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The influence of routine and leisure family activities on the ability of young Asian Americans to maintain a healthy lifestyle: findings from a nationwide survey

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Abstract Family is uniquely influential in the health of young Asian Americans (AAs), yet little is known on the impact of specific shared family activities. This study explores different types and frequencies of AA young adult shared family activities on perceived familial influence on the ability to maintain a healthy lifestyle (diet, physical activity, sleep, social relationships, stress, and risky substances). A nationwide sample of 18–35-year-old AAs was surveyed in March 2021 on a list of 30 shared family activities with mothers, fathers, siblings, or extended family. Overall, 984 unique family relationships reported by 616 young AAs were analyzed. Confirmatory factor analysis synthesized a reliable two-factor (routine, leisure activities) 10-item Shared Activities with Family (SAF) scale. Mothers were most influential (mean 3.25, SD = 1.14), although shared activities among South Asians or with extended family were most associated with changes in perceived influence. Routine shared activities were more strongly associated with perceived influence on sleep, diet, and risky substances, while leisure shared activities were more associated with influence on developing healthy social relationships. Family-based, dyadic interventions for young AAs may incorporate shared activities (both routine and leisure) to promote healthy behaviors, although further research to explore mechanisms and directionality of influence is needed to inform action.

Keywords Asian American · Family · Lifestyle · Routine · Leisure · Parents · Multigenerational

Background

Asian Americans (AAs) are the fastest-growing racial or ethnic group in the United States (US) and comprise a diverse population of East, South, and Southeast Asian Americans (Budiman & Ruiz, 2021). AAs encounter significant challenges in the form of burdens associated with non-communicable diseases (NCDs) such as diabetes and heart disease (Hastings et al., 2015; Lee et al., 2010). Compared to Non-Hispanic Whites or other racial subgroups, AAs are more likely to be diagnosed with diabetes and hypertension at a younger age (Becerra, 2015; Yi et al., 2016). Lifestyle behaviors significantly contribute to NCD incidence (Aburto et al., 2021; Loef & Walach, 2012). Specifically, the American College of Lifestyle Medicine defines a healthy lifestyle through six domains: eating a healthy diet, engaging in physical activity, improving one's sleep, forming and maintaining meaningful relationships, developing strategies to manage stress, and avoiding risky substances (such as tobacco and alcohol) (American College of Lifestyle Medicine, 2018). Emerging evidence has suggested younger or second-generation AAs to engage in many unhealthy lifestyle behaviors (e.g., higher processed meat consumption and less physical activity) more than their older or first-generation counterparts (Ali, et al., 2022b; Kao et al., 2012), which likely contributes to

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the greater odds of obesity observed among some second-generation AAs (Gong et al., 2019). While this emerging research has brought attention to the complex NCD burden that young and second-generation AAs experience (Ali et al., 2021), little has been empirically studied to assess the context and contributors behind AA young adult lifestyle behaviors.

Family members play a pivotal role in the socialization, acculturation, and health experiences of diverse AA communities (including young adults) (Pew Research Center, 2012). Across the US, 73% of AAs report living with family members (compared to the US average of 65%) (USA Facts, 2021), with 27% of AAs living in a multigenerational household (i.e., living with both parents and grandparents) compared to the US average of 19% (Budiman & Ruiz, 2021). Moreover, there is important diversity in family dynamics when disaggregating by AA ethnic subgroup, including both in family structure (e.g., average family sizes range from 4.8 among Hmong Americans to 2.9 among Japanese Americans) and family values (e.g., Korean Americans reporting more positive attitudes towards parental control over a child's life decisions than other ethnic subgroups) (Pew Research Center, 2012; USA Facts, 2021).

Nonetheless, across ethnic subgroups, AA family structures are often interdependent (i.e., reliance on family members to meet social or health-related needs) (Paik et al., 2017). Much of the existing literature has either focused on the influence of family members on the health of AA children or adolescents (Y. Choi et al., 2021; Diep et al., 2015; Wyatt et al., 2015) or on that of older, first-generation AAs (National Academies of Sciences, Engineering, and Medicine, 2015; Pew Research Center, 2012; Xia et al., 2013); less empirical research has focused on characterizing how family dynamics impact the health and lifestyles of young adult AAs, a population with more decision-making agency than children or adolescents and a different socialization and acculturation profile than older AA communities.

The mechanism behind the uniquely powerful influence of family members in AA households can partly be understood through the concept of familism. Familism is a system of values prominent in diverse AA communities that emphasizes mutual interdependence and collaboration as central tenants of family relationships, including extended family members (APA Dictionary of Psychology, 2020; Edara, 2016). It highlights the importance of placing the interests of the family unit ahead of those of the individual. Familism has been associated with both positive and negative psychosocial and mental health outcomes in AA communities (Campos et al., 2014; Ying & Han, 2007); from a behavioral lens, the emphasis of generational respect and family-centered decision making (i.e., considering the implications of decisions in the context of other family members' needs before those of oneself) may contribute to either the promotion or obstruction of healthy lifestyle behaviors, depending on the family dynamic (Corrigan & Lee, 2021).

Intra-family interactions, in general, can have either positive or negative effects on health (Ali et al., n.d.; Jabbari & Rouster, 2022). Perceived confirmation from family members (listening to or acknowledging one's feelings) has been observed to directly influence one's health attitudes and behaviors (Baiocchi-Wagner & Talley, 2013). Moreover, negative family dynamics are associated with poor sleep health (sleep duration, quality, and efficiency), a greater risk of hypertension, and cardiovascular disease (Gunn & Eberhardt, 2019). While much of the existing research on family influences on the health of young AAs has centered around mental health and psychosocial outcomes (Ling et al., 2014; McGoldrick et al., 2005; Tsai-Chae & Nagata, 2008), in other US populations, family social influence dynamics have also been associated with dietary behaviors, physical activity, and substance use among youth and young adults (Kitzman-Ulrich et al., 2010; Shields et al., 2008; Vakalahi, 2001). Understanding the context and dimensions of family influences in the health of AA young adults has the potential to inform more impactful, targeted NCD prevention strategies.

