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Original article

The Role of Empathy in Chinese Adolescents' Preventive Health Behavior During COVID-19

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A B S T R A C T

Purpose: Preventive health behavior during COVID-19 protects not only oneself but also the welfare of others. However, little attention has been paid to prosocial motivation in adolescents, who are often viewed as selfish and egocentric. Therefore, the current study aimed to explore the role of empathy in adolescents' preventive health behavior using longitudinal data.

Methods: A total of 442 Chinese adolescents (mean age of youth = 13.35 years; 49.5% girls and 50.5% boys) completed two-wave longitudinal surveys over the span of two months during the pandemic (Time 1: July 2020; Time 2: September 2020). At T1, participants reported on their empathic concern, perspective taking, and concern for personal health. At both T1 and T2, participants reported on their preventive health behavior and COVID-related worry.

Results: Adolescents who showed greater empathic concern tend to engage in more preventive health behavior over time ($p < .01$). However, greater empathic concern also predicted adolescents' greater worry about COVID-19 over time ($p < .01$). In comparison, adolescents' perspective-taking and concern for personal health did not predict their health behavior or worry over time. Notably, the longitudinal effect of empathic concern on preventive health behavior and COVID-related worry remained ($ps < .05$) after taking into account adolescents' perspective-taking and concern for personal health.

Conclusions: These findings highlight adolescents' prosocial motivation in engaging in preventive health behavior during the pandemic and also point out the potential negative influence of empathic concern on adolescent mental health.

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IMPLICATIONS AND CONTRIBUTION

Empathy serves as an important driver of prosocial behavior among adolescents, which motivates them to engage in preventive health behavior during COVID-19. Efforts aiming at promoting adolescents' preventive health behavior should consider the motivating role of empathy, with attention to potential negative consequences of empathic concern.

Adolescents have long been viewed as egocentric and rebellious by adults [1]. During the pandemic, adolescents' risk-taking

and noncompliance to COVID-19 guidelines are also highlighted [2,3]. However, adolescents have fundamental needs to contribute to others, and they also gain increased ability to consider others [4,5]. Empathy, which can be defined as the ability or experience of sharing others' emotional state, is an affective and cognitive process that serves as an important driver of prosocial behavior [6]. Past studies have demonstrated that empathy motivates adolescents to assist others and make prosocial contributions [7,8]. In the same vein, empathy may be critical in motivating adolescents to behave in a prosocial

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manner during the current pandemic. Within the context of COVID-19, preventive health behavior (e.g., wearing a mask and practicing social distancing) may be prosocial because it helps protect the welfare of others [9,10]. Therefore, the main goal of this study was to investigate the role of empathy in adolescents' health-related behavior. Given that empathy may also induce emotional ill-being such as anxiety, distress, and guilt [11,12], the role of empathy in adolescents' COVID-related worry was also investigated in this study. Specifically, the current research examined the longitudinal effects of Chinese adolescents' empathic concern and perspective-taking on their preventive health behavior and COVID-related worry over two months during the pandemic while taking into account adolescents' concern for their personal health.

It is important to identify ecological and individual factors that can promote adolescent health behavior and mental health during COVID-19. Prior research has identified several ecological factors in the family (e.g., parent-child communication and conflict), school (e.g., school safety protocol), and peer groups (e.g., peer norms) that may affect adolescents' preventive health behavior and worry about COVID-19 [13–16]. For example, parent-child communication on COVID-19 and peer norms of adherence to COVID-related regulations contribute to adolescents' more preventive health behavior [13,16]. Drawing on the Health Belief Model, recent research also suggests that individual factors, such as self-efficacy, perceived personal benefit of health behavior, and perceived personal risk of the pandemic are linked to more frequent preventive health behavior [17]. Most studies on this issue only examined the concurrent correlations and focused on the factors that may contribute to protecting oneself (e.g., perceived benefit and risk for oneself). However, preventive health behavior has significant implications not only for one's own health but also for those around them and the whole society. For example, wearing a face mask can protect others nearby from respiratory droplets, which is regarded as a sign of altruism [9]. In the context of a global pandemic, preventive health behavior may be considered as sacrificing individual convenience for greater collective rights [18]. By following the policy of mask wearing, the combined effort of the masses can help slow down the spread of the virus and thus reduce the overall negative effects of COVID-19.

