in an experiment that examined the prefrontal cortex by sex and age of mice, mice stressed during adolescence tended to exhibit anxiety-related behaviors into adulthood (Page and Coutelier, 2018).

The findings of this study could serve as the basis for supporting adolescents in need of psychological help or selecting households in need of financial assistance due to COVID-19. It can also help parents or educators pay attention to adolescents vulnerable to anxiety in the COVID-19 era. Future studies should investigate the mechanism by which parental occupational factors affect adolescents' anxiety during a family financial decline due to COVID-19. Adolescents' psychological perceptions of their parents' financial decline due to the COVID-19 may differ depending on their parents' occupations or types of work.

5. Limitations

While our study presented essential findings, it also had certain limitations. First, the extent of causality between the perceived family financial decline since COVID-19 and GAD is unknown. This is because the present study adopted a cross-sectional design (Levin, 2006). Since cross-sectional studies do not have temporal antecedents, it is difficult to determine causality. Nevertheless, previous studies have suggested a strong association between financial decline or the adverse effects of COVID-19 and mental distress (Chen et al., 2020; Najman et al., 2010). Second, the data used in this study could have been over- or underestimated, since they consisted of adolescents' self-reports and the latter may diverge from legitimate information. Adolescents with distorted responses were more likely to exaggerate their reporting of psychosocial and behavioral data (Fan et al., 2006; Kim et al., 2019). Third, a selection bias may exist since the participants were students. Absent children, children with literary disabilities, home-schooled students,

Table 4
Results of subgroup analysis stratified by generalized anxiety disorder levels.^a

Variables	Generalized anxiety disorder								
	Normal			Mild anxiety		Moderate anxiety		Severe anxiety	
	OR	OR	95% CI	OR	95% CI	OR	95% CI		
Perceived family financial decline due to COVID-19									
Mild decline	1.00	1.16	(1.09–1.23)	1.13	(1.02–1.26)	0.85	(0.74–0.97)		
Moderate decline	1.00	1.31	(1.23–1.40)	1.42	(1.27–1.59)	1.07	(0.92–1.26)		
Severe decline	1.00	1.26	(1.12–1.40)	1.89	(1.62–2.21)	2.07	(1.70–2.53)		

^a Adjusted for other covariates.

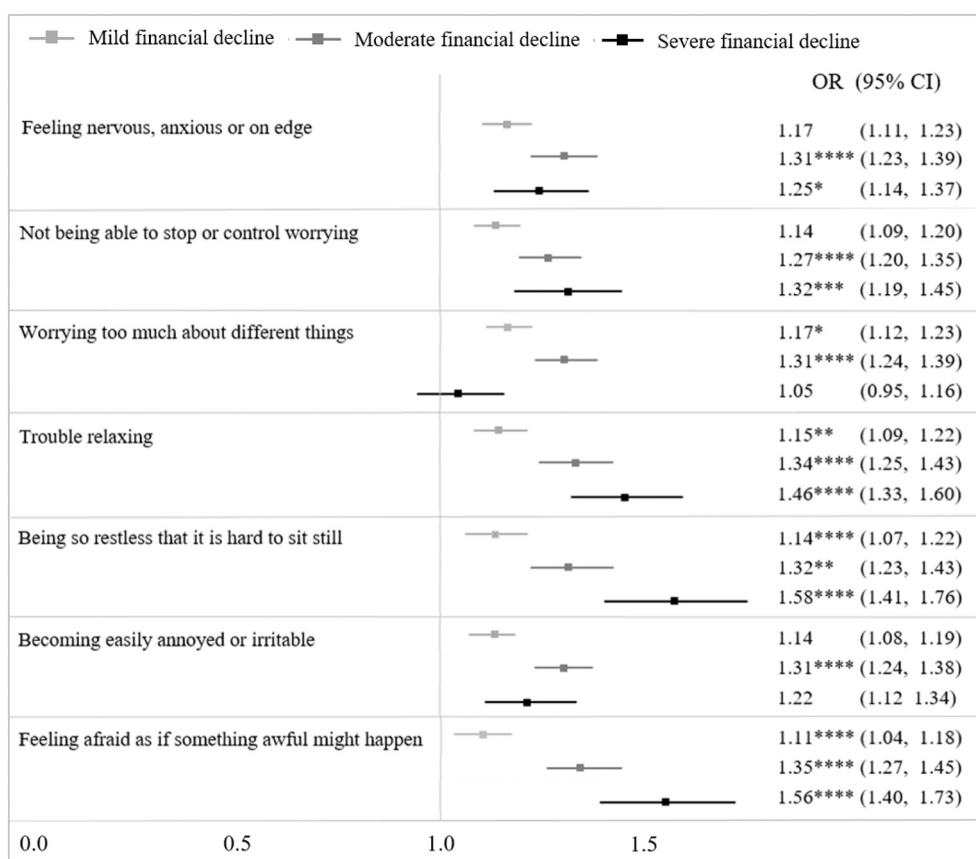


Fig. 2. The results of subgroup analysis stratified by the generalized anxiety disorder scale (adjusted for other covariates). Reference group: No financial decline. *: $p \leq 0.05$, **: $p \leq 0.01$, ***: $p \leq 0.001$, ****: $p \leq 0.0001$.

and exceptional children were excluded from the sample. However, since Korean middle school education is compulsory (Korea Ministry of Education, 1997, last amendment in 2007), and the enrollment rate for 15–19-year-olds is exceptionally high (84.3% in 2018) (Indicators, 2020), the possibility of selection bias may be minimal.

