A Protocol of Procedures and Operations

Reducing Stress, Anxiety, and Depressive Symptoms Via a Family-centered Preventative Intervention for Immigrants: A Randomized Controlled Feasibility Trial

Principal Investigator

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Study Title

Reducing stress, anxiety, and depressive symptoms via a family-centered preventative intervention for immigrants: A randomized controlled feasibility trial

Objective

The current study aims to pilot test the feasibility and acceptability of Problem Management Plus for Immigrants (PMP-I) among Bhutanese immigrants 18 years and older living in Massachusetts.

Aim 1: **Adapt and culturally modify PMP to develop PMP-I as a family-based preventative intervention.**

a) Develop a training guide and intervention curriculum;

b) Obtain iterative feedback about the format, ease of use, and implementation barriers from participants, facilitators, and community members.

Aim 2: **Test the feasibility, acceptability, and preliminary outcomes of PMP-I with trained community facilitators**.

a) Assess i) recruitment, session attendance, and retention rates and program acceptability using checklists from participants; ii) feasibility of measures for assessing inclusion/exclusion, the fidelity of intervention delivery, mediators of response, and outcomes using checklists from facilitators; and iii) barriers and facilitators of intervention using interview and focus group discussion with participants and facilitators.

b) Test preliminary effects of PMP-I vs. talk program with community support services pamphlets (CSS) using a small randomized pilot trial (N=116 families; 58 families per intervention and control) on perceived stress, anxiety and depressive symptoms (primary), physiological stress assessed in hair cortisol (secondary), and self-efficacy and coping strategy, family wellbeing, and social networking (targets), with assessments at baseline, post-intervention, and 3-month post-intervention.

c) Evaluate the relationships between targets and outcomes and explore mediators (e.g., coping) of intervention-outcome relation.

Design and Outcomes

Study design:

This mixed-methods study will incorporate a two-arm randomized controlled feasibility trial and qualitative evaluation of PMP-I intervention's acceptability to a range of stakeholders.

Allocation: Randomized

Intervention Model: Parallel Assignment

Masking: None

Primary purpose: Prevention

Outcomes:

Primary Outcome

Perceived stress: The 10-item Cohen Perceived Stress Scale (PSS)[1] will be used to assess perceived stress at baseline, post-intervention, and three-month post-intervention. The PSS uses a 5-point Likert scale (ranging from 0, "never" to 4, "very often") to assess psychological stress experienced during the past month, including the extent to which situations felt unpredictable, uncomfortable, and overwhelming.

Anxiety and Depressive symptoms: The Hopkins Symptom Checklist-25 (HSCL-25)[2] will be used to measure anxiety and depressive symptoms experienced over the past month at baseline, post-intervention, and three-month post-intervention. It is composed of a 10-item subscale for anxiety and a 15-item subscale for depression, with each item scored on a Likert scale from 1 (not at all) to 4 (extremely).

Secondary outcome

Physiological stress: Cortisol hair-test (average hormone levels over the past three months) will be used as a biomarker to measure physiological stress. Neuroendocrine indicators, such as cortisol, are effective stress biomarkers because they are the first to respond to a given stressor and coordinate the physiological response of other bio-physiological systems.

Interventions and Duration

Study Arms:

Experimental: Problem Management Plus for Immigrants (PMP-I) at family settings

Active Comparator: Talk program with Community Support Service Pamphlet (CSS)

Assessment:

Baseline, Post-Intervention, and 3-month Post-Intervention

Intervention:

PMP-I is a 5-week, peer-led, culturally tailored psychoeducation, behavioral activation, and problem-solving (90 minutes), breathing and yoga intervention (90 minutes) in a family setting. PMP-I will use a structured approach, including once a week, face-to-face sessions, breathing, yoga practice, homework that includes recording activities, rebuilding individual skills, or learning new skills to reduce stress.

1. **Managing Stress:** Breathing and yoga practices, stress-management sessions, and behavioral activation exercises to strengthen positive coping strategies.

2. Managing Problems: Practice exercises to identify the problems, develop solutions, and plan a strategy to carry out those solutions.

3. Behavior Activation: Communication skill sessions and practice exercises to identify and carry out pleasant tasks.

4. Strengthening Social Support: Social skills session and practice exercise to identify social support.

5. Staying Well: Make a plan that helps to create a supportive family environment.

Sample Size and Population

This study will be conducted among 226 Bhutanese adults settled in Massachusetts.

STUDY TEAM ROSTER

Principal Investigator: **Kalpana Poudel-Tandukar, Ph.D., MPH, MPHC, CGM**

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Co-Investigator: **Holly Laws, Ph.D.**

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Co-Investigator: **Pamela Burris, MSN, RN, AHN-BC, RYT 500 hr, Yoga Trainer**

Experienced Registered Yoga Teacher with Yoga Alliance (E-RYT,)

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STUDY TEAM MEMBER RESPONSIBILITIES

A. KEY PERSONNEL

Kalpana Poudel-Tandukar, Ph.D., MPH, MPHC, CGM, Principal Investigator (PI)

Responsibilities: Dr. Poudel-Tandukar will assume responsibility for all aspects of the proposed project, including study design, intervention development, training manual and guideline development, training staff, intervention implementation, measurement tools development, data collection, data analysis and interpretation, and progress reports and manuscript preparation, and preparation of the subsequent R01 application. She will work with the entire research team throughout the project, meeting monthly with Co-Is; and once every week with field staff (supervisors, interventionists, and research assistants) via in-person or skype as needed. She will do onsite supervision of fieldwork at least twice every month or more as needed. She will lead efforts to inform communities, health practitioners, and scientific communities of this investigation's results and disseminate relevant materials and resources related to studying findings and translation of research to practice.

Cynthia S. Jacelon, RN, BC, Ph.D., CRRN-A, FAAN, Co-Investigator

Responsibilities: Dr. Jacelon will contribute her expertise in qualitative research methods and dignity, sense of control, and self-management of health. She will be involved in research design, data collection, interpretation, and dissemination of findings, including manuscript preparation. She will advise PI on doing qualitative data analysis.

Elizabeth R. Bertone-Johnson, ScD, Co-Investigator

Responsibilities: Dr. Bertone-Johnson will contribute her expertise in life course epidemiology and quantitative research methods and involve studying design and data analysis decision making, data interpretation, and manuscript preparation. She will advise PI on doing quantitative data analysis of longitudinal data and multivariable modeling.

Jerrold S. Meyer, Ph.D., Co-Investigator

Responsibilities: Dr. Meyer’s role will focus on quality control for hair samples assays for cortisol levels. He will also analyze and explain data on the relationship between the bio-

physiological marker of stress, cortisol, and the results of the survey questionnaire scales that measure stress, the Cohen Perceived Stress scale.

Pamela Burris, MSN, Faculty Collaborator

Responsibilities: Ms. Burris will train ten community interventionists to deliver yoga intervention at the family level. She will provide training to the community interventionists to provide yoga and supervise their work in coordination with PI. She will also help PI to develop a yoga manual, CD, and pamphlets.

Christopher Martell, Ph.D. (Consultant through Psychological Services Center)

Responsibilities: Dr. Christopher Martell, consultant through Psychological Services Center (PSC), will be responsible for developing training manual, intervention guidelines and provide ten full days of extensive training on behavioral activation to the community interventionists in how to deliver Problem Management Plus for Immigrants intervention. He will provide two days of full training to the community supervisor on the supervision of intervention delivery. He will also supervise their work in coordination with PI during the intervention implementation phase in the field. He will advise PI to develop training materials, including homework practice sheets, information brochures, record-keeping charts, and other necessary documents.

Holly Laws, Ph.D., Faculty Collaborator

Responsibilities: Dr. Holly Laws, consultant through the Center for Research on Families Methodology Program at UMass Amherst, will be responsible for providing necessary statistical guidance to PI to conduct the data analysis of multivariable modeling dyadic longitudinal data analysis.

Steven Hollon, Ph.D., Co-Investigator

Responsibilities: Dr. Hollon brings expertise to research design and the development and testing of culturally adapted interventions for treatment and prevention. He will advise research design and assessment, intervention development and implementation, and assist in manuscript preparation.

B. OTHER PERSONNEL

Undergraduate Research Assistant

Responsibilities: The Undergraduate Research Assistant will be the main liaison between the PI and other academic and field staff. The Undergraduate Research Assistant will be responsible for the study's coordination and management, including organizing meetings and training, logistics arrangements for fieldwork, and preparing meeting minutes and field progress reports. The Undergraduate Research Assistant will prepare copies of the training manual, intervention guidelines, survey questionnaire, and other necessary forms, distribute them to field staff, and collect them back from field staff in coordination with the community supervisor.