The protective role of positive youth development in adolescent adjustment during the pandemic has been highlighted by prior research. For instance, positive youth development qualities (e.g., emotional competence, resilience, and bonding with others) may reduce PTSD symptoms during COVID-19 [19]. Given that engaging in preventive health behavior might be particularly prosocial during the pandemic, adolescents' empathy may play a role in promoting such health behavior. Empathy is a multidimensional construct that involves empathic concern (i.e., affective empathy, the feeling of sorrow and concern for others) and perspective-taking (i.e., cognitive empathy, the awareness and understanding of others' emotions) [6]. It is critical to study the role of empathy and prosocial behavior during a challenging time like COVID-19. As exposure to trauma is likely to elicit empathic feelings [20], empathy may play a particularly important role in behavioral and emotional responses to the pandemic. Moreover, since prosocial behavior tends to emerge in emergency situations [21], trauma and difficulty during COVID may also bring out the intention to engage in prosocial behavior. Despite the chaos and disorganization during challenging times, prosocial behavior is a primary response to the crisis [22].

Culture may shape empathic responses in multiple ways. For example, cross-cultural research across 63 countries suggests that the level of collectivism is associated with higher levels of empathic concern [23]. Moreover, because the self in East Asian cultures is interdependent and interpersonally connected to the group of people around them [24], East Asians are more likely to show heightened empathic response toward their in-group members over their out-group members [25]. Despite country-level differences in empathy, empathy is related to greater prosocial behavior across cultures [23].

Recent research found that empathic concern is concurrently correlated with more frequent social distancing and mask wearing in adults, and inducing empathy increases adults' intention to engage in these health behaviors [26]. With regard to adolescent development, longitudinal studies demonstrate that empathic concern is predictive of adolescents' increased prosocial behavior (e.g., helping a stranger in need) [7,8]. Given the possible prosocial aspect of preventive health behavior, it is likely that empathic concern also predicts adolescents' health behavior over time during the pandemic. In comparison, the impact of perspective-taking on prosocial behavior is less clear. Prior meta-analysis reveals mixed results on the link between perspective-taking and prosocial behavior [27]. Whereas individuals with greater perspective-taking may be more capable of helping others [28], they may also be more likely to manipulate and exploit personal relationships [29].

Although empathic concern may promote adolescents' preventive health behavior during COVID-19, it may come at the cost of greater worry about the pandemic. Past research suggests that empathic concern tends to induce distress and guilt that can eventually lead to greater depression [11]. For example, empathy-based guilt may dampen emotional well-being through greater burnout and compassion fatigue [30]. Moreover, empathy tends to elicit greater pathogenic guilt under adverse environments (e.g., family conflict) [12]. During COVID-19, a great number of individuals around the world suffer from the disease. Therefore, adolescents with a greater empathic concern may worry too much about the pandemic, which may negatively influence their mental health in the long run.

The current research examined Chinese adolescents during the time when the country was drastically influenced by the COVID-19. Scholars have pointed out that prior studies on Chinese adolescents during COVID-19 were mainly cross-sectional [31]. To address this issue, the current research employed a two-wave longitudinal design, which spanned two months during COVID-19. The first goal was to examine whether adolescents' empathy is predictive of their preventive health behavior over time. Guided by prior research, it was hypothesized that adolescents' affective empathy (i.e., empathic concern), but not their cognitive empathy (i.e., perspective-taking), longitudinally predicts more preventive health behavior. The second goal was to investigate whether empathic concern is predictive of adolescents' greater COVID-related worry over time. It was expected that adolescents who showed greater levels of empathic concern tend to worry more about the pandemic over two months. Importantly, the effects of adolescents' empathy on their preventive health behavior and COVID-related worry were examined while taking into account their concern for personal health. Moreover, given that empathic concern and perspective-taking are distinctive concepts (i.e., affective empathy vs. cognitive empathy) [6], and they may interact with each other [8], the current study examined whether

there are interaction effects between empathic concern and perspective-taking in predicting adolescents' preventive health behavior and COVID-related worry.

Methods

Participants

The sample consisted of 442 Chinese adolescents recruited from three middle schools in Shanghai. One school was above-average, and the other two were average in terms of achievement, with families primarily from working- and middle-class backgrounds. Adolescents were seventh graders (Mean age = 13.35 years, $SD = .36$ years; 49.5% girls and 50.5% boys). With regard to parents' educational attainment, 47% of mothers and 52% of fathers had education beyond high school (e.g., a bachelor's or master's degree). Parents' educational attainment was similar to the average level in the Shanghai municipal area [32], suggesting that the sample may be regionally representative.

