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Exploring the role of family communication time in the association between family dinner frequency and adolescent psychological distress

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Short title: Adolescent distress and family dynamics

Declarations

Funding

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Competing interests

The authors declare that they have no competing interests

Ethical approval

This study has been approved by the Institutional Review Board of Hong Kong University and Hospital Authority Hong Kong West Cluster (Reference number: UW 17-179). Informed written consent was obtained from parents of all child participants.

Consent to participate

This study has been approved by the Institutional Review Board of Hong Kong University and Hospital Authority Hong Kong West Cluster (Reference number: UW 17-179). Informed written consent was obtained from parents of all child participants.

Consent for publication

Not applicable.

Availability of data and material

The datasets generated and/or analyzed during the current study are available from the corresponding author on request.

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Authors' contributions: RSW drafted the initial manuscript and performed major parts of the statistical analysis. KHTC and ARML drafted the initial manuscript. KTST drafted the initial manuscript and assisted in performing statistical analysis. FKWH, KLC and PI contributed to overall study coordination, data preparation, and interpretation of results. All authors have approved the final manuscript as submitted.

Abstract (215 words)

Although research shows that family dinner is associated with adolescent psychological well-being, it is unclear whether this association still exists when parent-adolescent communication is limited particularly in today's high-tech society where frequent family meals may not necessarily co-exist with frequent family communication. We therefore examined the relationships between adolescent psychological distress and parent-adolescent dinner frequency and parent-adolescent communication time using data from 826 parent-adolescent dyads. Adolescents self-reported symptoms of anxiety, depression, and stress in the preceding month using the validated Chinese version of the Depression Anxiety and Stress Scale – 21 (DASS-21). Their parents reported the frequency of breakfasts and dinners and duration of daily communication with the adolescent as well as other family sociodemographic characteristics. Moderated regression analysis was used to examine associations of adolescent psychological distress with parent-adolescent dinner frequency and parent-adolescent non-conflictual communication time. We found that parent-adolescent non-conflictual communication time was independently and significantly associated with adolescent DASS Depression ($\beta = -1.31, p < 0.001$), Anxiety ($\beta = -0.84, p < 0.001$), and Stress ($\beta = -1.00, p < 0.001$) scores, but parent-adolescent dinner frequency was not. Furthermore, adolescents reported lower levels of depression and stress only when they concurrently engaged in both everyday dinner and regular non-conflictual communication with parents. Findings emphasize the importance of regular dinner and non-conflictual communication with parents for promoting adolescent psychological well-being.

Keywords: family dinner, parent-adolescent communication, depression, anxiety, stress

Introduction

Psychological distress is an umbrella term covering a broad spectrum of negative emotional states characterized by feelings of sadness, tension, irritability, and anxiety (Drapeau et al., 2012). Notably, the symptoms of anxiety, depression, and stress have attracted considerable attention in the adolescent mental health literature. Compared to anxiety and depression, stress was thought to be more transient and exhibited as an immediate response to environmental demands (Anyan & Hjemdal, 2016). Rapid physical, emotional, and social changes are among the factors that can increase psychological distress in adolescents, whereas parental support can help to buffer the negative consequences of these stressful events (Mackin et al., 2017). Indeed, researchers often use parent-adolescent communication time and family meals frequency as a proxy of the degree of closeness between parents and their adolescents (Fulkerson et al., 2006; Wong et al., 2021). High-quality parent-adolescent relationship was found to provide a secure base to support adolescents to overcome difficulties and challenges (Guang et al., 2017), but the definition of high quality can vary between individuals.

Previous research has shown a link between family meals and adolescent perception of family relationship (Wong et al., 2021). It has been theorized that family meals are the most plausible time of the day when parents and adolescents can sit together to learn about the everyday, ongoing aspects of each other's lives (Wang et al., 2014). Eating meals together provides an activity setting for parents to observe any unusual changes or signs of risk behaviors in their adolescents (Skeer & Ballard, 2013). As described in the literature, regular mealtime activities can foster a sense of belonging in the adolescents, and enhance their willingness to discuss sensitive, difficult topics with parents (Offer, 2013a). Nonetheless, adolescents who are

distressed or perceive bad relationships with parents may avoid meals with their families (Larson et al., 2006). Enhanced mobile connectivity in today's society was also reported to be associated with the reduction and interruption of daily parent-adolescent activities (Kildare & Middlemiss, 2017; Tadpatrikar et al., 2021). In modern societies such as Hong Kong where people have high reliance upon digital technology anytime and anywhere, eating meals together could be merely the act of eating without any communication or interaction between family members.