Community Supervisor (2)

Responsibilities: The Community Supervisors will guide community interventionists and supervise their work during intervention delivery at family. They observe intervention delivery with a fidelity checklist, collect data from participants at the end of intervention using a feasibility checklist, logistic arrangement for community interventionist, prepare intervention delivery progress report, and submit them to Undergraduate Research Assistant.

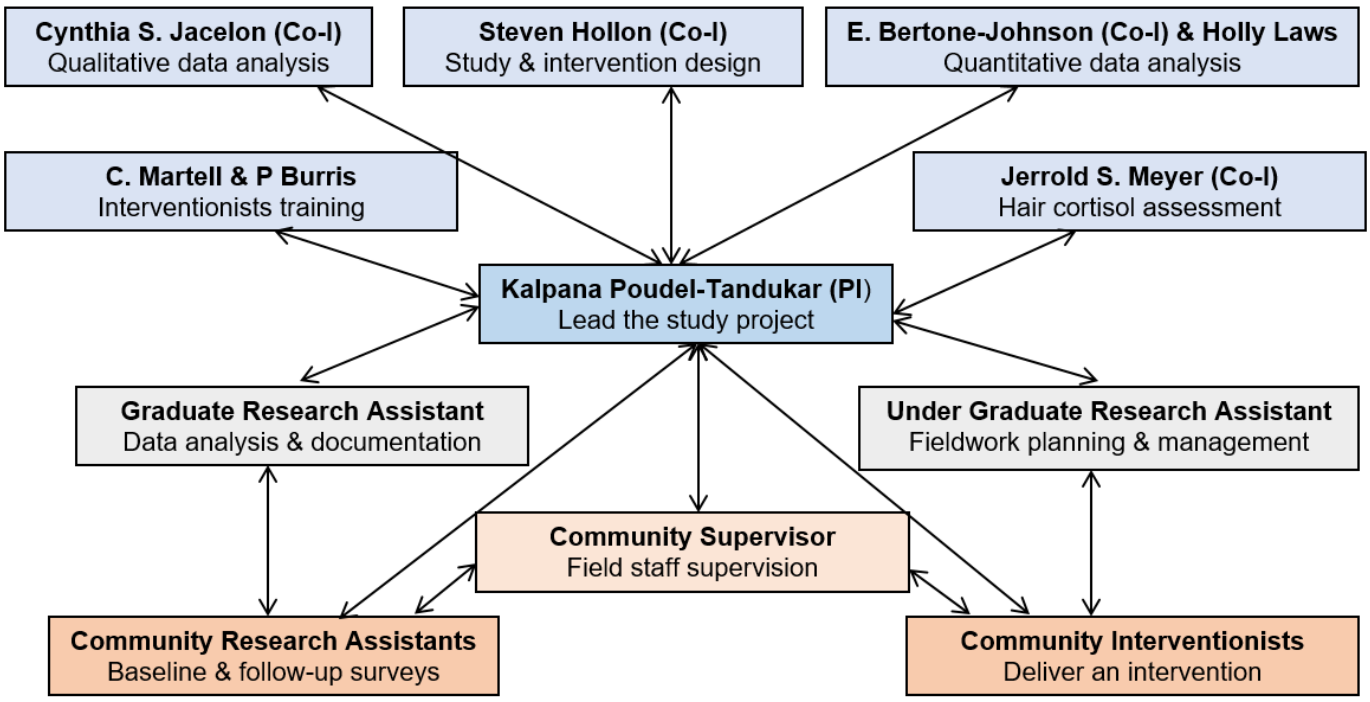
Community Interventionists (8)

Responsibilities: Community Interventionists will be responsible for delivering five days intervention package using the training manual at the family level, keep a record of intervention delivery, prepare field progress reports, and report progress and any constraints to the community supervisor and PI.

Community Research Assistants (6)

Responsibilities: The Community Research Assistants will be responsible for recruiting study participants, take informed consent, conduct a quantitative survey, and measure height, weight, waist circumference, and blood pressure at baseline, post-intervention, and three months after intervention and keep a record of the completed survey. They will also take a hair sample from participants at baseline and three months after the intervention, store them properly in a dry white envelope, and submit completed questionnaires and hair samples to Undergraduate Research Assistant.

COMMUNICATION PLAN



1 STUDY OBJECTIVES

1.1 Hypothesis: Immigrants in the Problem Management Plus for Immigrants (PMP-I) will have significantly lower stress and anxiety/depressive symptoms than immigrants in the talk program with Community Support Service pamphlets (CSS).

1.2 Objective: The current study aims to pilot test the feasibility and acceptability of PMP-I among Bhutanese immigrants 18 years and older living in Massachusetts.

Aim 1: Adapt and culturally modify PMP to develop PMP-I as a family-based preventative intervention.

a) Develop a training guide and intervention curriculum;

b) Obtain iterative feedback about the format, ease of use, and implementation barriers from participants, facilitators, and community members.

Aim 2: Test the feasibility, acceptability, and preliminary outcomes of PMP-I with trained community facilitators.

a) Assess i) recruitment, session attendance, and retention rates and program acceptability using checklists from participants; ii) feasibility of measures for assessing inclusion/exclusion, the fidelity of intervention delivery, mediators of response, and outcomes using checklists from facilitators; and iii) barriers and facilitators of intervention using interview and focus group discussion with participants and facilitators.

b) Test preliminary effects of PMP-I vs. talk program with community support services pamphlets (CSS) using a small randomized pilot trial (N=116 families; 58 families per intervention and control), on perceived stress, anxiety and depressive symptoms (primary), physiological stress assessed in hair cortisol (secondary), and self-efficacy and coping strategy, family wellbeing, and social networking (targets), with assessments at baseline, post-intervention, and 3-month post-intervention.

c) Evaluate the relationships between targets and outcomes and explore mediators (e.g., coping) of intervention-outcome relation.

2 BACKGROUND AND RATIONALE

2.1 Background

Traumatic experiences and everyday stressors during and after migration contribute to the emergence of depression and other mental health problems among immigrants.[3-15] Immigrants living in the U.S. are more vulnerable to depression, anxiety, and psychological distress than the general population.[3, 7, 9, 10, 16-19] Although mental health treatments help alleviate the social and economic costs of mental disorders, immigrants underutilize such services.[20-22] For instance, Asian Americans use fewer mental health-related services compared with the general population; only 8.6% of Asian Americans sought any mental health-related services versus 17.9% of the general population in the National Comorbidity and Replication study.[22] In the National Latino and Asian American Study, only 8.5% (179/2095) of the total national sample of Asian Americans and 36.1% (68/188) of individuals who had a probable diagnosis of a psychiatric disorder sought mental health-related services.[20] Research suggests that culturally tailored, community-oriented strategies are needed to overcome barriers and prevent mental illness.[23] Specifically, the CDC recommends using a non-clinical, community support approach to prevent mental illness among refugees resettled in the U.S.[24]

Stress resulting from attempts to integrate into a new culture while maintaining one's own culture takes a heavy toll on newly settled immigrants' mental health.[25] Immigrants' risk for mental health problems increases during their acculturative process due to exposure to multiple stressors such as adjusting to a new culture with limited language[26, 27] and socio-cultural skills, and a lack of culturally-mediated and protective social support resources.[28-30] Language problems can impede social and professional integration, reduce self-esteem, create social isolation, and increase stress. Perceived stress of acculturation[14, 15, 31-33], or discrimination[4, 34] is strongly associated with immigrants' psychological distress. Previous studies point to difficulties immigrants encounter in various spheres of daily life such as acculturation to employment,[35-37] housing,[35-37] and education;[35, 37] changes to family roles and obligations;[38] inadequate parenting skills,[38] and weak bonds in family and social ties.[38]

Bhutanese immigrants are one of the most disadvantaged newly settled populations residing in inner cities in the U.S. In Hampden County, MA—consistently ranked the

poorest county in the state—there are approximately 4,000 Bhutanese. Our need assessment studies[39-41] found a high prevalence of depression (23.8%), anxiety (34.5%), and perceived high stress (38.1%) among Bhutanese immigrants living in Western MA. Unlike other South Asian immigrants, Bhutanese immigrants come from rural farming backgrounds and typically are illiterate. It is hard for them to learn English quickly and thus be able to communicate and work in the U.S. Limited literacy skills impede learning other social skills required to adapt to a new culture. We found that Bhutanese tend to rely exclusively upon their own ethnic, cultural, and religious supports and are less willing to explore and use resources and services from the host community. Their culture of interdependence impedes them from exploring their host culture and engaging in social and recreational activities outside of their own culture, leading to social isolation. One of the most prevalent community concerns is coping with the overall lack of support and isolation found in a new country. Lack of motivation and confidence to learn new skills and feelings of social isolation are the major stressors highlighted by the Bhutanese immigrants living in Western MA.[40] Understanding these cultural dynamics are essential for designing culturally tailored mental health promotion program.