Procedure

The current study employed a longitudinal design in which adolescents completed online questionnaires twice over the span of two months. The research team sent recruitment letters to parents via the school principal, which provided detailed information about the study, such as the research institution, main topics in questionnaires, and the estimated time to complete the questionnaires. A head instructor who is in charge of a class also reminded parents of the letter in the class group chats in WeChat, a commonly used mobile application in China. At each wave, extensive explanations of the research were given. Parents provided permission for adolescents to participate in the study, and adolescents completed the online consent before taking the questionnaire. Both waves were conducted when the society was under the influence of COVID-19 (Time 1: early July 2020; Time 2: early September 2020), such that COVID-specific preventive health behavior (e.g., wearing a mask) was required by the government and advised by the media. Ethical approval for the study was obtained from the Institutional Review Board in the School of Social Development and Public Policy at Fudan University. Participants received small gifts for their participation.

Among the 442 adolescents who participated at T1, 376 of them continued to participate at T2. Attrition from T1 to T2 was 14.9%. Comparison of participants completing both waves to those completing only the first revealed no differences at T1 on any of the variables examined in this report, $F_s < .72$, $p_s > .39$. Moreover, results in Little's MCAR test (Chi-Square = 2.31, $p = .68$) verified that missing cases were missing completely at random (MCAR) [33]. To handle the missing data, analyses were conducted using Amos 21.0, which utilizes Full Information Maximum Likelihood (FIML) estimation to provide reliable standard errors under a wide range of conditions, and is preferred over list-wise deletion, pairwise deletion, and mean-imputation [34].

Measures

Adolescents' empathic concern and perspective-taking. At T1, adolescents' empathic concern and perspective-taking were

assessed using the empathic concern subscale and the perspective-taking subscale from the Interpersonal Reactivity Index (IRI) [35]. Adolescents reported on their empathic concern (7 items; e.g., "I am often quite touched by things that I see happen"), as well as their perspective-taking (7 items; e.g., "I sometimes try to understand my friends better by imagining how things look from their perspective") on a 5-point Likert scale (1 = *does not describe me well*, 5 = *describe me well*). The means were taken for each subscale, with higher numbers indicating adolescents' greater empathic concern ($\alpha = .81$) and perspective-taking ($\alpha = .80$).

Adolescents' concern for personal health. At T1, adolescents reported on their concern for personal health using six items that have been widely used in prior research on health beliefs [36]. Adolescents rated how much they value their own health (e.g., "I think about my health a lot") on a 5-point Likert scale (1 = *not accurate at all*, 5 = *extremely accurate*). The items were averaged, with higher numbers indicating adolescents' greater concern for their personal health ($\alpha = .82$).

Adolescents' COVID-related preventive health behavior. At both T1 and T2, adolescents reported on their preventive health behavior using items adapted from the World Health Organization's guidance of preventive behavior [10]. On a 5-point Likert scale (1 = *never*, 5 = *all the time*), adolescents reported on the frequency of each behavior (5 items; e.g., "practice social distance" and "wear a mask when you go outside") during the week. The items were averaged, with higher numbers indicating more frequent COVID-related preventive health behavior ($\alpha = .84$ at T1 and $.86$ at T2).

Adolescents' COVID-related worry. At both T1 and T2, adolescents responded to the question "How worried are you about COVID-19?" on a 5-point Likert scale (1 = *not worried at all*, 5 = *very worried*). Higher numbers indicated adolescents' greater COVID-related worry.

Demographic covariates. At T1, adolescents reported on their age (years), gender ($-1 =$ boys and $1 =$ girls), and their parents' educational attainment ($-1 =$ less than a college degree and $1 =$ college degree or higher).

Results

Overview of analyses

The key goal of the study was to examine the role of adolescents' empathy (i.e., empathic concern and perspective-taking) in their preventive health behavior and COVID-related worry. Moreover, adolescents' concern for personal health was also taken into account as a potential predictor to ensure the unique effect of empathy. To this end, a set of analyses was conducted in the context of Structural Equation Modeling (SEM) with Amos 21.0. Adolescents' COVID-related health behavior (or worry) at T2 were predicted by adolescents' empathic concern, perspective-taking, and concern for personal health separately and simultaneously at T1, while controlling for adolescents' prior (i.e., T1) health behavior (or worry). Adolescents' age (years), gender ($-1 =$ boys and $1 =$ girls), and parents' educational attainment ($-1 =$ less than a college degree and $1 =$ college degree or higher) were included as covariates in the models and allowed to