Although reports on parents taking family mealtimes to deal with work-related emails are available, very few empirical work has been done to explore the potential impact of this new form of family meal culture on adolescent psychological well-being. Furthermore, it remains uncertain as to whether eating dinner with parents, in the absence of communication and interactions, could still have a positive effect on adolescent psychological functioning. Hence, we conducted a cross-sectional survey study to explore the relationship between parent-adolescent dinner frequency, parent-adolescent non-conflictual communication time, and adolescent psychological distress in Hong Kong where regular family dinner is common, but parents and their adolescents may not communicate with each other regularly. Specifically, we hypothesized that parent-adolescent dinner frequency and parent-adolescent non-conflictual communication time would be independently and significantly associated with symptoms of anxiety, depression, and stress in the adolescents. The relationship between eating dinner with parents and adolescent psychological distress would differ as a function of parent-adolescent non-conflictual communication time.

Methods

Participants and data collection

Participants were recruited from the Healthy Kids cohort (Ip et al., 2016; Tso et al., 2019), which was established to examine the effect of early-life socioeconomic status on long-term health and development. Data collection was performed in 2018-19 when the cohort participants were in Grade 7 or Grade 8. To maximize the sample size, we also recruited non-cohort participants who studied in the same grade of the same school with the cohort participants. With school consent and teachers' assistance, a parent letter describing the survey information was distributed to parents of all eligible students. Research assistants subsequently contacted and mailed the parent- and adolescent self-reported questionnaires to all those families who expressed interest in participation and can read either Chinese or English well. They completed the questionnaires at home and mailed them back to the research team upon completion. Participants who provided blank questionnaires or invalid responses such as selecting multiple answers for single-answer questions were excluded from the study sample.

Measures

Weekly parent-adolescent meal frequency

Parents were asked to provide weekly frequency of parent-adolescent meals, separately for breakfast and dinner, with the item "On average, how many times per week do you and your adolescent child eat breakfast/dinner together?", which has been used in a previous population study (Wong et al., 2021). Response ranged from 0 to 7 times a week. In this study, to explore the effect of everyday family dinner, we categorized the participants, based on their dinner frequency responses, into the "0-6 times per week" group and the "7 times per week" group.

Daily parent-adolescent non-conflictual communication time

Daily parent-adolescent non-conflictual communication time was reported by the parent and measured with one item, “On average, how long would you perform non-conflictual communication with your [adolescent] child each day?” Response options included “never”, “<1 minute”, “1 to <5 minutes”, “5 to <10 minutes”, “10 to <20 minutes”, “20 to <30 minutes”, and “30 minutes or above”. Its convergent validity was confirmed by the finding that compared to the reference group, a higher proportion of families in the everyday family dinner group spent at least 30 minutes chatting with their adolescent children each day (54.3% vs 39.1%, $p<0.001$). Responses were recoded to reflect low (<30 minutes) and high (≥ 30 minutes) parent-adolescent non-conflictual communication time.

Adolescents’ psychological distress

Adolescents’ psychological distress was self-reported by the adolescent using the validated Chinese version of the Depression Anxiety and Stress Scale – 21 (DASS-21) (Taouk et al., 2001). The DASS-21 includes three scales designed to measure the negative emotional states of depression, anxiety, and stress. Each scale has seven items on a 4-point Likert scale ranging from 0=did not apply at all to 3=applied very much or most of the time. The final scale score is the sum of item scores multiplied by two. A higher score indicates more severe symptoms. Cronbach’s alphas in the current sample indicated good internal reliability for all the DASS-21 scales (α for DASS Depression=0.83; α for DASS Anxiety=0.75; α for DASS Stress=0.81).

Demographics characteristics

Child-level demographic variables including age and gender were self-reported by adolescents. Family-level demographic variables including monthly household income, parental and maternal education level, and parental marital status were reported by parents.

Sample size estimation

A power analysis was conducted based on the evidence of a previous study, which found a small difference in depressive symptoms ($d=0.39$) between adolescents with family meals ≥ 7 times/week and those with family meals 5–6 times/week after adjusting for six confounders (Utter et al., 2017). To detect this small effect size with 0.80 power at 0.05 significance level, a minimum sample size of 208 participants (104 in each group) was required.

Data analysis

All data were analyzed using both the SPSS statistical software package (Version 25.0) and R statistical software (version 3.5.1 (2018-07-02)). Descriptive statistics were used to summarize adolescents' demographic and family characteristics. A series of independent t-tests (for continuous variables) and chi-square analyses (for categorical variables) were computed to determine differences in family characteristics and adolescent characteristics and psychological distress levels based on the weekly parent-adolescent dinner frequency (i.e. 7 times a week or 0-6 times per week). Assumptions of linear regression including normality and linearity were assessed and verified graphically. In addition, we found no evidence of outliers and multicollinearity between variables. Linear regression analyses were conducted to assess associations of adolescent psychological distress with weekly parent-adolescent dinner frequency