6. Conclusion

The perceived family financial decline caused by COVID-19 is closely related to GAD among adolescents, especially among women and members of the low-income class. Adolescents with GAD are usually afraid of uncertainty and terrible things happening to them. Thus, increased severity in the perceived financial constraint due to COVID-19, results in higher GAD level. Therefore, there is a need to provide appropriate mental care for adolescents whose households have been affected by financial problems. Future research in this area should develop a more effective response to the challenges posed by the COVID-19.

CRedit authorship contribution statement

Yun Hwa Jung designed the study, analyzed the data, and drafted the manuscript. Bich Na Jang and Minah Park assisted to perform the statistical analysis. Eun-Cheol Park conceived the study and provided statistical expertise and contributed to interpretation of results.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of interest

We have no competing interests to report. We have no financial interest, such as fees or grants, received in connection with this study. We also have no other interests, such as employment, consulting, or ownership, that could be affected by the publication of this study.

Acknowledgments

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

We would like to express their sincere appreciation towards the editor and reviewers for their helpful suggestions. We also would like to express our gratitude to KDCA for providing us with the KYRBS dataset. We would like to thank Editage (www.editage.co.kr) for English language editing.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jad.2022.04.154>.

References

- Attar, B.K., Guerra, N.G., Tolan, P.H., 1994. Neighborhood disadvantage, stressful life events and adjustments in urban elementary-school children. *J. Clin. Child Psychol.* 23 (4), 391–400.
- Bolton, D., O’Ryan, D., Udwin, O., Boyle, S., Yule, W., 2000. The long-term psychological effects of a disaster experienced in adolescence: II: general psychopathology. *J. Child Psychol. Psychiatry Allied Discip.* 41 (4), 513–523.
- Borkovec, T., Inz, J., 1990. The nature of worry in generalized anxiety disorder: a predominance of thought activity. *Behav. Res. Ther.* 28 (2), 153–158.
- Brawman-Mintzer, O., Lydiard, R.B., Emmanuel, N., Payeur, R., Johnson, M., Roberts, J., Jarrell, M.P., Ballenger, J.C., 1993. Psychiatric comorbidity in patients with generalized anxiety disorder. *Am. J. Psychiatry* 150 (8), 1216–1218.
- Chen, F., Zheng, D., Liu, J., Gong, Y., Guan, Z., Lou, D., 2020. Depression and anxiety among adolescents during COVID-19: a cross-sectional study. *Brain Behav. Immun.* 88, 36.
- Dugas, M.J., 2000. Generalized anxiety disorder publications: so where do we stand? *J. Anxiety Disord.* 14 (1), 31–40.
- Fan, X., Miller, B.C., Park, K.-E., Winward, B.W., Christensen, M., Grotevant, H.D., Tai, R. H., 2006. An exploratory study about inaccuracy and invalidity in adolescent self-report surveys. *Field Methods* 18 (3), 223–244.
- Freeston, M.H., Rhéaume, J., Letarte, H., Dugas, M.J., Ladouceur, R., 1994. Why do people worry? *Personal. Individ. Differ.* 17 (6), 791–802.
- Gassman-Pines, A., Ananat, E.O., Fitz-Henley, J., 2020. COVID-19 and parent-child psychological well-being. *Pediatrics* 146 (4).
- Hale, W.W., Raaijmakers, Q., Muris, P., Van Goethem, A., Meeus, W., 2008. Developmental trajectories of adolescent anxiety disorder symptoms: a 5-year prospective community study. *J. Am. Acad. Child Adolesc. Psychiatry* 47 (5), 556–564.
- Hewlett, B.S., 2000. Culture, history, and sex: anthropological contributions to conceptualizing father involvement. *Marriage Fam. Rev.* 29 (2–3), 59–73.
- Hong, S., Bae, H.C., Kim, H.S., Park, E.-C., 2014. Variation in meal-skipping rates of Korean adolescents according to socio-economic status: results of the Korea youth risk behavior web-based survey. *J. Prev. Med. Public Health* 47 (3), 158.
- Indicators, O., 2020. Education at a Glance.
- Jackson, S., Goossens, L., 2020. *Handbook of Adolescent Development*.
- James Riegler, L., Raj, S.P., Moscato, E.L., Narad, M.E., Kincaid, A., Wade, S.L., 2020. Pilot trial of a telepsychotherapy parenting skills intervention for veteran families: implications for managing parenting stress during COVID-19. *J. Psychother. Integr.* 30 (2), 290–303. <https://doi.org/10.1037/int0000220>.