Table 1
Descriptive statistics and correlations between the variables

	1	2	3	4	5	6	7	8	9	10
1. T1 empathic concern	–									
2. T1 perspective-taking	.51***	–								
3. T1 concern for personal health	.30***	.37***	–							
4. T1 preventive health behavior	.22**	.25***	.30***	–						
5. T2 preventive health behavior	.21**	.15**	.10	.29***	–					
6. T1 COVID-related worry	.15***	.10*	.26***	.24***	.19***	–				
7. T2 COVID-related worry	.19***	.07	.22***	.24***	.28***	.47***	–			
8. Age	.05	.00	–.05	–.02	.01	–.01	.05	–		
9. Gender	.05	.02	–.09	.03	.14*	.04	–.01	–.06	–	
10. Parent education	–.00	.09	.11*	.03	–.00	–.09	–.06	–.07	–.01	–
Mean	3.38	3.50	3.88	4.42	4.34	3.30	3.03	13.35	–.01	–.00
SD	.61	.64	.81	.72	.77	1.07	1.10	.36	1.00	.92
Range	1–5	1.71–5	1–5	1–5	1–5	1–5	1–5	12.3–15.5	–1–1	–1–1

Note. For gender, –1 = boys and 1 = girls. For parental education, –1 = less than a college degree and 1 = college degree or higher.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

correlate with one another; they were also allowed to correlate with adolescents' empathic concern, perspective-taking, concern for personal health, health behavior, and worry at T1 and predict health behavior and worry at T2. The models included all possible links, making them saturated with a perfect fit.

Descriptive analyses

Table 1 shows descriptive statistics and the Pearson correlations among variables. Adolescents' empathy and concern for personal health were positively correlated. Adolescents who reported greater empathic concern at T1 engaged in more preventive health behavior and reported greater COVID-related worry at both waves. Adolescents who reported greater perspective-taking at T1 engaged in more preventive health behavior at both waves and reported greater COVID-related worry at T1. Adolescents who showed greater concern for personal health engaged in more preventive health behavior at T1 and reported greater COVID-related worry at both waves. Within-subject repeated measure analyses suggested that adolescents' preventive health behavior decreased marginally from T1 to T2 ($F = 3.78, p = .053$), and their COVID-19 related worry decreased significantly over time ($F = 24.98, p < .001$).

Predicting adolescents' preventive health behavior and COVID-related worry

We first included adolescents' empathic concern, perspective-taking, and concern for personal health separately into the models (Model 1, 2, and 3 in Table 2), such that adolescents' preventive health behavior (or COVID-related worry) at T2 was predicted by adolescents' empathic concern (or perspective-taking, or concern for personal health) at T1 while controlling for adolescents' prior (i.e., T1) health behavior (or worry) and other covariates. As shown in Model 1 of Table 2, adolescents' empathy at T1 predicted more frequent preventive health behavior ($\beta = .16, p < .01$), as well as greater COVID-related worry ($\beta = .13, p < .01$) two months later (i.e., T2). However, as shown in Model 2 of Table 2, adolescents' perspective-taking at T1 did not predict their preventive health behavior nor their COVID-related worry over time ($\beta s < .08, ps$

$> .14$). Similarly, as shown in Model 3 of Table 2, adolescents' concern for personal health at T1 did not predict their preventive health behavior nor their COVID-related worry over time ($\beta s < .10, ps > .05$).

Given the concurrent association between adolescents' empathic concern and perspective-taking, as well as concern for personal health at T1 ($r s > .30, ps < .001$), we then included them simultaneously to identify their unique and overlapping effects on adolescents' health behavior and worry (Model 4 in Table 2). As shown in Model 4 of Table 2, when adolescents' preventive health behavior (or COVID-related worry) was predicted simultaneously from adolescents' empathic concern, perspective-taking, and concern for personal health, adolescents' empathic concern was still predictive of more frequent preventive health behavior ($\beta = .17, p < .01$), as well as greater COVID-related worry ($\beta = .15, p < .05$) at T2, whereas adolescents' perspective-taking and concern for personal health failed to predict neither health behavior nor worry over time ($\beta s < .08, ps > .18$).