and daily parent-adolescent non-conflictual communication time. Since there were missing values on confounding variables (0.36 - 2.66% missing data) and DASS-21 scale scores (1.57 - 2.30% missing data), multiple imputation by chained equations (MICE) R package (Buuren & Groothuis-Oudshoorn, 2010) was employed using the fully conditional approach and predictive mean matching to fill in the missing values. All linear regression analyses were first mutually adjusted to test the independent effects of weekly parent-adolescent dinner frequency and daily parent-adolescent non-conflictual communication time. Additionally, the regression analyses controlled for the effects of demographic variables (adolescent age and gender, maternal and paternal education level, monthly family income, parental marital status, and parent-adolescent breakfast frequency). Moderated effects of weekly parent-adolescent dinner frequency and daily parent-adolescent non-conflictual communication time were tested using hierarchical linear regression analyses (Hayes & Matthes, 2009). Using a block entry method, interaction terms were created and included in adjusted regression models after the main effects were tested. A sensitive analysis was also performed using the original data, in which subjects with missing data were excluded, to confirm the findings based on the imputed data.

Ethical approval

The study protocol was approved by the Institutional Review Board of the University of Hong Kong/Hospital Authority Hong Kong West Cluster (UW 18-057).

Results

This study recruited 826 parent-adolescent dyads. Their sociodemographic characteristics were shown in Table 1. There were 465 girls (56.3%) and 361 boys (45.7%) aged 13.28 years on

average. While the Hong Kong median monthly 3-member household income in 2018 was HKD 32,700 (USD 4,192) (HKSAR Census and Statistics Department, 2018), the average monthly household income of our study sample was HKD 51,800 (USD 6,641). Over 30% of the mothers and fathers attained tertiary education level, and nearly 89% were married and living together. The adolescents on average ate breakfasts with parents approximately 3 times a week, and 58.8% had dinner with parents every day (i.e. 7 times a week). More than 50% of the adolescents communicated with parents less than 30 minutes per day. There was a small correlation between parent-adolescent dinner frequency and parent-adolescent non-conflictual communication time ($r=0.22$, $p < 0.001$). About 45% of the adolescents in the frequent family dinner group talked to their parents less than 30 minutes each day. Compared to the adolescents who did not eat dinner with parents every day, those who did were from lower family socioeconomic background, and their parents were more likely to be married and live together. They also had lower stress levels and higher frequency of communicating and eating breakfasts with parents.

As shown in Tables 2a-c, the associations between weekly parent-adolescent dinner frequency and adolescent DASS Depression and Anxiety scores were not significant in both univariate and multivariate analyses. Univariate analysis found that the weekly parent-adolescent dinner frequency was negatively associated with adolescent DASS Stress scores ($\beta = -0.35$, $p=0.046$), but this association became insignificant after differences in daily parent-adolescent non-conflictual communication time were held constant. On the other hand, daily parent-adolescent non-conflictual communication time remained significantly associated with adolescent DASS Depression ($\beta = -1.31$, $p < 0.001$), Anxiety ($\beta = -0.84$, $p < 0.001$), and Stress ($\beta = -1.00$, $p < 0.001$) scores even after controlling for the effect of weekly parent-adolescent dinner

frequency. Additional regression analysis confirmed the significance of these associations after differences in child age and gender, maternal and paternal education level, monthly family income, parental marital status, and weekly parent-adolescent breakfast frequency were held constant.

Furthermore, daily parent-adolescent non-conflictual communication time significantly strengthened the associations of parent-adolescent dinner frequency with adolescent DASS Depression ($\beta=-2.44$, $p=0.015$) and Stress ($\beta=-2.42$, $p=0.030$) scores but not with adolescent DASS Anxiety scores (Table 3). The patterns of associations remained unchanged after adjusting for demographic confounders, suggesting that the effects of parent-adolescent dinner frequency on adolescent psychological well-being differed based on the type of psychological outcome under investigation as well as daily parent-adolescent non-conflictual communication time. Among adolescents who did not eat dinner with parents every day, adolescent DASS Depression (Figure 1a) and Stress (Figure 1b) scores were similar with regard to daily parent-adolescent non-conflictual communication time; however, among those who ate dinner with parents every day, DASS Depression and Stress scores were higher in the <30 minutes of daily parent-adolescent non-conflictual communication group than the ≥ 30 minutes of daily parent-adolescent non-conflictual communication group.

Discussion

This study found evidence for the association between parent-adolescent non-conflictual communication time and adolescent psychological distress. Previous research showed that frequent family dinner was associated with better psychological well-being in adolescents

(Harrison et al., 2015; Offer, 2013b). In contrast to these findings, we found that parent-adolescent dinner frequency alone had no association with adolescent psychological distress. Specifically, the association became insignificant after controlling for the effect of daily parent-adolescent non-conflictual communication time. Furthermore, we found that adolescents who ate dinner with parents every day and communicated with parents at least 30 minutes per day reported the lowest level of psychological distress especially in the domains of stress and depression symptoms. On the other hand, for adolescents who did not eat dinner with parents every day, their distress levels were similar across parent-adolescent non-conflictual communication time, but these adolescents reported lower distress levels than those who ate dinners regularly with parents but rarely conversed with them.