There is limited literature that disaggregates specific AA family interaction patterns and shared activities that may influence health behaviors. Qualitative research has suggested that routine shared family activities (e.g., eating meals and attending competition events) play a pivotal role in exerting a positive health influence on youth by exchanging health-related information and establishing healthy behavioral norms (Wäsche et al., 2021). Among adults, at-home routine activities with family members are similarly foundational in social and emotional experiences linked with health (Repetti et al., 2011). Beyond the routine, shared leisurely activities with family members have also been shown to encourage healthy behaviors among multiple family members (Militello et al., 2018) and create spaces to stimulate conversations relevant to health (Sandbulte et al., 2019). However, it remains unknown whether these shared family activities shown to be associated with health behaviors among children or non-Asian US populations are comparable to the experience of AA young adults, for whom family dynamics manifest in a unique socio-cultural context, given the confluence of Asian and Western influences on lifestyle behaviors (Ali et al., 2021) and familism (Y. Choi et al., 2021). Therefore, this study aims to explore the association between different types and frequencies of shared family activities reported by young AAs on the perceived influence of specific family members on the ability to maintain a healthy lifestyle.

Methods

Data collection

An online Qualtrics-based survey of 18–35-year-old AAs was conducted in March 2021 to understand different facets of young AAs' family interaction patterns and the perceived influence of family members on their lifestyle behaviors. The survey included various social, interpersonal, health, and acculturation-related items. An initial draft of survey items was developed through a literature review centered around past research in the fields of family communication, social support, therapy, and conflict, including literature specific to Asian immigrant family dynamics (Healey et al., 2006; Maiter & George, 2003; Sung, 2010; Wong et al., 2012). Items were then pretested among 11 young (18–35-year-old) AAs (45.5% South Asian, 27.3% East Asian, 27.3% Southeast Asian). In-depth interviews of the pretest participants were conducted to refine and generate additional survey items.

Participants were recruited via convenience sampling using multiple approaches. Social media advertisements were developed given their effectiveness in recruiting young adults in health research, including during the COVID-19 pandemic (Ali et al., 2020; Whitaker et al., 2017). Advertisements were placed on Facebook-affiliated platforms (i.e., Facebook, Messenger, Instagram, and third-party platforms) targeted towards 18–35-year-olds living in the US with usage patterns (e.g., pages and posts liked by users) suggesting an AA affiliation. Further efforts included disseminating recruitment information through various email listservs, Twitter and WhatsApp networks, and affiliates of organizations catering to AA young adults (e.g., university student associations, AA community or professional organizations).

Eligibility was assessed through screening questions before the survey: 18–35-year-old self-identified Asians currently living in the US (for any length of time) with at least one family member currently residing in the US with whom they interact in-person, by audio or video call, or by text message (including through social media) were eligible for the survey. Participation was entirely voluntary and did not involve monetary compensation; informed online consent was taken prior to commencing the survey. Study procedures were reviewed and exempted by the New York University Institutional Review Board.

Measures

Participants were asked about their socio-demographic background (age, gender, specific AA ethnic subgroup, educational attainment, country of birth, relationship status, household size) and acculturation, measured using the 4-item Short Acculturation Scale, which has been validated among Asian immigrants and used in past research on young and second-generation AA populations (Ali et al., 2022b; Choi & Reed, 2011; Marin et al., 1987). Participants then identified which types of US-based family members they interact with, including a mother, father, sibling(s), grandparent(s), aunt(s) or uncle(s), cousin(s), niece(s) or nephew(s), or a spouse or partner. Participants ranked which type of family member they interacted with most frequently, from 1 (most frequently) and up to 8 (least frequently), depending on the range of family members the participant interacted with. If participants interacted with multiple siblings, grandparents, aunts/uncles, or nieces/nephews, they were asked to answer questions in relation to the individual within each category with whom they interacted most often.

For the types of family member(s) ranked as either 1 or 2, participants were asked about the frequency of engaging in a set of 30 different shared activities with the family member(s). Item generation occurred through a literature search on typical family activities (Fuligni et al., 2002; Lehto et al., 2012; Ruiz, 2007; Schreck & Fisher, 2004), consultation with AA family health researchers, and 11 in-depth interviews of young AAs conducted in the formative stage of the study. The aim behind the process of generating and refining shared activity items was to capture all salient, distinct facets of shared interactions between young AAs and their family members. Activities ranged from eating meals, watching movies, traveling for errands, washing dishes, participating in religious or cultural events, meeting friends (both one's own and the family member's), and having deep, thoughtful conversations (Suppl. File 1). Although there has not been a systematic theoretical explanation on specific categories of shared family activities, informed by existing research focused on routine and leisure family activities (Militello et al., 2018; Repetti et al., 2011; Sandbulte et al., 2019; Wäsche et al., 2021) (further corroborated by the in-depth interviews of young AAs conducted during formative research), items were categorized by two researchers (with a third as tie-breaker) as either routine, task-oriented, or habitual behaviors ("routine"), or those indicative of leisure, pleasure-oriented, or bonding behaviors ("leisure"). Importantly, since the sources used to identify shared activities may not have pre-classified many items as explicitly leisure and routine, strong or exclusive conceptual connections may not exist with these constructs. As such, these initial categorizations mainly served as a foundation for the confirmatory factor analysis (described below) and factor loading analysis to ultimately inform the final items under each construct. Participants indicated the frequency of engaging in each activity with a family member from: (1) never, (2) a few times a year or less, (3) a few times a month, (4) a few times a week, (5) a few times a day, or (6) many times a day. Given social disruptions from the COVID-19

pandemic, participants were asked to consider interaction patterns before the onset of the pandemic in answering all questions.