2.2 Study Rationale

Existing interventions are primarily based on treatment models to improve access to and quality of care for immigrants with diagnosed mental health problems;[42, 43] however, culturally tailored, preventative behavioral interventions aimed at preventing or reducing mental health problems are limited. For prevention, a culturally tailored intervention that addresses multiple psycho-socio-cultural stressors holds the most promise.[44-47] Problem Management Plus (PMP) is a low-intensity evidence-based psychological intervention developed by the World Health Organization that can be delivered by trained laypeople.[48, 49] PMP systematically teaches four strategies: stress management through breathing exercises, problem-solving, behavioral activation, and skills to strengthen social support at the individual level. The current study plans to adapt PMP to develop the PMP for Immigrants (PMP-I) for a family setting to address immigrant's multiple social and emotional stressors while adjusting to the United States' new multi-cultural environment. The rationale to adapt PMP is based on our intervention model that demands an integration

of social and emotional stressors; promising results of PMP; strong evidence of family and community ties in health care process; and growing consensus among community, scientists, and policymakers on the need for family-based care models that are sustainable. PMP-I is a 5-week, peer-led, culturally tailored mental health promotion program that includes psychoeducation, behavioral activation, problem-solving (90 mhnutes/session/weekly), breathing exercises, and yoga (90 minutes/session/weekly) in a family setting.

3 STUDY DESIGN

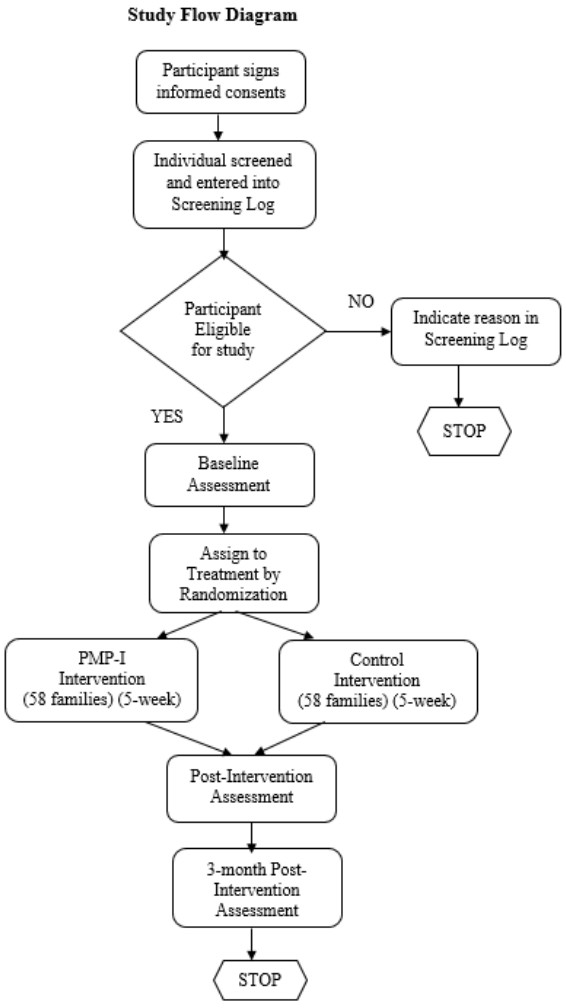
Study design: This mixed-methods study will incorporate a two-arm randomized controlled feasibility trial and qualitative evaluation of the acceptability of Problem Management Plus for Immigrants (PMP-I) intervention to a range of stakeholders.

Allocation: Randomized

Intervention Model: Parallel Assignment

Masking: None

Primary purpose: Prevention



Outcome Measures

Name: **Anxiety & Depressive Symptoms**

Type: Primary

Time Frame: Baseline, Post-intervention, 3-month Post-intervention

Brief Description: The Hopkins Symptom Checklist-25 (HSCL-25) [2] will be used to measure anxiety and depressive symptoms experienced over the past month. It is composed of a 10-item subscale for anxiety and a 15-item subscale for depression, with each item scored on a Likert scale from 1 (not at all) to 4 (extremely). The scale was validated for use in Nepal with a clinical DSM-IV diagnosis of major depressive disorder. The sensitivity and specificity with a cutoff point

of 1.75 were 0.87 and 0.60, respectively, with an area under the curve of 0.79.[50] The HSCL-25 has widely been used in studies among refugees in other countries as well as Nepal. The HSCL-25 score was categorized into two groups: the cutoff score of 1.75; depressed (1.75 or more), and not depressed (below 1.75). The scale has high internal consistency for anxiety (Cronbach's $\alpha = 0.92$) and depression (Cronbach's $\alpha = 0.94$) in our previous study with the same population group.[39]

Name: **Perceived Stress**

Type: Primary

Time Frame: Baseline, Post-intervention, 3-month Post-intervention

Brief Description: The 10-item Cohen Perceived Stress Scale (PSS)[1] will assess perceived stress. The PSS uses a 5-point Likert scale (ranging from 0, "never" to 4, "very often") to assess psychological stress experienced during the past month, including the extent to which situations felt unpredictable, uncomfortable, and overwhelming. The items included in the PSS scale are easy to understand as it was designed for use with community samples with junior high school education. This scale has been widely used in diverse populations, including immigrants. The scale has high internal consistency (Cronbach's $\alpha = 0.80$) in our previous study with the same population group.[39] Items were summed to provide a total score with higher scores indicating greater perceived stress.

Name: **Physiological stress**

Type: Secondary

Time Frame: Baseline, 3-month Post-intervention

Brief Description: We will use the ELISA cortisol hair-test (average hormone levels over the past three months) as a biomarker to measure physiological stress. Neuroendocrine indicators, such as cortisol, are effective stress biomarkers because they are the first to respond to a given stressor and coordinate the physiological response of other bio-physiological systems. Biomarker measurement helps to overcome the limitations of self-report because it provides an objective marker of levels of stress. Hair samples will be processed in the neuroendocrine lab at UMass.[51, 52] Sensitive and specific

enzyme immunoassay (Salmetrics) will be used for the analysis. The assay has intra- and inter-assay coefficients of variation of <10%. The cortisol distribution will be tested for normality, and if the data are not normal, they will be log-transformed before statistical analysis.

Study Location and Population:

Bhutanese adults resettled in Massachusetts, USA.

Study Arms:

Experimental: Problem Management Plus for Immigrants (PMP-I) at family settings (58 families)

Active Comparator: Talk program with Community Support Service Pamphlet (CSS) (58 families)

Intervention:

PMP-I is a 5-week, peer-led, culturally tailored psychoeducation, behavioral activation (90 minutes), breathing, and yoga intervention (90 minutes) in a family setting. PMP-I will use a structured approach, including a once-a-week face-to-face session, breathing, and yoga practices.

1. **Managing Stress:** Breathing and yoga practices, stress-management sessions, and behavioral activation exercises to strengthen positive coping strategies.

2. Managing Problems: Practice exercises to identify the problems, develop solutions, and plan a strategy to carry out those solutions.

3. Behavior Activation: Communication skill sessions and practice exercises to identify and carry out pleasant tasks.

4. Strengthening Social Support: Social skills session and practice exercise to identify some support.

5. Staying Well: Make a plan that helps to create a supportive family environment.

4 SELECTION AND ENROLLMENT OF PARTICIPANTS

4.1 Inclusion Criteria

We plan to include eligible adults aged 18 or older interested in participating in the study as primary study participants. This includes parents and their adult children aged 18 and above. At baseline, we will use our screening tool to identify individuals without significant depressive symptoms, as we aim to evaluate the effect of our intervention to prevent depression, rather than treat depression.

Eligibility criteria for our primary study participants include Bhutanese adults 18 years or older (both parents and children of each family) resettled in Massachusetts with a score 14 or below on the Patient Health Questionnaire (PHQ-9), a screening questionnaire for depression. Our statistical analysis will focus on data from primary study participants only with baseline PHQ-9 scores 14 or below. However, all other interested adult family members, both parents and their adult children, regardless of PHQ-9 score, will be invited to participate in our study, to maintain the confidentiality of each family member's mental health status within their family.

Besides, individuals with PHQ-9 screening score '15-19' (moderately severe depression) and '20-27' (severe depression) will be provided with feedback on their screening questionnaire outcomes confidentially. They will be encouraged to consult their primary health care providers. A field supervisor can provide the necessary support for setting up an appointment with primary health care providers and emergency services, as needed. A field supervisor also will make a follow-up home visit to monitor their mental health condition, as necessary.

4.2 Exclusion Criteria

Participants with clinically diagnosed mental disorders and those taking psychiatric medications for any mental health problems will also be encouraged to participate in the family-based intervention activities. However, we will not consider data from those participants with PHQ-9 scores 15 or above or diagnosed with mental health problems in our main statistical analysis.