Supplementary analyses

Supplementary analyses were conducted to examine whether there are interaction effects between empathic concern and perspective-taking or concern for personal health in predicting preventive health behavior and COVID-related worry over time. Moderation analyses suggested that there was no Empathic concern X Perspective-taking interaction effects on adolescents' preventive health behavior or COVID-related worry ($\beta s < .08, p > .11$). Similarly, results suggested that there was no Empathic concern X Concern for personal health interaction effects on preventive health behavior or COVID-related worry ($\beta s < .03, p > .74$). In addition, supplementary analyses were conducted to examine whether there are (1) gender differences in adolescents' empathic concern or perspective-taking, and (2) gender differences in the links between adolescents' empathic concern or perspective-taking and their preventive health behavior or COVID-related worry over time. Independent samples T-tests suggested that there were no gender differences in adolescents' empathic concern or perspective-taking ($t s < .99, ps > .32$). Moreover, multigroup comparison analyses in the context of SEM suggested that the longitudinal associations between

Table 2
Predicting adolescents' preventive health behavior and COVID-Related worry over time

	T2 Preventive health behavior			T2 COVID-related worry		
	B	SE	β	B	SE	β
Model 1						
Age	.01	.11	.01	.14	.15	.05
Gender	.08	.04	.11*	-.02	.05	-.02
Parent education	.00	.04	.00	-.04	.06	-.03
T1 health behavior or worry	.27	.06	.25***	.45	.05	.44***
T1 empathic concern	.20	.07	.16**	.23	.09	.13**
Model 2						
Age	.03	.11	.02	.17	.15	.06
Gender	.09	.04	.11*	-.01	.05	-.01
Parent education	-.01	.05	-.01	-.04	.06	-.03
T1 health behavior or worry	.28	.06	.26***	.46	.05	.45***
T1 perspective-taking	.10	.07	.08	.05	.09	.03
Model 3						
Age	.04	.11	.02	.18	.15	.06
Gender	.09	.04	.12*	-.00	.05	-.00
Parent education	-.00	.05	-.00	-.05	.06	-.04
T1 health behavior or worry	.29	.06	.27***	.44	.05	.43***
T1 concern for personal health	.03	.05	.03	.14	.07	.10
Model 4						
Age	.01	.11	.01	.15	.15	.05
Gender	.08	.04	.11	-.01	.05	-.01
Parent education	.00	.04	.00	-.04	.06	-.03
T1 health behavior or worry	.27	.06	.26***	.43	.05	.42***
T1 empathic concern	.21	.08	.17**	.26	.10	.15*
T1 perspective-taking	.00	.08	.00	-.12	.10	-.07
T1 concern for personal health	-.03	.06	-.03	.10	.07	.08

Note. For child gender, -1 = boys and 1 = girls. For parental education, -1 = less than a college degree and 1 = college degree or higher.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

adolescents' empathic concern or perspective-taking and their preventive health behavior or COVID-related worry did not vary by gender.

Discussion

Preventive health behavior during COVID-19 has a potential prosocial aspect in that it protects not only one's own health but also the well-being of other individuals. However, little attention has been paid to how prosocial motivation may influence such behavior in adolescents. To our knowledge, the current study is the first longitudinal study to examine the role of empathy in adolescents' behavioral adjustment during COVID-19. Results suggest that higher levels of empathic concern in adolescents were predictive of their more frequent preventive health behavior over two months during COVID-19. The findings are in line with recent research that highlights the role of empathic concern in preventive health behavior in adults [26], as well as prior studies that demonstrate the longitudinal effects of empathic concern on adolescents' heightened prosocial behavior during a normal time [7,8]. Moreover, the findings echo previous research that highlights the protective role of positive youth development in adolescent adjustment during the pandemic [19].

Adolescents have long been viewed as selfish and self-centered [1]. During the pandemic, their noncompliance to COVID-19 guidelines has been widely mentioned [2,3]. However, our findings suggest that there may be a prosocial

component in preventive health behavior, and adolescents may engage in preventive health behavior for a prosocial reason. Scholars have called for attention that although adolescents have fundamental needs to contribute to others, they may not have enough opportunities to make these contributions in everyday lives [4,5]. Our findings suggest that, engaging in preventive health behavior during the pandemic may be an opportunity for them to assist others, and such assistance may have a notable positive impact on adolescents' behavioral adjustment.