Our findings are generally consistent with the literature that parents and their adolescents are more likely to speak to each other when they have regular dinner together as a family (Wang et al., 2014). However, a closer examination of their interaction patterns revealed that among the adolescents who had frequent family dinners, 45.7% communicated with their parents for less than 30 minutes each day. Although the association between parent-adolescent dinner frequency and adolescent stress level became insignificant after controlling for the effect of parent-adolescent non-conflictual communication time, the association between parent-adolescent non-conflictual communication time and adolescent psychological distress remained largely unchanged after adjusting for parent-adolescent dinner frequency. A previous study found that the quality of communication between adolescents and parents explained 13% to 30% of the effect of family dinner frequency on adolescent mental health (Elgar et al., 2013). Other studies have observed the effect of unpleasant interactions with parents during mealtimes on adolescent

distress (Manczak et al., 2018). Our findings also point to the importance of parent-adolescent non-conflictual communication time over parent-adolescent dinner frequency in promoting adolescent psychological well-being.

Contrary to previous reports showing that the link between family dinner frequency and high-risk behavior was independent of family support and communication levels (Fulkerson et al., 2006), we found that having both frequent non-conflictual communication and dinner with parents was beneficial for adolescent psychological well-being. In the absence of regular non-conflictual communication with parents which could be a sign of poor parent-adolescent relationship, frequent family dinner may provide a context for unpleasant parent-adolescent interactions to occur and can add tension to the parent-adolescent relationship. As noted in previous research (Elgar et al., 2013; Fulkerson et al., 2006), the benefits of frequent family meal are largely attributable to positive family mealtime dynamics. High-quality mealtime interactions can connect parents and their adolescents together by creating dialogue opportunities for the adolescents to express concerns and for parents to resolve their adolescents' concerns. These positive interactions may not only strengthen parent-adolescent bonding but also reduce psychological distress in the adolescents. A previous study found that difficult family dynamics or interactions may heighten negative emotional experience of mealtimes (White et al., 2019). In line with this finding, this study showed that instead of compelling adolescents to eat dinner with their parents, frequent parent-adolescent conversations about things that matter may have a greater potential to improve adolescent psychological well-being.

We also found that the strength of associations of adolescent psychological distress with frequent parent-adolescent dinners and non-conflictual communication could differ with respect to the type of psychological distress outcome under investigation. Adolescents who engaged in both daily dinner and regular non-conflictual communication with parents were found to have significantly lower levels of depression and stress than those who had daily family dinner only, but their differences in anxiety levels were relatively small. Given that anxiety symptoms are usually responses to novel or arousing conditions (Weger et al., 2018), daily routines and activities such as family meals or family communication may have weaker associations with symptoms of anxiety. Consistent with our findings, previous research also reported parallel changes in stress and depressive symptoms over the course of adolescence, and demonstrated stressful interpersonal experiences as a risk factor for depression (Owens et al., 2019). Although frequent dinner and non-conflictual communication can be an indicator of parental commitment and willingness to invest time in developing positive relationships with their adolescents, previous research reported that higher levels of positive parental behaviors was associated with lower levels of depression but not anxiety symptoms in adolescents (Schwartz et al., 2012). Another study found that maternal overinvolvement was associated with increased anxiety in children over time (Hudson et al., 2019). It is thus important to investigate whether there is an optimal level of parental involvement that can enhance psychological well-being in adolescents. In addition, future research should also measure the affective nature of family communication during mealtimes.

A key strength of this study is the use of adolescent self-report questionnaire method to assess the adolescent's psychological distress as well as the use of parent-report questionnaire

items to assess the parent-adolescent dinner frequency and non-conflictual communication time, so we could examine the associations using multiple informants' responses to minimize reporting bias. The current study also had several limitations. First, this was a cross-sectional study, and thus we were unable to conclude on the causality and directionality between study variables. Second, we did not ask the adolescent to self-report the frequency of eating meals or non-conflictual communication with parents, so we cannot examine parent-adolescent agreement in the reporting of these family activities. In addition, this study focused on a subset of Chinese families in Hong Kong, which limits the generalizability of the findings to the broader population. Third, despite the strength of adolescent self-report data, this study did not collect biological samples or conduct direct assessment to measure adolescent mental health, which would reduce the robustness of the results. Future research should examine the effect of possible gene x environment interactions on adolescent mental health using different measures and perspectives (De Berardis et al., 2018; Orsolini et al., 2020). Lastly, we did not collect data on family structures such as the number of siblings and the quality and content of parent-adolescent mealtime interactions, and thus we were unable to determine the unique contribution of these variables to adolescent psychological well-being. Future research should examine more family characteristics such as household size and investigate how these characteristics may impact the association between family interactions and adolescent psychological distress.