4.3 Study Enrollment Procedures

Identifying survey participants

The PI has already established a strong network with the Bhutanese community and completed her needs assessment studies collecting determinants of a mental health problem through engaging community members in the research process. We will use an existing community network to spread the study information in coordination with church leaders, community research assistants (RAs), and supervisors. PI will prepare an oral script including study objectives, eligibility criteria, intervention procedure, study and survey information, hair sample collection, and informed consent procedure. It will also distribute it to them to spread the study information. They will be requested to disseminate the information about the study purpose and process to their community in phone or in-person meetings in any of their gatherings, word of mouth, formal/informal discussions, and festivals to check-in for their interest to participate in the study. Interested participants will be requested to contact PI, RAs, and supervisors.

Recruiting survey participants

Community RAs from the local area will be mobilized to reach interested families to check their eligibility and make a list of eligible participants. Eligibility criteria for participants are: being Bhutanese adults 18 years or older resettled in Massachusetts with a score of 14 or below on the Patient Health Questionnaire-9, showing commitment to complete the intervention procedure, and giving informed consent to participate in the study. RAs will recruit interested eligible participants with their informed consent and will conduct a baseline survey. RAs will be asked to leave a note in the screening tool and screening log of reasons for ineligibility, such as a PHQ-9 score of more than 14 or any history of clinically diagnosed mental health problems or taking any medication related to mental health problems. RAs will also leave a note for non-participation of eligible candidates in the screening tool and screening log.

Randomizing study participants for intervention and control

We will randomly allocate selected families into intervention and control groups using a random sampling method after the baseline survey. We will randomly assign 116 interested

families (58 families per intervention and control) using a random number table. For random allocation, first, PI will prepare the sampling frame that lists interested families. Second, assign a number to each family in the sampling frame. Third, select 116 numbers using a table of random numbers. PI will request any interested community member to point one number in the random number table by closing his/her eyes. Since the selected families total 116, or three digits, we will choose only the first three digits of the number chosen as the first sampled family. Finally, we will choose other numbers moving down the first number column until all 116 families will be selected.

We will assign a random number selected at the first attempt for intervention and the second attempt for control. It means random numbers selected at odd attempts (first, third, seventh, …..) will be assigned for intervention and at even attempts (second, forth, sixth…) for control. The sample elements corresponding to the selected random numbers become the sample. Procedures are in place for tracking the participants for intervention and follow-up (e.g., contact address and phone). RAs will visit selected families and brief them about study procedures, informed consent, and procedures to protect human subjects. All adult members of selected families who meet the inclusion criteria and give informed consent will be recruited for the study. We will follow up with all families randomized to either study arm. We will not follow up with participants if they decide to end their participation at a particular time point of our study. But, we will include their already collected data in our analysis. Given our strong community networks and mobilization of community RAs, we anticipate low attrition rates in practice. Ethical approval for our study will be obtained from the Institutional Review Board at UMass Amherst.

Recruitment of focus group discussion participants

PI will collect data on engagement, acceptability, and satisfaction of intervention delivery by conducting focus group discussions (FGD) with selected interested participants who are already enrolled in our study from the intervention group (30) upon intervention completion using a brief guide questionnaire. The participant will be eligible to attend the focus group discussion if they are already enrolled in our intervention group and have attended our mental health promotion program. RAs will inform participants about FGD

details verbally while implementing our mental health promotion program. We will recruit interested participants on a first-come-first-serve basis until we get enough participants.

Informed consent procedure

PI will prepare an informed consent document including an explanation on study background, rationale, screening criteria, inclusion and exclusion criteria, study setting, sample size, data collection and intervention procedures, study risks and benefits, privacy and confidentiality of personal information, National Institute of Mental Health Data Archive (NDA) data sharing policy, hair samples collection procedure, storage, and testing procedure, participant compensation, study policy, and study contact person details. PI will train community RAs and field supervisors about processes of taking informed consent from participants.

RAs will inform screening and study procedures to each participant using UMass Amherst IRB approved single informed consent form. A copy of the informed consent form will be provided to each participant for their review. If they want, RAs can read informed consent for them. Participants will be given enough time to review informed consent and ask questions if they have any confusion. RAs will make sure that participants understand about study procedure, privacy and confidentiality of private information, and data sharing policy of NDA. They will be reminded that their participation in the study is voluntary and free to leave the study without penalty. Once participants understand about study details, RAs will request them to do their signature or write their initials or fingerprint for those who cannot write their names in the two copies of the informed consent form before collecting their information. One copy of signed informed consent will be provided to each participant. We will not recruit any individuals who are unable to consent for themselves. The signed informed consent documents will be stored securely in the locked cabinet of the PI's office. (Please see the attached informed consent for details)

5 STUDY INTERVENTIONS

5.1 Interventions, Administration, and Duration

Intervention group: Each participant's involvement will be 5-sessions of the PMP-I program of 180 minutes each for a total of 900 minutes. We will request intervention group participants to complete five sessions of PMP-I intervention. Each session is about 180 minutes. Our proposed family-based mental health intervention is a 5-week, culturally tailored stress management, behavioral activation, problem-solving (90 minutes), and mind-body exercises, including yoga and breathing exercises (90 minutes) at a family level delivered by trained community interventionists at their family settings.

Control group: We also plan to implement five talk programs about community support services to control group participants. Each participant's involvement will be 5-sessions of a talk program of 60 minutes each for a total of 300 minutes.

Post-Intervention for Control group: Each participant's involvement will be 2-sessions of mental health intervention of 120 minutes each for a total of 240 minutes.

Training for Community Interventionists: We will train community members to deliver the intervention in family settings. Dr. Christopher Martell will provide 12 full-day training to the community interventionists in collaboration with PI and Dr. Steven D Hollon following the World Health Organization PM+ training manual. We will provide a PMP-I program manual describing the procedure of delivering each intervention component to community interventionists. They will use the intervention manual to provide PMP-I to community members at family settings under field supervisors and PI's supervision. (Please see attached the PMP-I intervention manual for the details)

Local community members with a high school level of education and no formal training or prior experience with mental health service providers will deliver the PMP-I. First, Drs. Hollon and Martell will review with the PI the PMP-I Manual, fidelity checklists, and other training materials. Second, Dr. Martell will provide ten full days (80 hours) of intensive classroom training to community interventionists (CI) using the PMP Helpers' Training Guide. Classroom training includes information about stress and depression, the rationale for each of the strategies, necessary helping skills, extensive role-plays, peer observations, and group discussion related to core intervention concepts. Third, Dr. Martell will provide an additional two days of training in supervision to the same CIs so that they can play the

dual role of interventionists and supervisors as needed. Supervision involves discussing participants' progress and difficulties experienced when delivering strategies and role-playing on managing problems or practicing skills. Fourth, following classroom training, the PI will provide field training with at least two participants for five sessions. Finally, after overall training, we will conduct a formal evaluation of the interventionists' readiness to implement/supervise the PMP-I intervention such as using the manual, answering questions, and managing time, using a fidelity checklist, practice exercise, and role play, and will provide feedback as necessary.

Ms. Burris will provide 4 hours of breathing exercises and 16 hours of yoga practice to CIs and field supervisors using a Yoga Training Guide. Classroom training includes theoretical and practice exercises to guide participants in mind-body exercises for attention to breath, body sensation, emotional awareness, and mental function on different postures of yoga practices such as *Pranayama* (3 poses) and *Asana* (21 poses). Training will include practice assessment at the end to ensure that all staff was adequately trained, using a checklist, practice exercise, and role-plays. (Please find attached the mind-body exercise manual for the details)

Intervention Components

Psychoeducation: A brief educational session on stress management to increase awareness of the health benefits of reducing stress. To address the social isolation of many immigrants' in a new culture, we plan to educate on multi-cultural communication and social networking to promote their cross-cultural interaction.

Behavioral activation (BA): In BA, we plan to propose behavior modification activities with a specific focus on identifying and strengthening positive coping styles for immigrants adapting to a new cultural environment as members of the immigrant community feel relief talking in person and prefer doing culturally appropriate behavior modification activities to other more traditional western psychotherapies.

Problem-solving (PS): In PS, we plan to include practice exercises in identifying and trying at least three best problem-solving measures that would help manage stress, and strengthening coping, communication, and social networking skills.

Mind-Body Exercise (MBE): Yoga and breathing exercises are a mind-body intervention scientifically sound and well known in the community. They are included in our intervention as community members viewed yoga and breathing exercises as a culturally preferred essential part of stress management and are critical contributors to the stress reduction observed in our pilot programs.

Strengthening social support (SS): In SS, we plan to include practice exercises to identify and try at least three best social events that would help make them feel better and happy.

