Study Information
1. Title
   1.1. Provide the working title of your study. It may be the same title that you submit for publication of your final manuscript, but it is not a requirement.

Understanding Family Dynamics in a Cross-Cultural Sample

2. Authorship

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3. Research Questions
   3.1. Please list each research question included in this study.

   Although the Circumplex Model of family functioning is well validated in westernized majority Caucasian samples, the model has yet to be validated cross-culturally (Olson, Sprenkle, & Russell, 1979; Pirutinsky & Kor, 2013). Thus, the current study intends to determine if the Circumplex Model of family functioning fits across cross-cultural (e.g., regions of the U.S., European countries, and Hong Kong) samples.

   Furthermore, previous research suggests that there is an ideal model of family functioning (i.e., high cohesion and high adaptability) that predicts the best outcomes for children. However, research on the best outcomes from family dynamics is mixed, suggesting that positive and negative outcomes may vary by cultural context.

4. Hypotheses
   4.1. For each of the research questions listed in the previous section, provide one or multiple specific and testable hypotheses. Please state if the hypotheses are directional or non-directional. If directional, state the direction. A predicted effect is also appropriate here.

The current study intends to use multigroup analysis (MGA) to determine differences and similarities in family dynamics across regions within the United States (e.g., Northeast, South, Midwest) and between countries (e.g., Hong Kong, Sweden). It is hypothesized that samples with higher values related to collectivism and filial piety will report higher family enmeshment and higher family rigidity which will be associated with better outcomes than in samples with higher individualism and lower filial piety. It is also hypothesized that in cultures with higher
collectivism and filial piety family dynamics of higher enmeshment and rigidity will be associated with more positive outcomes (e.g., lower substance use, lower risky sexual behavior, and higher adjustment). Furthermore, parent-child gender dyads will likely moderate the relations among these variables such that sons may respond to less adaptive family dynamics with higher externalizing problems (e.g., substance use) and daughters may respond with higher internalizing problems (e.g., lower self-esteem).

**Sampling Plan**

In this section we will ask you to describe how you plan to collect samples, as well as the number of samples you plan to collect and your rationale for this decision. Please keep in mind that the data described in this section should be the actual data used for analysis, so if you are using a subset of a larger dataset, please describe the subset that will actually be used in your study.

5. **Existing data**
   5.1. Preregistration is designed to make clear the distinction between confirmatory tests, specified prior to seeing the data, and exploratory analyses conducted after observing the data. Therefore, creating a research plan in which existing data will be used presents unique challenges. Please select the description that best describes your situation. Please do not hesitate to contact us if you have questions about how to answer this question (prereg@cos.io).
   
   **5.1.1. Registration prior to creation of data:** As of the date of submission of this research plan for preregistration, the data have not yet been collected, created, or realized.

6. **Explanation of existing data**
   6.1. If you indicate that you will be using some data that already exist in this study, please describe the steps you have taken to assure that you are unaware of any patterns or summary statistics in the data. This may include an explanation of how access to the data has been limited, who has observed the data, or how you have avoided observing any analysis of the specific data you will use in your study. The purpose of this question is to assure that the line between confirmatory and exploratory analysis is clear.

   **N/A**

7. **Data collection procedures.**
   7.1. Please describe the process by which you will collect your data. If you are using human subjects, this should include the population from which you obtain subjects, recruitment efforts, payment for participation, how subjects will be selected for eligibility from the initial pool (e.g. inclusion and exclusion rules), and your study timeline. For studies that don't include human subjects, include
information about how you will collect samples, duration of data gathering efforts, source or location of samples, or batch numbers you will use.

Participants will be recruited through universities psychology research participant pool or via instructors for voluntary participation. Participants will be provided a link to complete an attached online anonymous survey via Qualtrics that will not collect IP information or demographic information that could identify that individual. Participants will be requested to complete all questionnaires from current perceptions of family dynamics and current behavior. Questionnaires will be presented in random order and once complete participants will be redirected to receive credit if participating through a psychology participant pool.

8. Sample size
   8.1. Describe the sample size of your study. How many units will be analyzed in the study? This could be the number of people, birds, classrooms, plots, interactions, or countries included. If the units are not individuals, then describe the size requirements for each unit. If you are using a clustered or multilevel design, how many units are you collecting at each level of the analysis?

   Participants will consist of at least 100 emerging adults from each site, as suggested by Byrne (2016) to achieve appropriate power. Participants aged 18 to 25 years enrolled in universities at multiple sites in the United States and in countries in Europe and Asia.