Conclusions

This study revealed the importance of regular non-conflictual communication between parents and adolescents for adolescent psychological well-being. The benefits of frequent parent-adolescent dinners partly depend on the quality and quantity of communication and interactions

between members during the mealtimes. Specifically, family dinners are beneficial to adolescent psychological well-being only when parents and their adolescents communicate with each other regularly and frequently. The findings are particularly relevant to today's society. Because of the popularity of information and media tools, online activities are common and may distract parents and their adolescents from traditional family activities. Regular family dinners in today's society may not carry the same meaning of positive family dynamics as it had been in the past. Child and public health professionals should work to educate the general public about the harms and benefits of technology on family communication and the role of parent or primary caregiver to engage children and adolescents in healthy meal interactions. Further studies with robust strategies such as measurement of stress-related biomarkers, direct mental health assessment, and use of multiple informant reports regarding family interaction quality and quantity are needed to advance our understanding of the effect of family interactions on adolescent mental health.

References

- Anyan, F., & Hjemdal, O. (2016). Adolescent stress and symptoms of anxiety and depression: Resilience explains and differentiates the relationships. *Journal of affective disorders*, 203, 213-220.
- Buuren, S. v., & Groothuis-Oudshoorn, K. (2010). mice: Multivariate imputation by chained equations in R. *Journal of statistical software*, 1-68.
- De Berardis, D., Fornaro, M., Valchera, A., Cavuto, M., Perna, G., Di Nicola, M., Serafini, G., Carano, A., Pompili, M., Vellante, F., Orsolini, L., Fiengo, A., Ventriglio, A., Yong-Ku, K., Martinotti, G., Di Giannantonio, M., & Tomasetti, C. (2018, Sep 23). Eradicating Suicide at Its Roots: Preclinical Bases and Clinical Evidence of the Efficacy of Ketamine in the Treatment of Suicidal Behaviors. *Int J Mol Sci*, 19(10). <https://doi.org/10.3390/ijms19102888>
- Drapeau, A., Marchand, A., & Beaulieu-Prévost, D. (2012). Epidemiology of psychological distress. *Mental illnesses-understanding, prediction and control*, 69, 105-106.
- Elgar, F. J., Craig, W., & Trites, S. J. (2013). Family dinners, communication, and mental health in Canadian adolescents. *Journal of Adolescent Health*, 52(4), 433-438.
- Fulkerson, J. A., Story, M., Mellin, A., Leffert, N., Neumark-Sztainer, D., & French, S. A. (2006). Family dinner meal frequency and adolescent development: Relationships with developmental assets and high-risk behaviors. *Journal of Adolescent Health*, 39(3), 337-345.
- Guang, Y., Feng, Z., Yang, G., Yang, Y., Wang, L., Dai, Q., Hu, C., Liu, K., Zhang, R., & Xia, F. (2017). Depressive symptoms and negative life events: What psycho-social factors protect or harm left-behind children in China? *BMC psychiatry*, 17(1), 402.
- Harrison, M. E., Norris, M. L., Obeid, N., Fu, M., Weinstangel, H., & Sampson, M. (2015). Systematic review of the effects of family meal frequency on psychosocial outcomes in youth. *Canadian Family Physician*, 61(2), e96-e106.
- Hayes, A. F., & Matthes, J. (2009, 2009/08/01). Computational procedures for probing interactions in OLS and logistic regression: SPSS and SAS implementations. *Behavior Research Methods*, 41(3), 924-936. <https://doi.org/10.3758/BRM.41.3.924>
- HKSAR Census and Statistics Department. (2018). *Population estimates*. Retrieved 15 March from <https://www.censtatd.gov.hk/hkstat/sub/sp150.jsp?productCode=D5250038>
- Hudson, J. L., Murayama, K., Meteyard, L., Morris, T., & Dodd, H. F. (2019). Early childhood predictors of anxiety in early adolescence. *Journal of abnormal child psychology*, 47(7), 1121-1133.