5.2 Adherence Assessment

The PMP trainers training guidelines developed by the World Health Organization provide specific tools for evaluating and monitoring the intervention that we will use to monitor fidelity of intervention delivery. These tools are PMP Quiz, PMP Helper's Supervision Form, PMP Helper Classroom-based Competency Assessment, PMP Helper In-field based Competency Assessment, PMP Trainer/Supervisor Competency Assessment, and Session-by-Session Checklists for PMP Helpers. We have adapted these tools in the context of our program contents. (Please find attached PMP-I program monitoring tools for the details)

Using these standard tools, we will evaluate session-by-session classroom and in-field based competencies of participants, community trainers, and supervisor and provide them feedback as needed using supervision forms, role-plays, group discussion, and training. After each session and program completion, the field supervisor will collect data on engagement, acceptability, and satisfaction via a brief questionnaire and qualitative interviews with community interventionists. The field supervisor will also collect data on adherence to the manual, percent of intervention content administered, proper use of time and materials, and adequate response to participants' questions through field observation of community interventionists' work.

Field supervisors will collect data on eligibility, recruitment and enrollment, intervention session attendance (including reasons for missed sessions), and compliance with data collection procedures, including hair sample collection and anthropometric measurements using a checklist. They will monitor intervention sessions using WHO standard checklists. Items include adherence to the manual, percent of intervention content administered, proper use of time/materials, and adequate response to participants' questions. They will also collect data on engagement, acceptability, and satisfaction via

brief questionnaires and focus group discussions (FGD) with participants and interventionists after each session and upon intervention completion.

The PI will conduct FGD in the Nepali language with interventionists, supervisors, and participants separately to collect information on barriers and facilitators of intervention, perceptions about whether the intervention met participants' needs, and feedback on how effectively the program team worked with participants. Interviews and FGD will be documented verbatim in a written transcript for subsequent analysis. All qualitative data will be analyzed using thematic content analysis.[53] Feedback provided by the field staff will be reviewed and coded to identify recurrent themes regarding the intervention's acceptability. All analyses will be conducted in Nepali and translated into English. Fidelity data will be used to assess intervention content and transmission. We will determine retention by obtaining proportions of participants attending all or portion of sessions.

6 STUDY PROCEDURES

6.1 Schedule of Evaluations Participant Name: _____ Mention DATES mm/dd/yy in below table for each activity.

Assessment	*Screening: Visit 1 (Day 0)*	*Baseline, Enrollment, Randomization: Visit 1 (Day 0)*	*Treatment Visit 2 Day 7 (± 2 Days)*	*Treatment Visit 3 Day 14 (± 2 Days)*	*Treatment Visit 4 Day 21 (± 2 Days)*	*Treatment Visit 5 Day 28 (± 2 Days)*	*Treatment Visit 6 Day 35 (± 2 Days)*	*Follow up 7 Day 42 (± 2 Days)*	*Follow-up: Final Visit Day 132 (± 2 Days)*
Informed Consent Form	*X*								
Screening tool	*X*								
Inclusion/Exclusion Criteria	*X*								
Demographics		*X*						*X*	*X*
Blood pressure		*X*						*X*	*X*
Bodyweight & height		*X*						*X*	*X*
Waist circumference		*X*						*X*	*X*
Hair samples		*X*							*X*
Stress		*X*						*X*	*X*
Anxiety & Depression		*X*						*X*	*X*
Coping Strategies		*X*						*X*	*X*
Self-efficacy		*X*						*X*	*X*
Family Conflict Resolution		*X*						*X*	*X*
Family Satisfaction		*X*							
Enrollment/Randomization		*X*							
Intervention Session and its assessment using fidelity form			*X*	*X*	*X*	*X*	*X*	*X*	*X*
Adverse Events		*X*	*X*	*X*	*X*	*X*	*X*	*X*	*X*

6.2 Description of Evaluations

6.2.1 Screening Evaluation

These evaluations occur to determine if the participant is eligible for the study.

Consenting Procedure

Trained RAs will meet interested participants and inform them about screening and study procedures to each participant using UMass Amherst IRB-approved single informed consent form. A copy of the informed consent form will be provided to each participant for their review. If they want, RAs can read informed consent for them. Participants will be given enough time to review informed consent and ask questions if they have any confusion. RAs will ensure that participants understand screening, study procedure, privacy and confidentiality of private information, and NDA data sharing policy. They will be reminded that their participation in the study is voluntary and free to leave the study without penalty. Once participants understand about study details, RAs will request them to do their signature or write their initials or fingerprint for those who cannot write their names in the two copies of the informed consent form before collecting their information. One copy of the signed informed consent form will be provided to each participant. We will not recruit any individuals who are unable to consent for themselves. The signed informed consent form will be stored securely in the locked cabinet of the PI's office. (Please find attached informed consent for details)

Screening

RAs will screen interested participants after obtaining their informed consent on the same day. We plan to include eligible Bhutanese adults aged 18 or older interested in participating in the study as primary study participants. This includes parents and their adult children aged 18 and above. At baseline, we will use our screening tool to identify individuals without significant depressive symptoms, as we aim to evaluate the effect of our intervention to prevent depression rather than treat depression. Eligibility criteria for our primary study participants include Bhutanese adults 18 years or older (both parents and children of each family) resettled in Massachusetts with a score of 14 or below on the Patient Health Questionnaire (PHQ-9), a screening

questionnaire for depression. Our statistical analysis will focus on data from primary study participants only with baseline PHQ-9 scores 14 or below. However, all other interested adult family members, both parents and their adult children, regardless of PHQ-9 score, will be invited to participate in our study, to maintain the confidentiality of each family member's mental health status within their family.

Besides, individuals with PHQ-9 screening scores '15-19' (moderately severe depression) and '20-27' (severe depression) will be provided with feedback on their screening questionnaire outcomes confidentially and encouraged to consult their primary health care providers. A field supervisor can provide the necessary support for setting up an appointment with primary health care providers and emergency services, as needed. A field supervisor also will make a follow-up home visit to monitor their mental health condition, as necessary. Participants with clinically diagnosed mental disorders and those taking psychiatric medications for any mental health problems will also be encouraged to participate in the family-based intervention activities. However, we will not consider data from those participants with PHQ-9 scores of 15 or above or diagnosed with mental health problems in our primary statistical analysis. RAs will keep a record of participants using the attached screening log.

SCREEN LOG

Study: ____

Site: ____

Investigator: ____

Screening Number	Participant Names	Date of Birth	Gender	Screening Date	Screening Status (use codes below)	Consent Obtained	Enrolled (if no, indicate reason from codes below)	Date Enrolled
☐☐☐		/ / mm/dd/yyyy	☐ M ☐ F	/ / mm/dd/yyyy		☐ Yes ☐ No	☐ Yes ☐ No	/ / mm/dd/yyyy
☐☐☐		/ / mm/dd/yyyy	☐ M ☐ F	/ / mm/dd/yyyy		☐ Yes ☐ No	☐ Yes ☐ No	/ / mm/dd/yyyy
☐☐☐		/ / mm/dd/yyyy	☐ M ☐ F	/ / mm/dd/yyyy		☐ Yes ☐ No	☐ Yes ☐ No	/ / mm/dd/yyyy
☐☐☐		/ / mm/dd/yyyy	☐ M ☐ F	/ / mm/dd/yyyy		☐ Yes ☐ No	☐ Yes ☐ No	/ / mm/dd/yyyy
☐☐☐		/ / mm/dd/yyyy	☐ M ☐ F	/ / mm/dd/yyyy		☐ Yes ☐ No	☐ Yes ☐ No	/ / mm/dd/yyyy

Sample Screen Status Codes:
1-Eligible
2-Eligible, declined participation
3-Not Eligible
4-Eligible, lost to follow up
5-Other, specify in space provided

6.2.2 Enrollment, Baseline, and Randomization

Enrollment

In this study, the enrollment date is the day the participant has met all the screening criteria and signs a single informed consent form that describes both screening and study procedures. RAs will record the enrollment date on a case report form along with the allowable window between screening and randomization.

Baseline Assessments

For participants who will have successfully been screened for eligibility and are enrolled in the study, baseline assessments will be performed to measure the study outcome on the same day of enrollment. We will measure study outcomes as listed below:

Anxiety and Depressive Symptoms

The Hopkins Symptom Checklist-25 (HSCL-25) [2] will be used to measure anxiety and depressive symptoms[2] experienced over the past month. It is composed of a 10-item subscale for anxiety and a 15-item subscale for depression, with each item scored on a Likert scale from 1 (not at all) to 4 (extremely). The scale was validated for use in Nepal with a clinical DSM-IV diagnosis of major depressive disorder. The sensitivity and specificity with a cutoff point of 1.75 were 0.87 and 0.60, respectively, with an area under the curve of 0.79.[50] The HSCL-25 has widely been used in studies among refugees in other countries as well as Nepal. The HSCL-25 score was categorized into two groups: the cutoff score of 1.75, depressed (1.75 or more), and not depressed (below 1.75). The scale has high internal consistency for anxiety (Cronbach's $\alpha = 0.92$) and depression (Cronbach's $\alpha = 0.94$) in our previous Bhutanese study.[39]

Perceived Stress

The 10-item Cohen Perceived Stress Scale (PSS)[1] will be used to assess perceived stress. The PSS uses a 5-point Likert scale (ranging from 0, "never" to 4, "very often") to assess psychological stress experienced during the past month, including

the extent to which situations felt unpredictable, uncomfortable, and overwhelming. The items included in the PSS scale are easy to understand as it was designed for use with community samples with junior high school education. This scale has been widely used in different populations, including immigrants. The scale has high internal consistency (Cronbach's $\alpha = 0.80$) in our previous Bhutanese study.[39] Items were summed to provide a total score with higher scores indicating greater perceived stress.