9. Sample size rationale
   9.1. This could include a power analysis or an arbitrary constraint such as time, money, or personnel.

   As suggested by Byrne (2016), 200 participants per group is adequate to achieve desired power of .80 for MGA and LPA SEM analyses.

10. Stopping rule
   10.1. If your data collection procedures do not give you full control over your exact sample size, specify how you will decide when to terminate your data collection.

   Data collection will terminate upon completion of sample size from each site or within two semesters (1 school year) from beginning data collection.

Variables

In this section you can describe all variables (both manipulated and measured variables) that will later be used in your confirmatory analysis plan. In your analysis plan, you will have the opportunity to describe how each variable will be used. If you have variables that you are
measuring for exploratory analyses, you are not required to list them, though you are permitted
to do so.

11. Manipulated variables
11.1. Describe all variables you plan to manipulate and the levels or treatment arms of
each variable. For observational studies and meta-analyses, simply state that
this is not applicable.

N/A

12. Measured variables
12.1. Describe each variable that you will measure. This will include outcome
measures, as well as any predictors or covariates that you will measure. You do
not need to include any variables that you plan on collecting if they are not going
to be included in the confirmatory analyses of this study.

Family Circumplex Model. The Family Adaptability and Cohesion Scale (FACES-IV; Olson,
2011) is a 42-item measure that assesses adaptability and cohesion dimensions of family
dynamics on a 5-point Likert scale from 1 = Strongly disagree to 5 = Strongly agree. Six
subscales include balanced cohesion (e.g., Family members are involved in each others lives),
balanced flexibility (e.g., Discipline is fair in our family), disengaged (e.g., Our family seldom
depend on each other), enmeshed (e.g., We spend too much time together), rigid (e.g., Our family
is highly organized), and chaotic (e.g., Things do not get done in our family). FACES has been
validated in North American and European based samples with Cronbach’s alpha scores ranging
from .75 to .89.

Parent-child relationship. The Network of Relationships Inventory (NRI; Furman &
Buhrmester, 1985) is a 30-item measure that broadly assesses relationship characteristics on a 5-
point Likert scale from 1 = Little or None to 5 = The Most. Ten subscales include companionship
(e.g., How often do you spend fun time with this person), conflict (e.g., How often do you and
this person argue with each other), instrumental aid (e.g., How much does this person help you
figure out or fix things), antagonism (e.g., How much do you and this person get on each other’s
nerves), intimate disclosure (e.g., *How often do you tell this person everything that you are going through*), nurturance (e.g., *How much do you take care of this person*), affection (e.g., *How much does this person like or love you*), reassurance of worth (e.g., *How much does this person treat you like you’re good at things*), relative power (e.g., *Who tells the other person what to do more often, you or this person*), and reliable alliance (e.g., *How sure are you that this relationship will last no matter what*). The NRI has been validated in North American samples.

**Parent Discipline.** The Domains of Young Adult Discipline (DYADS; Walker & McKinney, submitted for publication) is a 25-item measure that assesses parental (i.e., maternal and paternal) discipline on a 5-point Likert scale ranging from 1 = *never* to 5 = *always*. The four subscales include behavioral control (e.g., *Removes access to my car*), psychological control (e.g., *Yells or shouts at me*), physical assault (e.g., *Shoves me*), and non-violent/inductive reasoning (e.g., *Celebrates my good behavior*). This measure was validated in a Southern United States sample with alphas ranging from .75 to .91.

**Filial Piety.** The Contemporary Filial Piety Scale (CFPS; Lum et al., 2016) is a 10-item scale that assesses reverence and honor of duty to family on a 5-point Likert scale from 1 = *very unimportant* to 5 = *very important*. The two subscales include pragmatic obligations (e.g., *Arrange appropriate treatment for parents when they fall ill*) and compassionate reverence (e.g., *Try my best to achieve parents’ expectation*). It has been validated in a sample from the metropolitan area of Hong Kong with Cronbachs alpha ranging from .84 to .90.

**Cultural Orientation.** The Culture Orientation Scale (COS; Triandis & Gelfland, 1998) is a 16-item measure that assesses four dimensions of cultural orientation on a 9-point Likert scale ranging from 1 = *never or definitely no* to 9 = *always or definitely yes*. Four subscales include vertical collectivism (e.g., *Family members should stick together, no matter what*).
sacrifices are required), vertical individualism (e.g., *Winning is everything*), horizontal collectivism (e.g., *If a coworker gets a prize, I would feel proud*), and horizontal individualism (e.g., *I rely on myself most of the time; I rarely rely on others*).