- Ip, P., Rao, N., Bacon-Shone, J., Li, S. L., Ho, F. K.-w., Chow, C.-b., & Jiang, F. (2016). Socioeconomic gradients in school readiness of Chinese preschool children: The mediating role of family processes and kindergarten quality. *Early Childhood Research Quarterly*, 35, 111-123.
- Kildare, C. A., & Middlemiss, W. (2017, 2017/10/01/). Impact of parents mobile device use on parent-child interaction: A literature review. *Computers in Human Behavior*, 75, 579-593. <https://doi.org/https://doi.org/10.1016/j.chb.2017.06.003>
- Larson, R. W., Branscomb, K. R., & Wiley, A. R. (2006). Forms and functions of family mealtimes: Multidisciplinary perspectives. *New Directions for Child and Adolescent Development*, 2006(111), 1-15.
- Mackin, D. M., Perlman, G., Davila, J., Kotov, R., & Klein, D. N. (2017). Social support buffers the effect of interpersonal life stress on suicidal ideation and self-injury during adolescence. *Psychological Medicine*, 47(6), 1149-1161. <https://doi.org/10.1017/S0033291716003275>
- Manczak, E. M., Donenberg, G. R., & Emerson, E. (2018). Can Mother-Daughter Communication Buffer Adolescent Risk for Mental Health Problems Associated With Maternal Depressive Symptoms? *Journal of clinical child and adolescent psychology : the official journal for the Society of Clinical Child and Adolescent Psychology*, American Psychological Association, Division 53, 47(sup1), S509-S519. <https://doi.org/10.1080/15374416.2018.1443458>
- Offer, S. (2013a). Assessing the relationship between family mealtime communication and adolescent emotional well-being using the experience sampling method. *Journal of adolescence*, 36(3), 577-585. <https://doi.org/https://doi.org/10.1016/j.adolescence.2013.03.007>
- Offer, S. (2013b). Family time activities and adolescents' emotional well-being. *Journal of Marriage and Family*, 75(1), 26-41.
- Orsolini, L., Latini, R., Pompili, M., Serafini, G., Volpe, U., Vellante, F., Fornaro, M., Valchera, A., Tomasetti, C., Fraticelli, S., Alessandrini, M., La Rovere, R., Trotta, S., Martinotti, G., Di Giannantonio, M., & De Berardis, D. (2020, Mar). Understanding the Complex of Suicide in Depression: from Research to Clinics. *Psychiatry Investig*, 17(3), 207-221. <https://doi.org/10.30773/pi.2019.0171>
- Owens, S. A., Helms, S. W., Rudolph, K. D., Hastings, P. D., Nock, M. K., & Prinstein, M. J. (2019). Interpersonal stress severity longitudinally predicts adolescent girls' depressive symptoms: The moderating role of subjective and HPA axis stress responses. *Journal of abnormal child psychology*, 47(5), 895-905.

- Schwartz, O. S., Dudgeon, P., Sheeber, L. B., Yap, M. B., Simmons, J. G., & Allen, N. B. (2012). Parental behaviors during family interactions predict changes in depression and anxiety symptoms during adolescence. *Journal of abnormal child psychology*, 40(1), 59-71.
- Skeer, M. R., & Ballard, E. L. (2013, 2013/07/01). Are Family Meals as Good for Youth as We Think They Are? A Review of the Literature on Family Meals as They Pertain to Adolescent Risk Prevention. *Journal of youth and adolescence*, 42(7), 943-963. <https://doi.org/10.1007/s10964-013-9963-z>
- Tadpatrikar, A., Sharma, M. K., & Viswanath, S. S. (2021, 2021/04/01/). Influence of technology usage on family communication patterns and functioning: A systematic review. *Asian Journal of Psychiatry*, 58, 102595. <https://doi.org/https://doi.org/10.1016/j.ajp.2021.102595>
- Taouk, M. M., Lovibond, P. F., & Laube, R. (2001). *Psychometric properties of a Chinese version of the short depression anxiety stress scales (DASS21)*. Cumberland hospital. Retrieved 22 March from <http://www2.psy.unsw.edu.au/dass/Chinese/Chinese%20DASS21%20Paper.pdf>
- Tso, W., Chan, M., Ho, F. K., Rao, N., Li, A. M., Chan, K. L., Tiwari, A., Wong, I. C., Wing, Y. K., & Van Voorhees, B. (2019). Early sleep deprivation and attention-deficit/hyperactivity disorder. *Pediatric research*, 85(4), 449-455.
- Utter, J., Denny, S., Peiris-John, R., Moselen, E., Dyson, B., & Clark, T. (2017, 2017/01/01/). Family Meals and Adolescent Emotional Well-Being: Findings From a National Study. *Journal of Nutrition Education and Behavior*, 49(1), 67-72.e61. <https://doi.org/https://doi.org/10.1016/j.jneb.2016.09.002>
- Wang, M. T., Hill, N. E., & Hofkens, T. (2014). Parental involvement and African American and European American adolescents' academic, behavioral, and emotional development in secondary school. *Child development*, 85(6), 2151-2168.
- Weger, M., Sandi, C. J. N., & Reviews, B. (2018). High anxiety trait: a vulnerable phenotype for stress-induced depression. 87, 27-37.
- White, H. J., Haycraft, E., & Meyer, C. (2019, 2019/08/01/). Family mealtime negativity and adolescent binge-eating: A replication and extension study in a community sample. *Eating Behaviors*, 34, 101306. <https://doi.org/https://doi.org/10.1016/j.eatbeh.2019.101306>
- Wong, R. S., Tung, K. T. S., Wong, W. H. S., Ho, F. K. W., Tso, W. W. Y., Yip, P. S. F., Wong, C. K. H., Fan, S. Y. S., & Ip, P. (2021, May 19). Associations of Family Meals with Adolescent Perception of Family Relationship and Compliance with Parental Guidance in Hong Kong: Results of a Representative Cross-Sectional Survey. *Int J Environ Res Public Health*, 18(10). <https://doi.org/10.3390/ijerph18105402>