For each of the 1 or 2 highest ranked family members, participants were additionally asked to what extent the family member influenced their healthy lifestyle behaviors. Lifestyle behaviors were developed using the six-component framework of a healthy lifestyle defined by the American College of Lifestyle Medicine: eating a healthy diet, increasing physical activity, improving one's sleep, forming and maintaining relationships with people, developing strategies to manage stress, and avoiding risky substances (American College of Lifestyle Medicine, 2018). Participants specified to what extent they felt the family member in question influenced their ability to achieve each healthy lifestyle behavior from 1 (no influence) to 6 (significant influence). Participants could also respond "don't know" (which was coded as "0" during analysis).

Analysis

Participants with data on interaction patterns with specific family members were included in analyses; interaction patterns with spouses or partners were excluded due to the significant differences in dynamics and interaction patterns with one's romantic partner versus other members of one's immediate or extended family (Ho et al., 2019; Rollock & Lui, 2016). Descriptive and correlation analyses were first conducted of all assessed shared activity items. After first testing factorability through a KMO and Bartlett's test of sphericity (Howard, 2016), a confirmatory factor analysis of shared activity items was also conducted to assess a two-factor solution of routine and leisure shared activities. An analysis of item factor loadings, proportion of variance explained, and inter-item covariances were used to refine scale items. Model fit was evaluated using the following criteria: CFI > 0.9, TLI > 0.9, RMSEA < 0.08, and SRMR < 0.08 (Marsh et al., 1988). CFAs using the final factor structure were also conducted in a subset of interactions with mothers, fathers, siblings, and extended family to assess applicability of the structure in these samples.

Responses for the degree of perceived influence in each lifestyle behavior domain were similarly summated and scaled to reflect a range from 0 to 6. Additionally, answers for each influence domain were dichotomized into low (1–3) and high (4–6) perceived influence. Descriptive analyses on average perceived influence (overall and across each of the six domains) were conducted to identify differences across different types of family members. A series of Pearson correlation analyses were conducted to assess the association between increased frequency of shared activities (using aggregate metrics developed in the factor analysis) with increases in the constructed metric of overall perceived influence on lifestyle behaviors, disaggregated by interaction patterns with different types of family members. Finally, a series of linear and logistic mixed model analyses were conducted to evaluate the association between an increased frequency of shared activities) and influence on lifestyle behaviors, disaggregating by AA ethnic subgroup (except the Mixed group due to small sample size and heterogeneity), accounting for nesting of multiple observations from participants, and adjusting for relevant socio-demographic and acculturation variables identified through literature and bivariable analyses. All analyses were conducted in R (version 4.1.2).

Results

Overall, 628 participants reported data on shared activities; 12 only interacted with a spouse or partner, leaving an analytic sample of 616 participants (Table 1). The average age of participants was 25.0 (SD:4.9), with 54.7% reporting being female. East Asians comprised the greatest proportion of the sample (46.8%), followed by South Asians (22.6%) and Southeast Asians (22.1%). The sample was majority US-born (77.8%), highly educated (68.5% with a Bachelor's degree or above), single (65.9% not married or without a partner), and lived with family (64.0%). Data for 984 unique family relationships were provided by participants, which included relationships with a mother (n = 423), father (n = 187), and sibling (n = 264). Due to the small sample size of relationships with a cousin (n = 52), aunt or uncle (n = 30), grandparent (n = 20), and niece or nephew (n = 8), these were condensed into a singular "extended family" category (n = 110).

Participants reported the highest average frequency of having casual conversations with family members (4.17, SD:1.39) and lowest average frequency of rigorous exercise (1.50, SD:1.39) (Suppl. File 2). Although correlations between most items were relatively low (between 0.20–0.40), the highest correlation was observed between watching TV and movies (0.83), routine religious activities and religious events (0.83), and eating meals and being in the same space (0.83) (Fig. 1).

Data from the 30 shared activity items were observed to be factorable (KMO:0.94, Bartlett's test of sphericity: $\chi^2 = 18{,}820.98$, df = 435, $p < 0.001$). The initial confirmatory factor analysis suggested poor model fit (CFI:0.701, TLI:0.678, RMSEA:0.120, SRMR:0.077). Five routine and leisure shared activity items (displayed in Suppl. File 3) were then selected for a second CFA through assessment of factor loadings and covariances, which suggested good model fit (CFI:0.950, TLI:0.933, RMSEA:0.081, SRMR:0.038). This 10-item scale was used to calculate a Shared Activities

Table 1 Characteristics of Asian American young adults analyzed (n = 616) across family member relationships reflected across the sample (n = 984)