**Socioeconomic Status.** The MacArthur Scale of Subjective Social Status (SSS; Adler, Epel, Castellazzo, & Ickovics, 2000) is a 10-item scale that assesses socioeconomic status. The scale is presented in the form of a ladder and a statement indicating that the top of the ladder indicates people with the most wealth, education, and careers in their society/country and the bottom of the ladder indicates those with the lowest wealth and resources and the participant places themselves where they believe they are on the scale given their resources. The SSS has been validated globally with reliability rates ranging from .70 to .90.

**Emerging Adult Adjustment.** The Strengths and Difficulties Questionnaire (SDQ; Goodman, Lamping, & Ploubidis, 2010) is a 25-item scale that assesses broad strengths and weaknesses regarding emotional and interpersonal adjustment on a 3 point Likert scale ranging from 0 = *Not True* to 2 = *Certainly True*. Subscales include emotional symptoms (e.g., *I am often unhappy, depressed or tearful*), conduct problems (e.g., *I fight a lot. I can make other people do what I want*), hyperactivity (e.g., *I am constantly fidgeting or squirming*), peer problems (e.g., *I get along better with older people than with people of my own age*), and prosocial behavior (e.g., *I try to be nice to other people. I care about their feelings*). The SDQ has been validated in cross-cultural samples and has versions in multiple languages.

**Emerging Adult Risky Sexual Behavior.** The Safe Sex Behavior Questionnaire (SSBQ; Dilario et al., 1993) is a 27-item measure that assesses sexual behaviors, such as condom use and communication regarding sex safe practices in a college-age population on a 4-point Likert scale from 1 = *Never* to 4 = *Always*. Four subscales include condom usage, sexual behaviors, high risk
sexual behaviors, and sexual communication and negotiation. Sample items include “I insist on condom use when I have sexual intercourse”, “I have sexual intercourse with someone who injects drugs into his/her veins”, and “I engage in sexual intercourse on the first date.”

**Emerging Adult Substance Use.** The Youth Risk Behavior Scale (YRBS; Eaton et al., 2008) is an 89-item measure that assesses health risk behaviors including eating behaviors, sleep behaviors, risky sexual behavior, and substance use. For the current study 16 of the questions with content related to substance use will be used and addresses frequency of use related to tobacco, alcohol, marijuana, and prescription drugs, and other illicit drugs within the last 30 days and the last year. Sample items include “During the last year, how many times have you used ecstasy (also called MDMA or Molly)” and “During the last month, how many times did you use marijuana.”

13. Indices

13.1. If any measurements are going to be combined into an index (or even a mean), what measures will you use and how will they be combined? Include either a formula or a precise description of your method. If you are using a more complicated statistical method to combine measures (e.g. a factor analysis), you can note that here but describe the exact method in the analysis plan section.

As described above, almost all subscales will be created as sum scales to indicate frequency or level of the variable measured.

**Design Plan**

In this section, you will be asked to describe the overall design of your study. Remember that this research plan is designed to register a single study, so if you have multiple experimental designs, please complete a separate preregistration.

14. Study type

14.1. **Observational Study** - Data is collected from study subjects that are not randomly assigned to a treatment. This includes surveys, natural experiments, and regression discontinuity designs.
15. **Blinding**
   15.1. Blinding describes who is aware of the experimental manipulations within a study. Mark all that apply.
   
   **15.1.1. No blinding is involved in this study.**

16. **Study design**
   16.1. Describe your study design. Examples include two-group, factorial, randomized block, and repeated measures. Is it a between (unpaired), within-subject (paired), or mixed design? Describe any counterbalancing required. Typical study designs for observation studies include cohort, cross sectional, and case-control studies.

   This is a mixed study cross-sectional design in order to collect data from emerging adults cross-culturally and compare family dynamics between and within groups.

17. **Randomization**
   17.1. If you are doing a randomized study, how will you randomize, and at what level?

   N/A

**Analysis Plan**

You may describe one or more confirmatory analysis in this preregistration. Please remember that all analyses specified below must be reported in the final article, and any additional analyses must be noted as exploratory or hypothesis generating.

A confirmatory analysis plan must state up front which variables are predictors (independent) and which are the outcomes (dependent), otherwise it is an exploratory analysis. You are allowed to describe any exploratory work here, but a clear confirmatory analysis is required.