Table 1. Subject characteristics

	Parent-adolescent dinner frequency			p-value
	Overall (n=826)	7 times per week (n=486)	0-6 times per week (n=340)	
	mean (SD)/n(%)	mean (SD)/n(%)	mean (SD)/n(%)	
Age	13.28 (0.51)	13.26 (0.50)	13.30 (0.53)	0.29
Gender				0.82
Male	361 (43.7)	214 (44.0)	147 (43.2)	
Female	465 (56.3)	272 (56.0)	193 (56.8)	
Monthly household income (HKD'000)	51.8 (40.0)	47.8 (37.1)	57.5 (43.2)	0.001
Paternal educational level				0.311
Bachelor degree and above	273 (33.1)	154 (31.8)	119 (35.7)	
Grade 10 to diploma	342 (41.4)	202 (41.7)	140 (42.0)	
Grade 9 and below	202 (24.5)	128 (26.4)	74 (22.2)	
Missing	9 (1.1)	-	-	
Maternal educational level				0.009
Bachelor degree and above	252 (30.5)	129 (26.6)	123 (36.4)	
Grade 10 to diploma	376 (45.5)	231 (47.6)	145 (42.9)	
Grade 9 and below	195 (23.6)	125 (25.8)	70 (20.7)	
Missing	3 (0.4)	-	-	
Parental marital status				<0.001
Married and living together	733 (88.7)	446 (93.9)	287 (87.2)	
Divorced/separation	60 (7.3)	21 (4.4)	39 (11.9)	
Cohabited	11 (1.3)	8 (1.7)	3 (0.9)	
Missing	22 (2.7)	-	-	
Parent-adolescent breakfast frequency (per week)	2.72 (2.27)	3.09 (2.38)	2.19 (1.99)	<0.001
Parent-adolescent dinner frequency (per week)				
7 times	486 (58.8)	-	-	
0-6 times	340 (41.2)	-	-	
Parent-adolescent communication time (per day)				<0.001
≥ 30 minutes	397 (48.1)	264 (54.3)	133 (39.1)	
< 30 minutes	429 (51.9)	222 (45.7)	207 (60.9)	
DASS Depression subscale	6.55 (7.10)	6.37 (7.41)	6.80 (6.61)	0.397
DASS Anxiety subscale	6.35 (6.16)	6.07 (6.15)	6.74 (6.15)	0.13
DASS Stress subscale	9.14 (7.79)	8.67 (8.00)	9.81 (7.45)	0.041

DASS: Depression Anxiety Stress Scale

Table 2a. Associations of adolescent depressive symptoms with weekly parent-adolescent dinner frequency and daily parent-adolescent communication time

	Weekly parent-adolescent dinner frequency		Daily parent-adolescent communication time	
	β (95%CI)	p-value	β (95%CI)	p-value
Univariate	-0.07 (-0.39 to 0.24)	0.655	-1.26 (-1.70 to -0.84)	<0.001
Bivariable ^a	0.13 (-0.18 to 0.46)	0.392	-1.31 (-1.75 to -0.87)	<0.001
Adjusted for confounders ^b	0.13 (-0.20 to -0.45)	0.444	-1.20 (-1.64 to -0.76)	<0.001

^a In the bivariable, we adjusted for weekly parent-adolescent dinner frequency and daily parent-adolescent communication time to test independent associations.

^b Bivariable model adjusted for child age and gender, maternal and paternal education level, monthly family income, parental marital status, and weekly parent-adolescent breakfast frequency.

Table 2b. Associations of adolescent anxious symptoms with weekly parent-adolescent dinner frequency and daily parent-adolescent communication time

	Weekly parent-adolescent dinner frequency		Daily parent-adolescent communication time	
	β (95%CI)	p-value	β (95%CI)	p-value
Univariate	-0.21 (-0.49 to 0.06)	0.131	-0.87 (-1.24 to -0.50)	<0.001
Bivariable ^a	-0.08 (-0.35 to 0.20)	0.593	-0.84 (-1.22 to -0.46)	<0.001
Adjusted for confounders ^b	-0.03 (-0.31 to 0.25)	0.841	-0.74 (-1.13 to -0.36)	<0.001

^a In the bivariable, we adjusted for weekly parent-adolescent dinner frequency and daily parent-adolescent communication time to test independent associations.

^b Bivariable model adjusted for child age and gender, maternal and paternal education level, monthly family income, parental marital status, and weekly parent-adolescent breakfast frequency.

Table 2c. Associations of adolescent stress with weekly parent-adolescent dinner frequency and daily parent-adolescent communication time

	Weekly parent-adolescent dinner frequency		Daily parent-adolescent communication time	
	β (95%CI)	p-value	β (95%CI)	p-value
Univariate	-0.35 (-0.70 to -0.01)	0.046	-1.06 (-1.53 to -0.59)	<0.001
Bivariable ^a	-0.19 (-0.55 to 0.16)	0.283	-1.00 (-1.48 to -0.52)	<0.001
Adjusted for confounders ^b	-0.15 (-0.51 to 0.21)	0.417	-0.92 (-1.41 to -0.43)	<0.001

^a In the bivariable, we adjusted for weekly parent-adolescent dinner frequency and daily parent-adolescent communication time to test independent associations.