	Total sample (n = 616)	Unique family relationships (n = 984)				
		Mother (n = 423)	Father (n = 187)	Sibling (n = 264)	Extended* (n = 110)	*p*-value
Age, mean (SD)	25.0 (4.9)	24.3 (4.8)	23.4 (4.3)	24.8 (5.0)	26.4 (4.8)	< 0.001
Gender, n (%)						0.067
Female	337 (54.7)	227 (53.7)	86 (46.0)	157 (59.5)	65 (59.1)	
Male	241 (39.1)	170 (40.2)	83 (44.4)	94 (35.6)	36 (32.7)	
Other	38 (6.2)	26 (6.1)	18 (9.6)	13 (4.9)	9 (8.2)	
Ethnicity, n (%)						0.066
East Asian	288 (46.8)	202 (47.8)	91 (48.7)	133 (50.4)	42 (38.2)	
South Asian	139 (22.6)	97 (22.9)	48 (25.7)	46 (17.4)	35 (31.8)	
Southeast Asian	136 (22.1)	91 (21.5)	30 (16.0)	58 (22.0)	27 (24.5)	
Mixed	53 (8.6)	33 (7.8)	18 (9.6)	27 (10.2)	6 (5.5)	
Education, n (%)						0.002
Some college or less	194 (31.5)	151 (35.7)	74 (39.6)	89 (33.7)	22 (20.0)	
Bachelor's	266 (43.2)	185 (43.7)	81 (43.3)	101 (38.3)	60 (54.5)	
Master's or more	156 (25.3)	87 (20.6)	32 (17.1)	74 (28.0)	28 (25.5)	
Working status, n (%)						0.294
Working	313 (50.8)	201 (47.5)	79 (42.2)	125 (47.3)	62 (56.4)	
Not working	33 (5.4)	23 (5.4)	10 (5.3)	15 (5.7)	8 (7.3)	
Student	270 (43.8)	199 (47.0)	98 (52.4)	124 (47.0)	40 (36.4)	
Sexuality						0.395
Heterosexual	432 (72.5)	285 (70.4)	120 (67.4)	192 (74.7)	78 (72.2)	
LGB +	164 (27.5)	120 (29.6)	58 (32.6)	65 (25.3)	30 (27.8)	
Religion						0849
Ath/Agn/Nothing	322 (52.4)	215 (51.1)	102 (54.5)	139 (52.9)	55 (50.5)	
Religious	292 (47.6)	206 (48.9)	85 (45.5)	124 (47.1)	54 (49.5)	
Generation						0.002
1st Gen (Foreign-Born)	137 (22.2)	81 (19.1)	36 (19.3)	54 (20.5)	39 (35.5)	
2nd + Gen (US-Born)	479 (77.8)	342 (80.9)	151 (80.7)	210 (79.5)	71 (64.5)	
Acculturation, mean (SD)	4.3 (0.6)	4.4 (0.6)	4.3 (0.6)	4.3 (0.6)	4.1 (0.7)	< 0.001
Relationship						0.037
Not married/partnered	406 (65.9)	314 (74.2)	150 (80.2)	180 (68.2)	83 (75.5)	
Married/partnered	210 (34.1)	109 (25.8)	37 (19.8)	84 (31.8)	27 (24.5)	
Household size						0.255
1	83 (13.5)	53 (12.6)	25 (13.4)	45 (17.0)	16 (14.5)	
2–3	289 (47.0)	188 (44.5)	80 (42.8)	97 (36.7)	54 (49.1)	
4 +	243 (39.5)	181 (42.9)	82 (43.9)	122 (46.2)	40 (36.4)	
Live with family						0.001
No	222 (36.0)	141 (33.3)	63 (33.7)	105 (39.8)	58 (52.7)	
Yes	394 (64.0)	282 (66.7)	124 (66.3)	159 (60.2)	52 (47.3)	
Frequency of shared activities						
Overall, mean (SD)	0.42 (0.13)	0.45 (0.13)	0.41 (0.12)	0.42 (0.13)	0.32 (0.12)	< 0.001
Routine, mean (SD)	0.49 (0.18)	0.55 (0.17)	0.48 (0.16)	0.49 (0.17)	0.35 (0.16)	< 0.001
Leisure, mean (SD)	0.35 (0.11)	0.36 (0.12)	0.34 (0.11)	0.35 (0.11)	0.28 (0.10)	< 0.001
Influence on lifestyle behaviors						
Overall, mean (SD)	2.77 (1.21)	3.25 (1.14)	2.79 (1.12)	2.45 (1.20)	2.08 (1.22)	< 0.001
Diet, mean (SD)	3.33 (1.77)	4.22 (1.57)	3.35 (1.72)	2.63 (1.58)	2.42 (1.63)	< 0.001
Exercise, mean (SD)	2.87 (1.62)	3.20 (1.58)	3.12 (1.66)	2.75 (1.55)	2.24 (1.50)	< 0.001
Sleep, mean (SD)	2.23 (1.47)	2.64 (1.56)	2.18 (1.43)	1.99 (1.35)	1.84 (1.38)	< 0.001

Table 1 (continued)

	Total sample (n = 616)	Unique family relationships (n = 984)				
		Mother (n = 423)	Father (n = 187)	Sibling (n = 264)	Extended* (n = 110)	*p*-value
Stress, mean (SD)	2.60 (1.56)	2.99 (1.64)	2.56 (1.49)	2.41 (1.51)	1.97 (1.32)	< 0.001
Social relations, mean (SD)	2.74 (1.61)	3.12 (1.66)	2.53 (1.60)	2.52 (1.55)	2.26 (1.49)	< 0.001
Risky behaviors, mean (SD)	3.15 (1.91)	3.87 (1.86)	3.33 (1.88)	2.49 (1.78)	2.04 (1.59)	< 0.001