18. **Statistical models**
   18.1. What statistical model will you use to test each hypothesis? Please include the type of model (e.g. ANOVA, multiple regression, SEM, etc) and the specification of the model (this includes each variable that will be included as predictors, outcomes, or covariates). Please specify any interactions that will be tested and remember that any test not included here must be noted as an exploratory test in your final article.

Utilizing IBM’s AMOS 24.0 statistical software, all scales will be assessed for scalar and metric invariance as well as confirmatory factor analyses will be conducted to determine if there are differences between collected samples. The Circumplex Model fit will be tested between collected samples. Variables include family cohesion, disengagement, enmeshment, adaptability, rigidity, chaotic, communication, and conflict. Other variables include socioeconomic status, filial piety, and cultural orientation. It is expected that samples with
higher collectivism, filial piety, and lower socioeconomic status will have different model fit from more typically westernized samples with higher individualism and lower filial piety. If initial fit of the Circumplex Model is poor, latent profile analysis will be conducted in order to determine the appropriate models for each sample. Furthermore, Multi-Group Analysis will be conducted to determine whether these models differ in association with emerging adult externalizing and internalizing problems. Variables included in the MGA will be outcomes of total substance use, risky sexual behavior, emotional distress, and prosocial behavior. Emerging adult gender will be included as a moderator in these analyses to determine if they further differentiate between male and female reporters.

19. Transformations
   19.1. If you plan on transforming, centering, recoding the data, or will require a coding scheme for categorical variables, please describe that process.

Data will be recoded as described in publications for each of the scales to create the necessary subscales. Data will be imputed according to the amount of missing data in order to conduct bootstrapping in AMOS 24.0.

20. Follow-up analyses
   20.1. If not specified previously, will you be conducting any confirmatory analyses to follow up on effects in your statistical model, such as subgroup analyses, pairwise or complex contrasts, or follow-up tests from interactions. Remember that any analyses not specified in this research plan must be noted as exploratory.

Additional confirmatory analyses may include assessment of group differences regarding frequency of parent behaviors and emerging adult satisfaction with family dynamics assessed in the current study.

21. Inference criteria
   21.1. What criteria will you use to make inferences? Please describe the information you will use (e.g. p-values, Bayes factors, specific model fit indices), as well as cut-off criterion, where appropriate. Will you be using one or two tailed tests for each of your analyses? If you are comparing multiple conditions or testing multiple hypotheses, will you account for this?

Good model fit indices (e.g., TLI > or = .90, RMSEA < or = .05, and CFI > or = .95) as indicated by Kenny (2015) and Kline (2011) will be used to determine Circumplex Model fit and two-tailed p-values (e.g., .05 alphas) will be used to determine group differences in multi-group analyses.

22. Data exclusion
   22.1. How will you determine what data or samples, if any, to exclude from your analyses? How will outliers be handled?
Participants outside of the emerging adult age range (i.e., 18 to 25) will be excluded from the dataset in order to ensure participants are within the same developmental range. Data that is incomplete at greater than 10% will be removed from analyses. Visual checks on the data using frequency tables, histograms, scatter plots, and tests of normality in SPSS to determine if errors exist or inappropriate systematic patterns exist in the data that indicate poor quality of response and a need for removal.

23. Missing data
23.1. How will you deal with incomplete or missing data?

Participants data will only be excluded if greater than 10% of their data is missing, otherwise all participants data will be included in the study and imputed via either top-coding or regression determined replacement.

24. Exploratory analysis (optional)
24.1. If you plan to explore your data set to look for unexpected differences or relationships, you may describe those tests here. An exploratory test is any test where a prediction is not made up front, or there are multiple possible tests that you are going to use. A statistically significant finding in an exploratory test is a great way to form a new confirmatory hypothesis, which could be registered at a later time.

Script (Optional)

The purpose of a fully commented analysis script is to unambiguously provide the responses to all of the questions raised in the analysis section. This step is not common, but we encourage you to try to create an analysis script, refine it using a modeled dataset, and use it in place of your written analysis plan.

25. Analysis scripts (Optional)
25.1. (Optional) Upload an analysis script with clear comments. This optional step is helpful in order to create a process that is completely transparent and increase the likelihood that your analysis can be replicated. We recommend that you run the code on a simulated dataset in order to check that it will run without errors.

Other

26. Other
26.1. If there is any additional information that you feel needs to be included in your preregistration, please enter it here.