In contrast, adolescents' perspective-taking did not predict their preventive health behavior over two months during COVID-19. In line with prior studies on perspective-taking and prosocial behavior [37], perspective-taking was concurrently correlated with preventive health behavior. However, the longitudinal association between perspective-taking and preventive health behavior was not significant, which is also consistent with prior research on longitudinal effects of perspective-taking on prosocial behavior [8]. Similarly, adolescents' concern for personal health did not predict their preventive health behavior over time. Consistent with prior cross-sectional studies using the Health Belief Model to study health behavior [17], concern for personal health was found to be concurrently correlated with preventive health behavior in the current study. However, such concern for personal health did not have a longitudinal effect on adolescents' preventive health behavior over time. It is possible that adolescents' concern for personal health may have changed during COVID-19 due to the rapid progression of the pandemic. Such changes may result in the differences in the longitudinal versus concurrent effects of concern for personal health on health behavior because personal health concerns at one time point may be less relevant in a later time as pandemic situations may have changed. In comparison, because empathy can be partially conceptualized as a trait [38], it is likely to have consistent associations with health behavior both concurrently and longitudinally.

With regard to adolescents' emotional well-being, higher levels of empathic concern also predicted adolescents' greater worry about COVID-19. This finding is in line with prior research on empathic concern and emotional ill-being (e.g., anxiety, guilt, distress) [11,12]. When individuals around the world suffer from COVID-19, there is a risk that adolescents with a greater empathic concern may worry too much about the pandemic. Past research suggests worry is longitudinally associated with mental health problems [39]. Therefore, greater worry during the pandemic may foreshadow long-term mental health issues. However, it is also important to note that the finding does not necessarily assert the detrimental consequence of empathic concern during the pandemic on adolescents' mental health because distress during COVID-19 is likely to be transient and it may not lead to depression or anxiety [40]. In fact, adolescents' well-being may thrive under the influence of COVID-19 [41]. Moreover, earlier studies on other pandemic incidents also suggest that pandemic is unlikely to have a long-term negative influence on mental health [42].

There are several limitations in the current study that point to directions for future research. First, the current study relied on self-reported measures. Because our examples of preventive health behavior were required or strongly recommended by the government and the media, it is possible that adolescents may over-report their health behavior due to social desirability [43]. It is important for future research to examine adolescents'

health behavior using reports also from parents and teachers, and pay attention to potential differences in self-report and other-report.

Second, the longitudinal design of the current study only included two waves with two months apart to examine the short-term influence of adolescents' empathy on their behavioral and emotional adjustment. Therefore, the effects of empathy on health behavior and COVID-related worry over a longer period during the pandemic remain unclear. Future studies should employ longitudinal designs over six months or one year to investigate the long-term influence. With regard to the effects of empathic concern on preventive health behavior and COVID-related worry over time, the effect sizes fall into the small range [44]. This may be due to the short interval (i.e., two months) between T1 and T2. However, small short-term effects may have more ultimately consequential impacts in the long run [44]. Moreover, the two-wave design made it difficult to examine the potential mediators in the link between empathic concern and preventive health behavior. Scholars have pointed out the necessity to study the “missing links” between the pandemic and adolescent outcomes and mapped out clear directions for future research [45]. In line with this call, it is important for future studies to consider potential moderators and mediators with regard to the link between empathy and health behavior. For example, it is possible that adolescents' empathic concern increases their attention to the progression and knowledge of the pandemic, which, in turn, leads to more frequent preventive health behavior.

Third, the current study only focused on Chinese adolescents using a sample of 442 adolescents. Due to the small sample size, the generalizability of the findings should be interpreted with caution. Adolescents in this study are from working- and middle-class families in Shanghai, and their parents' educational attainment is similar to the local average level [31], which suggests that the sample may be regionally representative. Given that the COVID situation varies across regions, it is necessary for future research to examine the role of empathy in adolescents' adjustment in other regions and countries. Finally, although the models in the current study have taken into account adolescents' demographics, concern for personal health, as well as adolescents' prior adjustment to examine the longitudinal impact of empathy on adolescents' health behavior and COVID-related worry, there are other factors that may play a role. Future studies can include potential factors such as epidemic knowledge, personality traits, and mental health status to examine adolescents' behavioral and emotional adjustment during the pandemic.

In summary, the current study found that the more adolescents showed empathic concern for others, the more they engaged in preventive health behavior during COVID-19. Notably, the effect of empathic concern on adolescents' preventive health behavior remained over and above their perspective-taking and personal health concerns. Despite the numerous negative impacts that the pandemic has caused, it also created an opportunity for adolescents to contribute to the society by engaging in preventive health behavior. Interventions aiming to promote adolescents' preventive health behavior during the pandemic should consider the motivating role of empathy. However, adolescents' empathic concern also predicted their greater COVID-related worry, which may have undesirable consequences on their long-term mental health. Whereas empathic concern may foster adolescents' behavioral adjustment during the pandemic, its

potential negative influence on emotional adjustment should not be overlooked.

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