* Includes grandparents, aunts, uncles, cousins, nieces, nephews

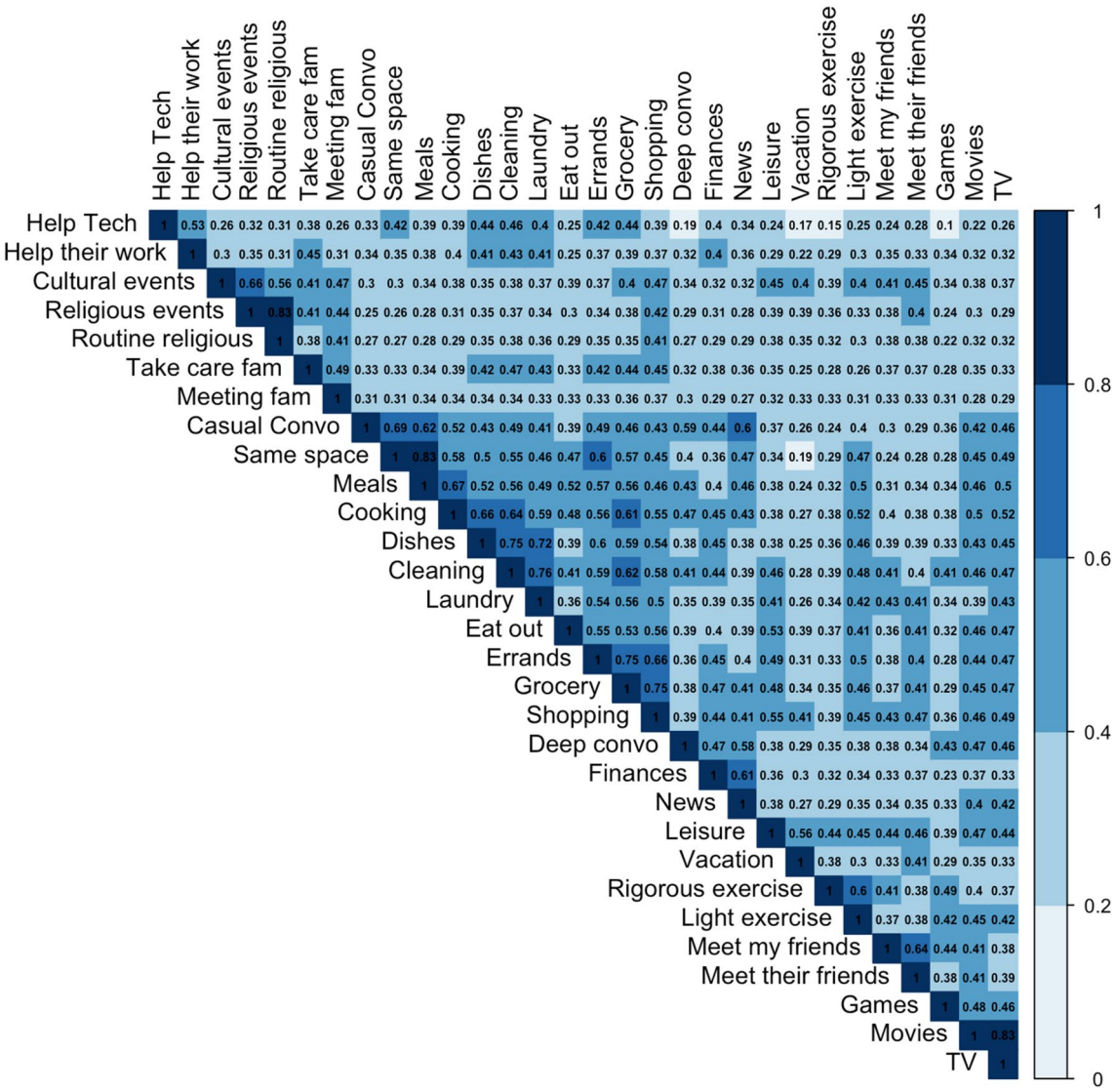

Fig. 1 Correlation matrix of and factor loadings of different types of shared activities with family members

with Family (SAF) score, include routine (SAF-R) and leisure (SAF-L) activities. Reliability of each scale was moderately strong to satisfactory (Cronbach's α: $SAF_{\alpha} = 0.89$, $SAF\text{-}R_{\alpha} = 0.87$, $SAF\text{-}L_{\alpha} = 0.79$). The factor structure also displayed strong model fit in mother, sibling, and extended family interactions, although relatively poorer fit with father interactions (CFI:0.895, TLI:0.861, RMSEA:0.107, SRMR:0.065). South Asians reported more shared activities (β:0.25, 95%CI:0.09, 0.42) than East Asians, while older age, higher acculturation, and living away from family were associated with fewer shared activities (Suppl. File

4); findings were consistent among both routine and leisure activities.

Participants, on average, reported a moderate level of influence from family members on lifestyle behaviors (mean = 2.77, SD = 1.21): the largest influence was on the ability to eat a healthy diet (mean = 3.33, SD = 1.77), and the smallest was on the ability to improve sleep (mean = 2.23, SD = 1.47). Practicing a religion was associated with higher behavioral influence (β:0.37, 95%CI:0.17, 0.58), while higher acculturation was associated with lower influence (β:-0.20, 95%CI:-0.37, -0.03) (Suppl. File 4). Mothers were observed to have the greatest influence on lifestyle behaviors (mean = 3.25, SD = 1.14) followed by fathers (mean = 2.79, SD = 1.12), siblings (mean = 2.45, SD = 1.20), and extended family members (mean = 2.08, SD = 1.22). When deconstructing influence across each of the six examined domains of lifestyle behaviors (Fig. 2), the influence of mothers was observed to skew strongly in the domains of eating a healthy diet and avoiding risky substances, while influence from fathers and siblings was particularly prominent in increasing physical activity. Influence on the ability to improve sleep was consistently low across family members.

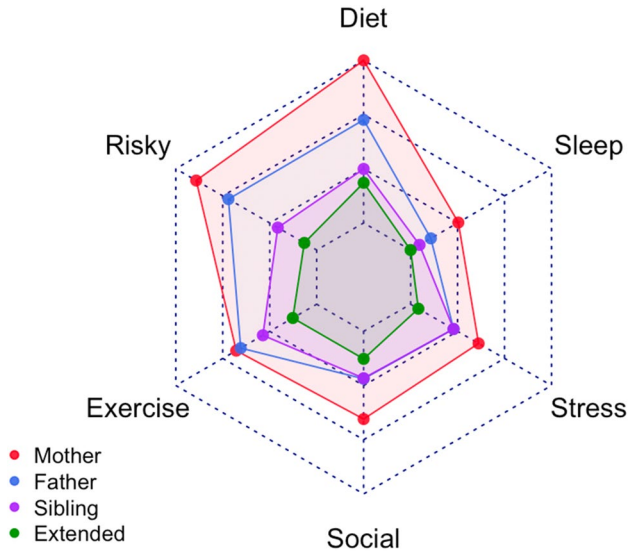

Fig. 2 Key domains of family member influence on lifestyle behaviors of young Asian Americans by type of family member relationship. Greater distance from the center of the plot reflects a greater degree of perceived of the family member on the indicated lifestyle behavioral domain

Disaggregating overall influence across different frequencies of shared activities highlighted important differences across each type of family relationship (Fig. 3); all correlations were statistically significant ($p < 0.01$). An increase in shared activities with extended family members was associated with the greatest increase in overall lifestyle behavioral influence ($SAF_{cor} = 0.55$, $SAF\text{-}R_{cor} = 0.54$, $SAF\text{-}L_{cor} = 0.51$). Conversely, an increase in shared activities with mothers was associated with a proportionally lower increase in influence ($SAF_{cor} = 0.30$, $SAF\text{-}R_{cor} = 0.27$, $SAF\text{-}L_{cor} = 0.32$). An increase in shared routine activities had a higher correlation with leisure activities than routine activities among siblings ($SAF\text{-}R_{cor} = 0.29$, $SAF\text{-}L_{cor} = 0.38$) while the inverse was observed among fathers ($SAF\text{-}R_{cor} = 0.39$, $SAF\text{-}L_{cor} = 0.28$).