^b Bivariable model adjusted for child age and gender, maternal and paternal education level, monthly family income, parental marital status, and weekly parent-adolescent breakfast frequency.

Table 3. Interaction effect of parent-adolescent dinner frequency and daily parent-adolescent communication time on adolescent psychological distress

	Crude		Adjusted	
	β (95% CI)	p-value	β (95% CI)	p-value
Depression symptoms				
Everyday parent-adolescent dinner	1.03 (-0.32 to 2.39)	0.134	1.00 (-0.37 to 2.36)	0.152
Daily parent-adolescent communication time ≥ 30 minutes	-1.19 (-2.72 to 0.33)	0.124	-0.90 (-2.42 to 0.62)	0.247
Dinner x Communication	-2.30 (-4.29 to -0.32)	0.023	-2.44 (-4.41 to -0.48)	0.015
Anxiety symptoms				
Everyday parent-adolescent dinner	0.33 (-0.83 to 1.49)	0.574	0.47 (-0.70 to 1.64)	0.431
Daily parent-adolescent communication time ≥ 30 minutes	-1.02 (-2.35 to 0.31)	0.132	-0.82 (-2.15 to 0.52)	0.231
Dinner x Communication	-1.47 (-3.19 to 0.25)	0.095	-1.46 (-3.17 to 0.26)	0.097
Stress symptoms				
Everyday parent-adolescent dinner	0.31 (-1.15 to 1.77)	0.679	0.44 (-1.03 to 1.92)	0.555
Daily parent-adolescent communication time ≥ 30 minutes	-0.91 (-2.60 to 0.78)	0.291	-0.72 (-2.42 to 0.98)	0.407
Dinner x Communication	-2.42 (-4.60 to -0.25)	0.029	-2.42 (-4.61 to -0.24)	0.030

Adjusted for child age and gender, maternal and paternal education level, monthly family income, parental marital status, and weekly parent-adolescent breakfast frequency

Figure 1. The interaction effect of parent-adolescent communication time and parent-adolescent dinner on adolescent depression symptoms

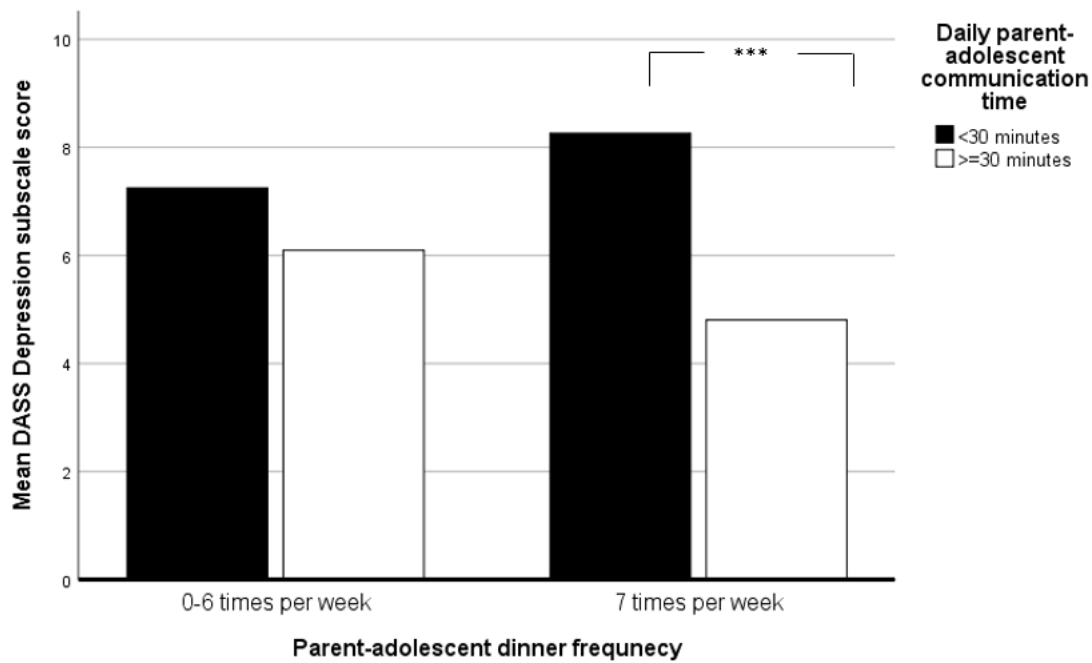


Figure 2. The interaction effect of parent-adolescent communication time and parent-adolescent dinner on adolescent stress symptoms