Physiological stress

We will use the ELISA cortisol hair-test (average hormone levels over the past three months) as a biomarker to measure physiological stress. Neuroendocrine indicators, such as cortisol, are effective stress biomarkers because they are the first to respond to a given stressor and coordinate the physiological response of other bio-physiological systems. Biomarker measurement helps overcome the limitations of self-report because it provides an objective marker of stress levels. Hair samples will be processed in the neuroendocrine lab at UMass.[51, 52] Sensitive and specific enzyme immunoassay (Salmetrics) will be used for the analysis. The assay has intra- and inter-assay coefficients of variation of <10%. The cortisol distribution will be tested for normality, and if the data are not normal, they will be log-transformed before statistical analysis.

Coping strategy

Coping strategy[54] will be measured using a 32-item Coping Strategies Inventory-Short Form (CSI-SF). The CSI-SF includes two overall coping factors, Engagement and Disengagement, and four secondary factors, Problem Engagement, Problem Disengagement, Emotion Engagement, and Emotion Disengagement. The CSI-SF scale (Cronbach's $\alpha = 0.95$) and its subscales problem engagement (Cronbach's $\alpha = 0.87$), emotion engagement (Cronbach's $\alpha = 0.89$), problem disengagement (Cronbach's $\alpha = 0.81$), and emotion disengagement (Cronbach's $\alpha = 0.78$) have high internal consistencies in our previous Bhutanese study.[39] A sample item for this scale is, "I worked on solving the problems in the situation." Participants were asked to rate

their responses on a 5-point Likert-type scale ranging from *not at all (1)* to *very much (5)*. Items are summed to provide sub-scale and larger composite scores with higher scores associated with greater adherence to that coping style.

Self-efficacy

Self-efficacy will be measured using a 26-item Coping Self-efficacy(CSE)[55] scale for coping with challenges and threats. A sample item for this scale is "Do something positive for yourself when you are feeling discouraged." Each item of the scale will be rated on an 11-point scale Likert-type scale ranging from *(0) cannot do at all, (5) moderately certain can do, and (10) certain can do*. Graded items will be summed up to provide a total score, and higher scores indicate high self-efficacy. The scale has high internal consistency (Cronbach's $\alpha = 0.96$) in our previous Bhutanese study.[39]

Social support

Perceived social support will be measured using a 12-item Multidimensional Scale of Perceived Social Support (MSPSS)[56], [57] including support from friends, family, and significant others, and has been used cross-culturally. A sample item for this scale is, "My family tries to help me." Each item of the scale will be rated on a 5-point Likert-type scale ranging from *strongly disagree (1)* to *strongly agree (5)*. Graded items will be summed up to provide a total score, and higher scores indicate high social support. The scale has high internal consistency (Cronbach's $\alpha = 0.92$) in our previous Bhutanese study.[39]

Social network

A social network including size, closeness, and frequency of active and intimate networks of family or friends will be measured using a 12-item version of the "Lubben Social Network" scale.[58] It consists of six questions, which assess kinship ties, and a comparable set of six questions, which determine friend ties by replacing the word relatives with the word friends. A sample item from this scale is, "How often is one of your relatives available for you to talk when you have an important decision to make?" Participants will be asked to respond on a 6-point Likert-type

scale, ranging from *less social engagement (0)* to *more social engagement (5)*. Scores across all items will be summed up to provide a total score, and higher scores indicate a high social network. We prepared three questions to measure cross-cultural social ties following a similar pattern. The scale has high internal consistency for kinship ties (Cronbach's $\alpha = 0.78$), friendship ties (Cronbach's $\alpha = 0.80$), and cross-cultural social ties (Cronbach's $\alpha = 0.74$) in our previous Bhutanese study.[39]

Family conflict resolution

Family conflict resolution, including positive or negative resolution, effective communication, and discussion of differences will be measured using a 17-item version of the "Family Conflict Resolution" scale.[59] A sample item from this scale is, "In my family, when we have an argument we usually work it out." Participants will be asked to respond on a 7-point Likert-type scale, ranging from *never (1)* to *always (7)*. Scores across all items will be summed up to provide a total score, and higher scores indicate high family well-being. The scale has high internal consistency (Cronbach's $\alpha = 0.92$) in our previous Bhutanese study.[39]

Family satisfaction: Family satisfaction with various aspects of family functioning, including family closeness, flexibility, and communication will be measured using a 10-item family satisfaction scale.[60] A sample item from this scale is, "How satisfied are you with the degree of closeness between your family members." Participants will be asked to respond on a 5-point Likert-type scale, ranging from *very dissatisfied (1)* to *extremely satisfied (5)*.

Randomization

Participants will be randomly assigned to intervention and control groups within 7-days of baseline survey completion. The first session of intervention will be delivered to the intervention and control groups within the seven days of baseline survey completion.

6.2.3 **Follow-up Visits**

- **Visit 2 Day 7 (± 2 Days)**:
  - Intervention Session 1
  - Intervention Fidelity Assessment Form
  - Adverse Events
- **Visit 3 Day 14 (± 2 Days)**:
  - Intervention Session 2
  - Intervention Fidelity Assessment Form
  - Adverse Events
- **Visit 4 Day 21 (± 2 Days):**
  - Intervention Session 3
  - Intervention Fidelity Assessment Form
  - Adverse Events
- **Visit 5 Day 28 (± 2 Days):**
  - Intervention Session 4
  - Intervention Fidelity Assessment Form
  - Adverse Events
- **Visit 6 Day 35 (± 2 Days):**
  - Intervention Session 5
  - Intervention Fidelity Assessment Form
  - Adverse Events
- **Visit 7 Day 42 (± 2 Days):**
  - Post-Intervention Assessment of Study Outcomes
  - Intervention Fidelity Assessment Form
  - Adverse Events

6.2.4 **Completion/Final Evaluation**

- **Final Visit Day 132 (± 2 Days):**
  - 3-month Post-Intervention Assessment of Study Outcomes
  - Intervention Fidelity Assessment Form
  - Adverse Events

7 SAFETY ASSESSMENTS

7.1 Adverse Events and Serious Adverse Events

The possible adverse events such as 1) reporting suicidal ideation; 2) discomfort with the PMP-I program content and/or evaluation procedures, and 3) risk of a breach of confidentiality of the collected data and/or by program personnel, and severe adverse events such as 1) suicide attempts and other events that involve hospitalization, disability, and/or death, will be reported in writing to the NIMH Program Officer according to pre-determined expectations and timeframes with the NIMH policy (https://www.nimh.nih.gov/funding/clinical-research/nimh-reportable-events-policy.shtml). The PI will be responsible for the overall trial oversight in the community and safety of participants in the trial and will review all possible study-related and not-related adverse events. Field supervisors will also be responsible for describing and adhering to the procedures for identifying, monitoring, and reporting reportable events.

Adverse events: All study participants will be monitored closely daily by the field supervisors under the PI's supervision throughout the study period. Field supervisors will request study participants and their family members to immediately report any unanticipated adverse events in their family, such as 1) reporting suicidal ideation; 2) discomfort with the PMP-I program content and/or evaluation procedures, and 3) risk of a breach of confidentiality, of the collected data and/or by program personnel to field supervisor or PI directly. Field supervisors will immediately report details of such adverse events to PI. The PI will be responsible for summarizing all adverse events that are deemed expected and/or unrelated to the study in the annual progress report submitted to the UMass Amherst IRB, ISM, and NIMH Program Officer by secure email.

Serious adverse events: All study participants will be monitored closely daily by the field supervisors under the PI's supervision throughout the study period. Field supervisors will request study participants and their family members to report any unanticipated serious adverse event in their family, such as suicide attempts and other events that involve hospitalization, disability, and/or death, to the field supervisors or PI. Field supervisors will immediately report details of such adverse events to the PI. The PI will be responsible for

reporting them to the UMass Amherst IRB, ISM, and NIMH Program Officer by secure email within ten business days of the study team becoming aware of any serious adverse events.

Unanticipated problems: Field supervisors will collect completed survey questionnaires and signed informed consent from the research assistant on the same day of data collection. The PI will collect them from the field supervisor every week. In the unlikely event that the field staff loses completed survey items, the PI will be responsible for reporting this to the UMass Amherst IRB, ISM, and NIMH Program Officer by secure email within ten business days of the investigator learning of the event.