Adjusted analyses revealed an increase in the total number of shared activities to be significantly associated with overall influence on lifestyle behaviors (β:0.44; 95%CI:0.34, 0.54), and a marginally stronger association with routine activities (AOR:0.44, 95%CI:0.34–0.55) than leisure (AOR:0.38; 95%CI:0.28, 0.47) (Table 2). Shared activities were associated with the highest odds of influence in the ability to improve sleep (AOR:2.21; 95%CI:1.61, 3.03) and develop strategies to manage stress (AOR:2.22; 95%CI:1.67, 2.96). Influence on the ability to improve sleep, eat a healthy diet, and avoid risky substances were more strongly associated with routine activities than leisure, while influence on the

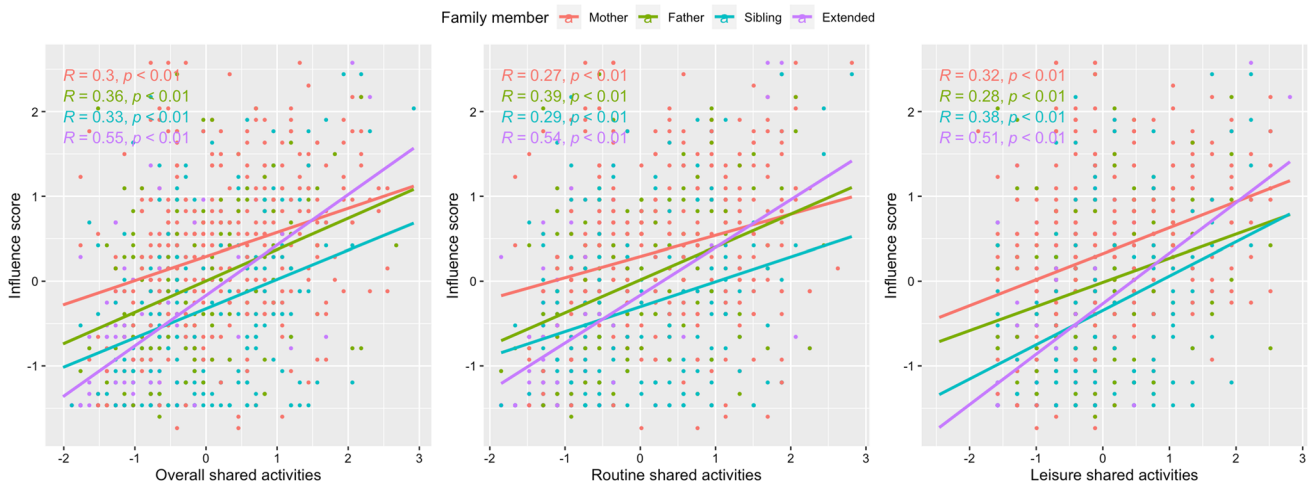

Fig. 3 Changes in lifestyle behavioral influence score and frequency of different shared activities by type of family member relationship

Table 2 Adjusted^ association between shared activities with family and influence on lifestyle behaviors

	Total sample β/AOR		East Asian β/AOR		South Asian β/AOR		Southeast Asian β/AOR	
Overall influence [1]								
Overall	**0.44	(0.34, 0.54)	**0.31	(0.15, 0.46)	**0.63	(0.40, 0.86)	**0.56	(0.36, 0.77)
Routine	**0.44	(0.34, 0.55)	**0.27	(0.12, 0.43)	**0.68	(0.45, 0.92)	**0.57	(0.34, 0.79)
Leisure	**0.38	(0.28, 0.47)	**0.24	(0.09, 0.39)	**0.41	(0.20, 0.62)	**0.57	(0.38, 0.76)
Diet [2]								
Overall	**1.57	(1.24, 1.98)	1.39	(0.97, 2.00)	*1.68	(1.04, 2.72)	*1.88	(1.16, 3.03)
Routine	**1.62	(1.28, 2.04)	*1.48	(1.02, 2.15)	*1.72	(1.03, 2.87)	**1.94	(1.20, 3.13)
Leisure	**1.37	(1.10, 1.70)	1.09	(0.78, 1.53)	1.42	(0.94, 2.14)	**1.85	(1.18, 2.90)
Exercise [2]								
Overall	**1.77	(1.42, 2.22)	1.39	(0.99, 1.96)	**3.07	(1.48, 6.37)	**2.10	(1.32, 3.35)
Routine	**1.70	(1.36, 2.11)	*1.43	(1.01, 2.02)	**2.64	(1.28, 5.42)	**1.99	(1.27, 3.10)
Leisure	**1.66	(1.35, 2.05)	1.16	(0.84, 1.61)	**2.49	(1.42, 4.35)	**2.21	(1.38, 3.55)
Sleep [2]								
Overall	**2.21	(1.61, 3.03)	1.83	(1.00, 3.34)	**2.68	(1.42, 5.06)	**2.22	(1.27, 3.88)
Routine	**2.23	(1.63, 3.06)	*1.96	(1.01, 3.76)	**3.22	(1.54, 6.71)	**2.10	(1.21, 3.63)
Leisure	**1.81	(1.38, 2.39)	1.32	(0.78, 2.23)	*1.77	(1.12, 2.79)	**2.38	(1.32, 4.26)
Stress [2]								
Overall	**2.22	(1.67, 2.96)	*1.72	(1.13, 2.62)	**4.73	(2.25, 9.96)	**3.16	(1.45, 6.88)
Routine	**2.02	(1.54, 2.65)	*1.60	(1.05, 2.42)	**5.75	(2.30, 14.40)	**2.76	(1.35, 5.64)
Leisure	**2.05	(1.57, 2.67)	1.48	(1.00, 2.20)	**2.72	(1.62, 4.57)	**3.42	(1.54, 7.61)
Social [2]								
Overall	**2.05	(1.57, 2.66)	**1.45	(1.44, 1.46)	**3.27	(1.89, 5.68)	**2.63	(1.46, 4.72)
Routine	**1.87	(1.44, 2.43)	1.31	(0.90, 1.91)	**2.89	(1.66, 5.04)	**2.33	(1.35, 4.03)
Leisure	**2.08	(1.62, 2.67)	*1.50	(1.04, 2.16)	**2.67	(1.67, 4.29)	**2.99	(1.59, 5.61)
Risky [2]								
Overall	**2.02	(1.44, 2.84)	1.39	(0.83, 2.35)	*2.22	(1.17, 4.22)	*4.00	(1.39, 11.51)
Routine	**1.98	(1.41, 2.77)	1.19	(0.71, 2.00)	*2.64	(1.23, 5.68)	**3.84	(1.51, 9.78)
Leisure	**1.75	(1.29, 2.36)	1.53	(0.95, 2.45)	1.52	(0.95, 2.43)	*3.32	(1.24, 8.85)