- Kang, D.-Y., Min, S.-H., Park, S.-G., 2021. In: *The Impact of the Corona Pandemic on the Korean Economy and Industry: Interim Evaluation*. Korea Institute for Industrial Economics and Trade Industrial Economy, pp. 7–20.
- Keller, M.B., Lavori, P.W., Wunder, J., Beardslee, W.R., Schwartz, C.E., Roth, J., 1992. Chronic course of anxiety disorders in children and adolescents. *J. Am. Acad. Child Adolesc. Psychiatry* 31 (4), 595–599.
- Kessler, R.C., Wang, P.S., 2008. The descriptive epidemiology of commonly occurring mental disorders in the United States. *Annu. Rev. Public Health* 29, 115–129.
- Kim, H.J., Oh, S.Y., Lee, D.W., Kwon, J., Park, E.-C., 2019. The effects of intense physical activity on stress in adolescents: findings from Korea youth risk behavior web-based survey (2015–2017). *Int. J. Environ. Res. Public Health* 16 (10), 1870.
- Korea Ministry of Education, 1997. KOREA FRAMEWORK ACT ON EDUCATION Article 8 (Compulsory Education). last amendment in 2007.
- Korea Ministry of Health and Welfare, 2021. Domestic Occurrences of COVID-19 (accessed 7.10. 2021).
- Korea Ministry of the Interior and Safety, 2021. Resident Registration Demographics (accessed 7.10. 2021).
- Lee, S.Y., Park, E.-C., Han, K.-T., Kim, S.J., Chun, S.-Y., Park, S., 2016. The association of level of internet use with suicidal ideation and suicide attempts in south Korean adolescents: a focus on family structure and household economic status. *Can. J. Psychiatry* 61 (4), 243–251.
- Levin, K.A., 2006. Study design III: cross-sectional studies. *Evid. Based Dent.* 7 (1), 24–25.
- McKee-Ryan, F., Song, Z., Wanberg, C.R., Kinicki, A.J., 2005. Psychological and physical well-being during unemployment: a meta-analytic study. *J. Appl. Psychol.* 90 (1), 53.
- McLoyd, V.C., 1998. Socioeconomic disadvantage and child development. *Am. Psychol.* 53 (2), 185.
- Najman, J.M., Hayatbakhsh, M.R., Clavarino, A., Bor, W., O’Callaghan, M.J., Williams, G. M., 2010. Family poverty over the early life course and recurrent adolescent and young adult anxiety and depression: a longitudinal study. *Am. J. Public Health* 100 (9), 1719–1723.
- Nelson, E.E., Jarcho, J.M., Guyer, A.E., 2016. Social re-orientation and brain development: an expanded and updated view. *Dev. Cogn. Neurosci.* 17, 118–127.
- Page, C.E., Coutellier, L., 2018. Adolescent stress disrupts the maturation of anxiety-related behaviors and alters the developmental trajectory of the prefrontal cortex in a sex- and age-specific manner. *Neuroscience* 390, 265–277.
- Pine, D.S., Cohen, P., Gurley, D., Brook, J., Ma, Y., 1998. The risk for early-adulthood anxiety and depressive disorders in adolescents with anxiety and depressive disorders. *Arch. Gen. Psychiatry* 55 (1), 56–64.
- Rudolph, K.D., 2002. Gender differences in emotional responses to interpersonal stress during adolescence. *J. Adolesc. Health* 30 (4), 3–13.
- Santiago, C.D., Wadsworth, M.E., Stump, J., 2011. Socioeconomic status, neighborhood disadvantage, and poverty-related stress: prospective effects on psychological syndromes among diverse low-income families. *J. Econ. Psychol.* 32 (2), 218–230.
- Stein, M.B., Sareen, J., 2015. Generalized anxiety disorder. *N. Engl. J. Med.* 373 (21), 2059–2068.
- Spitzer, R.L., Kroenke, K., Williams, J.B., Löwe, B., 2006. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch. Intern. Med.* 166 (10), 1092–1097.
- Turner, S.M., Beidel, D.C., Costello, A., 1987. Psychopathology in the offspring of anxiety disorders patients. *J. Consult. Clin. Psychol.* 55 (2), 229.
- Uzun, H., Karaca, N.H., Metin, Ş., 2021. Assessment of parent-child relationship in Covid-19 pandemic. *Child Youth Serv. Rev.* 120, 105748.
- Vine, M., Stoep, A.V., Bell, J., Rhew, I.C., Gudmundsen, G., McCauley, E., 2012. Associations between household and neighborhood income and anxiety symptoms in young adolescents. *Depression and Anxiety* 29 (9), 824–832.
- Wadsworth, M.E., Raviv*, T., Reinhard, C., Wolff, B., Santiago, C.D., Einhorn, L., 2008. An indirect effects model of the association between poverty and child functioning: the role of children’s poverty-related stress. *J. Loss Trauma* 13 (2–3), 156–185.
- Williams, N., 2014. The GAD-7 questionnaire. *Occup. Med.* 64 (3), 224.