Protocol violations: The PI will strictly monitor field staffs' protocol compliance while implementing different activities, such as participant enrollment and randomization, intervention compliance, and data collection through onsite supervisions and phone conversations with field staff and participants. The PI will be responsible for summarizing protocol violations (if any) in the annual progress report that will be submitted to the UMass Amherst IRB, ISM, and NIMH Program Officer by secure email.

IRB/ISM suspensions or terminations: The PI will be responsible for reporting any suspension of IRB approval and termination of ISM to the NIMH Program Officer by secure email within three business days of receipt, including a reason(s) for the action.

All reports to the NIMH Program Officer will be made in writing by secure email and will include the following information:

- Identifying information for the research protocol (e.g., project title, investigator's na me, or grant/contract number);
- The date on which the event occurred and the date of which the PI became aware of the event;
- A detailed description of the event and impact on the participant(s);
- A detailed description of the measures taken (including clinical) in response to the event (if any);

- Confirmation that the appropriate monitoring entities and regulatory bodies have been notified as needed; and
- A description of any changes to the protocol or other corrective actions that have been taken or are proposed in response to the event.

7.2 Independent Safety Monitor (ISM)

An Independent Safety Monitor (ISM) will be an independent member of mental health experts whose primary responsibility is to provide independent monitoring of this clinical trial in a timely fashion. We will select a member independent of any professional or financial conflict of interest (COI) with the research project and/or study investigators. A potential ISM member will provide the NIMH with his/her qualifications and a COI statement indicating that this individual has no direct involvement with the study or COI with the investigators conducting the study. The ISM will be guided by the NIMH policy governing independent data and safety monitoring boards (https://www.nimh.nih.gov/funding/clinical-research/policy-governing-independent-safety-monitors-and-independent-data-and-safety-monitoring-boards.shtml).

The primary responsibilities of the ISM will be:

- Reviewing protocols, consent procedures, consent forms, and safety plans before study initiation;
- Monitoring study progress, including recruitment and retention of participants, adverse events, serious adverse events, reasons for participant withdrawal, adherence to the timeline of the study, quality of data, and protocol violations or deviations;
- Making recommendations about the continuation, modification, or termination of the trial, based on the balance of adverse events and beneficial outcomes;
- Reviewing and approving amendments to trial protocols, including consent forms.

Overall, the ISM will review enrollment data, safety data, and data integrity to maintain safety in the trial. The principal investigator (PI) will submit data reports once a year to the ISM. The data report submitted to the ISM will follow the established reporting format

developed in consultation with NIMH. The report will include the key variables necessary for monitoring the safety and quality of data collection and the integrity of the study, including inclusion criteria, informed consent, subject enrollment and retention, data confidentiality, intervention compliance, dropouts, adverse events, protocol compliance, data quality, and baseline characteristics of study participants. The ISM will have access to all safety and data quality information collected and have the authority to stop the study if it is determined that there are unacceptable risks to participants. The ISM will also review the study protocol, informed consent, and all relevant documents before the study's onset and review and approve amendments to these documents. The ISM will issue a monitoring report to the PI following each review. The PI will submit all review reports to the UMass Amherst IRB and NIMH Program Officer in annual progress reports.

The PI will be responsible for monitoring procedures during the study, including enrollment, data and sample collection, and participant safety and well-being. During the trial, experienced field supervisors from the Bhutanese community, who are trained as a community health worker and have worked with the PI in previous church and family-based mental health intervention studies with depressive and suicidal ideation outcomes, will take responsibility for the day-to-day oversight of the participants and field teams in the implementation of the trial. Field supervisors will immediately report any noted adverse events among participants, such as suicidal ideation, to the PI. The PI will report adverse events data to the ISM, UMass Amherst IRB, and NIMH Program Officer following NIMH guidelines for reportable events, as described below (https://www.nimh.nih.gov/funding/clinical-research/nimh-reportable-events-policy.shtml).

To monitor trial protocol compliance and participants' safety, the PI will visit the trial site once every two weeks or more if needed. The PI will also conduct a weekly meeting with field staff (in-person and online on a rolling basis) to perform the continuous review of data and participant safety. The PI will be available for discussions by telephone and via email for participants and field staff if needed at any time. The PI will review the adverse effects and responses of the trial at these meetings. With this trial monitoring plan, the PI will oversee the participant safety protocols and the timely follow-up of any adverse events or serious adverse events throughout the study, as well as the reporting of adverse events to the ISM. The overall purpose of the day-to-day supervision and field visits, and any

independent monitoring visits, will be to verify that: the well-being of trial participants is protected; reported trial data are accurate and complete, and the conduct of the trial complies with the approved protocol and amendments.

7.3 Potential Risks and Mitigation Strategies

We do not anticipate any significant risks due to participation in research-related activities, based on our previous pilot intervention experience with similar mental health outcomes in the same population.

First, RA will remind each participant that if they perceive any question to be too personal, they can choose not to respond. Participants may feel hesitant to answer some of the questions regarding depression and suicidal ideation. In such cases, participants are free to skip such questions or are free to withdraw from participating in the study overall. If participants feel upset during or after completing the survey or find that some questions or aspects of the study triggered distress, the RA will immediately contact the PI. The PI will then immediately assist participants (in their native Nepali language) and help them to connect with mental health support services in coordination with the field supervisor. The RA will also provide them with contact information for emergency and other mental health support available locally but independent of the study.

Second, the field-team will be trained to recognize potential risks that require immediate reporting, such as suicidal ideation. If any participants respond “yes” to a questionnaire item that measures suicidal ideation or develops suicidal ideation during the intervention implementation phase, the RA will immediately contact the PI. The PI will then immediately assist participants (in their native Nepali language) and help them connect to mental health support services available in the area in coordination with the field supervisor. The field supervisor will provide the necessary support to them for setting up their appointment with primary health care providers if needed. The field supervisor will also make a follow-up home visit to monitor their mental health condition, as necessary.

Finally, all participants will be asked to contact the PI directly if they have any health concerns and/or need help during the intervention implementation phase. We would like to identify field supervisors as an alternative contact person for participants and research assistants if the Principal Investigator (PI) is busy or unavailable, for whatever reason

needed. We plan to recruit two field supervisors from the Bhutanese community. Both are trained as community health workers and have extensive experience in providing various health services (including referral for mental health problems), as they are part-time employees of local level non-profit organizations (e.g., Ascentria Care Alliance) and the MA Department of Public Health. Both of them have worked with the PI in previous church and family-based mental health intervention studies with depressive and suicidal ideation outcomes. They are familiar with available mental health support services available in the community and have been providing care and support to the community members in a mental health crisis, bearing the dual responsibility of community leader and church pastor. Field supervisors will make regular follow-up visits to monitor participants' mental health conditions. A pamphlet will be provided to participants who need additional help, which describes the community's psychological services. We handled such cases successfully when we conducted our previous three studies, all of which included needs assessments, church-based and family-based mental health promotion interventions, measured suicidal ideation and depressive symptoms, and utilized our well-established networks in the clinical and community settings.

8 INTERVENTION DISCONTINUATION

This study included behavioral intervention, which does not have any noted harm. Even though subjects may withdraw voluntarily from participation in the study at any time and for any reason. Participants should continue to be followed for outcomes, with their permission, even if the study intervention is discontinued. The replacement of subjects will not be made for those who withdraw or discontinue their participation in the study. RAs will collect safety data on any subject discontinued due to adverse events or serious adverse events and will be given appropriate care under medical supervision until the symptoms of any adverse events resolve or the subject's condition becomes stable. If voluntary withdrawal occurs, the subject will be asked to continue scheduled evaluations and complete an end-of-study evaluation. In any case, every effort will be made to undertake protocol-specified safety follow-up procedures.

9 STATISTICAL CONSIDERATIONS

9.1 Sample Size and Randomization

The pilot project aims to estimate the magnitude of the difference between the preventive intervention and the education control on the primary outcomes of interest (stress, anxiety, depressive symptoms) to inform the design of a large-scale intervention. A study comparing PMP to a treatment-as-usual control in Pakistan[61] found a mean difference of about 7 points with a standard deviation of 8.5 on a measure of anxiety and depression for effect size (ES=.86). We do not expect our ES to be as large as what was observed in the Pakistani study[61] given that we are doing a prevention trial and not an intervention study in a distressed population so that this study will provide an estimate of the ES of PMP as a preventive intervention.

We conducted a power analysis to detect an ES as small as ES=.30 with alpha = .05 and power of .80. We may find a larger effect in our pilot, but our understanding is that power estimates should be based on the smallest effect that we want to detect rather than the size of the effect that we expect.[62] We expect that families will average approximately 2-4 adult persons based on our pilot data, and conducted our power analysis to account for the correlation among family members. Analyses were conducted using Optimal Design,[63], which is power analysis software created for cluster randomized trials such as the present study. Accounting for the intra-correlation among family members of .10 and alpha = .05, we would have 80% power to detect a standardized difference of ES=.30 between two treatment groups of 116 families (58 per treatment arm) with an equal probability of being randomized to each of our two intervention arms.