^Adjusted for age, gender, education, sexuality, religion, generation, acculturation, relationship status, household size, type of family member, and living with a family member. *$p<0.05$, **$p<0.01$;

[1] Linear mixed model of one-point increase in overall influence

[2] Logistic mixed model of high (> 3 score) perceived lifestyle behavioral influence

ability to form and maintain relationships was more strongly associated with leisure activities. Ethnic subgroup analyses revealed that South Asians reported the highest increase in behavioral influence with shared activities (β:0.63; 95%CI:0.40, 0.86), and East Asians reported the lowest (β:0.31, 95%CI:0.15, 0.46). Across behavioral domains, activities among South Asians were consistently associated with higher odds of influence, although the ability to avoid risky substances was most strongly associated with shared activities among Southeast Asians (AOR:4.00, 95%CI:1.39, 11.51). Finally, while routine activities were more influential among South Asians across behavioral domains, leisure activities were more influential among Southeast Asians.

Discussion

Overall, AA young adults reported a significant influence of family members on different domains of a healthy lifestyle, and this was associated with shared activities (including both routine and leisure-oriented activities). Indeed, despite family members having less control on the health of AA young adults compared to children and older adults (Ali et al., n.d.; Wyatt et al., 2015), participants' family dynamics were nonetheless observed to be quite close (high frequency of shared activities) and powerful (particularly in influencing diet and risky behaviors), suggesting the importance of family dynamics across the lifespan of AAs. Importantly, mothers had the strongest overall influence on lifestyle behaviors irrespective of the frequency and type of shared activities. In contrast, changes in the frequency of shared activities

(across different types) with extended family members contributed to the greatest changes in perceived lifestyle behavioral influence. This data provides a foundation for public health professionals seeking to improve young AAs' health to better understand specific family dynamics that contribute to lifestyle behaviors and the types of activities with family members worthy of consideration in future research efforts aimed at tailoring the design of family-based, dyadic behavioral interventions.

Study findings also corroborate past research emphasizing the powerful and distinct role that mothers play within AA family dynamics (Ko & Wei, 2018). In particular, dietary behaviors within AA families, such as eating out, preferences towards Asian cuisines, and consumption of healthy foods, have been linked explicitly with characteristics of the mother in the household (notably employment status and level of acculturation) (Neumark-Sztainer et al., 2003; S.-Y. Park et al., 2003). Moreover, the transmission of values systems and priorities (i.e., socio-cultural norms, religious norms, and behaviors with potential relevance to health) is another pathway through which family members may influence young AAs' lifestyle behaviors. These values may be instilled through childhood and other socialization processes irrespective of current shared family activities. Indeed, qualitative research has suggested that the transmission of values held by AAs is primarily driven by parental influence (Ali et al., 2022a). In contrast, siblings and extended family are perceived as reinforcers, substitutes, or contrasts to the roles of parents (Park & Ecklund, 2007). As such, the lesser increase in influence observed through changes in shared activities with parents (particularly mothers) may suggest that their influence on health is occurring through other mechanisms, such as health-related values instilled through socialization.

Disaggregated analyses revealed that shared family activities were particularly powerful among South Asian young adults in driving familial lifestyle behavioral influence. Past research among South Asian young adults has observed that family members are an important gateway by which religious and cultural influences on lifestyle behaviors are experienced (Ali et al., 2022a). Given that the religious and cultural traditions prevalent in South Asia have a particularly strong emphasis on the control of lifestyle behaviors (e.g., Islamic or Hindu principles on meat-related dietary restrictions and the control of risky health behaviors, such as alcohol consumption), shared activities with family members (particularly mothers, fathers, and extended family) may act as a vessel for the transmission or enforcement of these behavioral restrictions. Conversely, the limited association between shared activities and behavioral influence among East Asians suggest that this influence may be experienced through other mechanisms, such as behavioral norms shaped during adolescence or childhood (Tseng, 2015). While culturally or religiously driven behavioral values may also explain significant findings observed among Southeast Asians, the particularly large range of countries and cultures in the region suggest country-specific research is warranted to elucidate potential mechanisms more appropriately. Indeed, further qualitative research based on these findings will be informative to deconstruct these region-specific disparities.

The final 10-item SAF scale utilized in this study, including both routine and leisure activity subscales, displayed strong model fit and reliability, and the rigorous, iterative development process and strong associations with lifestyle behaviors support its validity in AA young adult contexts. However, findings that the scale did not fit as strongly in interactions with fathers compared to other family members suggest either the types of shared activities indicative of routine and leisure activities with fathers are distinct, or that this dichotomization of shared activities is less applicable in relationships with fathers. Although past research specifically comparing paternal relationships with extended family members is limited, analyses into AA parental interactions have similarly observed significant differences in the structure and impact of maternal and paternal relationships (Ali et al., 2022a; Hou et al., 2016; Qin & Chang, 2013). Given that the relatively small sample size of father interactions limited the ability to develop a valid, reliable scale specific for shared activities for these relationships (e.g., through an exploratory factor analysis), further research is warranted to tailor or evaluate the scale with respect to paternal interactions.

Moreover, past research has similarly highlighted the powerful role of routine family activities as an influence on lifestyle behaviors (Repetti et al., 2011; Wäsche et al., 2021). However, differences in the association observed between routine and leisure activities with lifestyle behavioral influence may be explained by the unique types of spaces that different shared activities actually create for the meaningful, impactful interactions that contribute to lifestyle behaviors (Michaelson et al., 2021), or how influence is actually manifested across different lifestyle behaviors. For example, past research among young AAs has observed family dietary influence to occur through eating meals together, eating food cooked by family members, or conversations about food during regular interactions (Ali et al., 2022a); such findings corroborate the particularly strong association observed between dietary influence and routine activities. Conversely, leisure activities, which are inherently centered around bonding or other non-pragmatic objectives (Sandbulte et al., 2019), may create a very distinct type of space for interactions that contribute more strongly to the types of influence mechanisms more significant in other behaviors (e.g. developing healthy social relationships). As such, these preliminary findings provide a pathway for in-depth

qualitative and mixed methods research to disentangle the most important routine and leisure activities contributing to this observed familial lifestyle behavioral influence, and the actual mechanisms by which this influence is occurring.

Importantly, while the development of this survey was informed through literature specific to AA family dynamics and further refined through in-depth interviews of AAs, most of the examined shared activities were not necessarily culturally specific and are likely applicable to young adults more generally. Indeed, familial influence on the health of young adults is relevant to diverse communities in the US. For example, strong family networks and multigenerational households are also prevalent among Latin Americans (Landale et al., 2006), which has driven the popularity of family-based behavioral interventions in the community (Hu et al., 2014; Lescano et al., 2009). Future research can thus build on study findings be evaluating the validity of the 10-item SAF scale in other young adult populations.

The strength of this study lies in its ability to provide insights into the lifestyle experiences (across multiple domains) of the understudied, underserved population of young AA adults (Ali et al., 2021) by examining a comprehensive, multi-faceted range of family activities across distinct family members. However, some limitations must be acknowledged. The study relied upon a convenience sample of cross-sectional, self-reported data solely from the perspective of young AAs, thus the study is unable to directly point to actionable interventional approaches. Further family-wide, longitudinal assessments are warranted to expand findings and provide more intervention-oriented implications. Although targeted Facebook advertisements were used to enhance the gender, age, and AA ethnic subgroup distribution (Ali et al., 2020), the sample is not necessarily representative of the US AA young adult population; for example, participants reported a high degree of educational attainment, and future efforts may benefit by examining socio-economic differences in AA family dynamics and shared activities more intensively. Moreover, while ethnic subgroup analyses were conducted, given the small sample sizes of each subgroup, further subgroup-specific research is warranted to help expand these preliminary findings and illuminate the unique dynamics of familial influence and shared activities within diverse AA populations. Finally, the COVID-19 pandemic has had a significant impact in changing family dynamics, with growing evidence suggesting greater levels of family interaction (including among young adults) as result of school/workplace closures and quarantine-inducted confinement to home settings with family members (Fry et al., 2020; US Census Bureau, 2022). Although participants were prompted to reflect on family-interaction patterns before the pandemic, post-pandemic changes in family dynamics may have influenced participant responses; further research on how the pandemic has impacted AA young adult family dynamics is warranted.

Likewise, while behavioral outcomes were reflected in some shared activity items (including health behaviors such as exercise), the survey did not evaluate the independent prevalence of healthy lifestyle behaviors. Moreover, while the study assessed the overall magnitude of perceived behavioral influence, the directionality of influence (i.e., healthy or unhealthy) was not evaluated. Informed by these findings, in-depth behavioral assessments (beyond those reliant on self-report) among young AAs and their family members is warranted to explore whether perceived behavioral influence also translates to substantive changes in health behaviors. Indeed, a qualitative sub-study (driven by study findings) is currently underway to examine the specific mechanisms and directionality of perceived family influence on lifestyle behaviors through dyadic interviews of young AAs and their family members.

Family interactions and shared activities are a vital part of the AA experience, and they may also represent a platform to promote healthy lifestyle behaviors to address the growing and complex NCD burden experienced by young AAs. Findings from this analysis pave the way for further research efforts to explore how routine and leisure family activities can be innovatively incorporated into family-based health intervention designs. By acknowledging the complex ways these activities may influence behaviors across different dimensions of a healthy lifestyle and in the context of different types of family member relationships, public health professionals can tailor interventional efforts to optimize impact and sustainability in improving health outcomes among young AA adults.

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Availability of data and materials Data and materials used in this study are available from the corresponding author upon reasonable request.

Code availability Code used in this study are available from the corresponding other upon reasonable request.

Declarations

Conflict of interests None to declare.

Human and animal rights and Informed Consent All procedures followed were in accordance with ethical standards of the responsible committee on human experimentation (institutional and national) and

with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all patients for being included in the study.

Consent for publication Not applicable.

Ethics approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The study was approved by the New York University Institutional Review Board.

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