As noted above, we do not expect our ES to be as large as in the Pakistani study, but a sample of that size should be sufficient to provide the estimates of the differences between the conditions (with standard deviation in our sample) and the correlations between the targets specified by theory and our primary outcome of interest to inform the design of a larger-scale controlled trial. The other goal for the project is to determine whether the intervention affects the target mechanisms specified by theory to mediate or moderate the intervention's impact on the outcomes. Those estimates we will get from the correlation between our respective targets (coping and self-efficacy) and the primary outcomes.

9.2 Data Analyses

Baseline and follow-up data will be entered into an Excel database and exported to SAS statistical package for analyses. Privacy and security rules will be applied to protect the confidentiality and security of the data. Security features will be used at multiple levels, including the data element, user, application, and hosting services, with password protection for data access monitoring. These features will ensure control of access, authentication of users, and transmission security. The field team will be trained in project data maintenance.

Aim 2a Feasibility assessment: The PMP provides specific guidelines for evaluating and monitoring the intervention that we will use to monitor intervention delivery's fidelity. These tools are PMP Quiz, PMP Helper's Supervision Form, PMP Helper Classroom-based Competency Assessment, PMP Helper In-field based Competency Assessment, PM+ Trainer/Supervisor Competency Assessment, and Session-by-Session Checklists for PMP Helpers. Using these standard tools, we will evaluate session-by-session classroom and in-field based competencies of participants, community trainers, and supervisor and provide them feedback as needed using supervision forms, role-plays, group discussion, and training.

Community field supervisors will collect data on eligibility, recruitment and enrollment, intervention session attendance (including reasons for missed sessions), and compliance with data collection procedures, including hair sample collection and anthropometric measurements using a checklist. They will monitor intervention sessions using WHO standard checklists. Items include adherence to the manual, percent of intervention content administered, proper use of time/materials, and adequate response to participants' questions. They will also collect data on engagement, acceptability, and satisfaction via brief questionnaires and focus group discussions (FGD) with participants and interventionists after each session and upon intervention completion. The PI will conduct FGD in the Nepali language with interventionists, supervisors, and participants separately to collect information on barriers and facilitators of intervention, perceptions about whether the intervention met participants' needs, and feedback on how effectively the program team worked with participants. Interviews and FGD will be documented verbatim in a written transcript for subsequent analysis. All qualitative data will be analyzed using thematic

content analysis.[53] Feedback provided by the field staff will be reviewed and coded to identify recurrent themes regarding the intervention's acceptability. All analyses will be conducted in the Nepali and translated into English. Fidelity data will be used to assess intervention content and transmission. We will determine retention by obtaining proportions of participants attending all or portion of sessions.

Aim 2b Intervention efficacy: We will carry out data management and descriptive analyses for study outcomes. Means, standard deviations, and percentile distributions will be used to describe the continuous baseline variables. Frequencies and percentages will be used to describe categorical variables. We will compare baseline characteristics of intervention and control groups using chi-square and t-tests as appropriate. While differences between groups are not expected because of the randomization used in the study design, variables showing significant differences between the two groups will be included as covariates in primary analyses. We will compare participants' characteristics to follow-up to those with complete data to assess potential limitations in recruitment and retention.

The primary analyses will test whether participants' outcomes in the PMP-I arm differ from those in the control arm. Multilevel modeling will compare outcomes of each treatment arm while accounting for the clustering of participants within families. Continuous outcomes will be analyzed using hierarchical linear modeling, and dichotomous outcomes will be analyzed using multilevel generalized linear models with a Bernoulli distribution appropriate to nonlinear binary outcomes.[64] We expect approximately 2-4 members for each of the 58 families in each treatment arm, and the correlation among family members' responses will be accounted for in the model. Hierarchical or multilevel modeling is suited to these data as it accounts for the clustering of members within families and unbalanced designs (i.e., different family sizes).[64] This will be an intention-to-treat type of analysis, as multilevel modeling allows retention of all participants irrespective of the number of sessions attended (multilevel modeling uses maximum likelihood estimation, one of the recommended ways of handling missing data). The analysis will estimate endpoint outcomes based on repeated measures (Level 1) within individuals (Level 2) within families (Level 3). This three-level model is represented by the following equations:

Level 1: $Outcome_{ijk} = \pi_{ojk} + \pi_{1jk}*Time_{ijk} + e_{ijk}$; Level 2: $\pi_{0jk} = \beta_{00k} + r_{0jk}$; $\pi_{1jk} = \beta_{10k} + r_{1jk}$

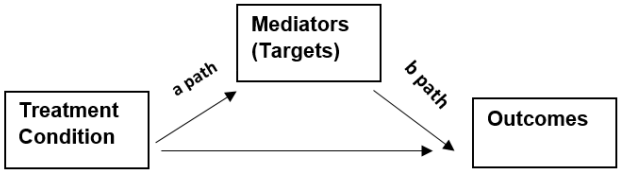
Level 3: $\beta_{00k} = \gamma_{000} + \mathbf{\gamma_{001}}\mathbf{*PMP\text{-}I_k} + u_{00k}$; $\beta_{10k} = \gamma_{100} + \gamma_{101}*PMP\text{-}I_k + u_{10k}$

Where the outcome is measured at each repeated measure *i* for each individual *j* within each family *k.* Time is centered at the endpoint, so that β_{00k} estimates the value of the outcome for each family at the end of the study, informed by all data points available for that family. If an endpoint observation is missing due to drop out, the advantage of multilevel modeling is that it utilizes maximum likelihood estimation, which estimates the expected outcome for that cluster using information from prior assessments as well as the expected value from the entire model. The key test of difference in the outcome between the treatment groups is represented by $\mathbf{\gamma_{001}}$ (in bold); this is a test of difference in outcome at endpoint between families randomized to PMP versus not. We expect this test of difference to be statistically significant based on our power analysis for the difference in outcome *level* at the endpoint. Note that this model will also test group differences in *change* in each outcome (γ_{101}). While our pilot is not powered for the significance of effects of change over time, we will be able to obtain estimates of ES for change for use in future larger-scale trials and analyses.

The ultimate goal of our analyses is to estimate the ES for this prevention trial for each outcome, to inform our planning of a full-scale trial. As noted earlier, we have powered this pilot prevention trial with a conservative estimate of effect size based on a similar study in a clinical population, but no known studies have characterized the precise effect size of PMP as a preventive intervention; a goal of our pilot is to estimate the expected effect on the population of interest (i.e. an at-risk vs clinical population). All analyses will be performed using SAS, version 9 (SAS Institute Inc, Cary, NC).

Aim 2c Mediating effects: Separate models will be created to evaluate the relationships between mediators (targets) and outcomes and to explore mediators (e.g. coping) of intervention-outcome relation.

Figure 1 Mediational Analysis Framework



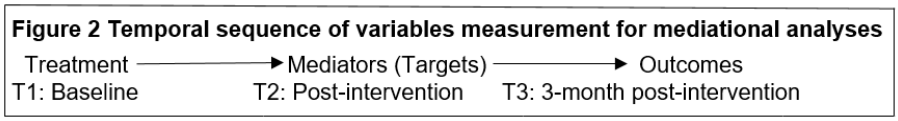
In this aim, we aim to test the potential *mediators* of the treatment-outcome association by conducting mediational analyses in a multilevel regression framework.[65] Following current

recommended best practices in mediational analysis, we will conduct these analyses using recommended practices for mediation with a multilevel framework. [66-68]

Figure 1 provides a visual representation of our proposed analyses, in which treatment is a predictor of treatment targets or mechanisms (i.e. the mediators such as coping), which are in turn associated with outcomes. As reviewers 1 and 3 note, in mediational analyses, variables must be measured in *temporal sequence*.

Figure 2 provides a visual representation of our proposed temporal sequence of variable measurement for mediational analyses, in which treatment randomization occurs before mediator target measurement, which in turn are collected before the outcome measure used in the proposed analyses. Second, it is crucial to test the *indirect effect* (a*b paths) of the treatment on the outcome through the hypothesized mediators. As the indirect effect is not normally distributed, we will assess its significance via Monte Carlo simulated confidence intervals, which are the recommended counterpart in multilevel mediation to bootstrapped confidence intervals used in single-level analyses.[66-68]

Figure 2 Temporal sequence of variables measurement for mediational analyses



Each potential mediational sequence will be tested in this manner (see **Table 1** for mediators and outcomes to be tested). While we acknowledge that mediational analyses are difficult to adequately power in a sample of our proposed size,[67] we believe these preliminary analyses will help identify potential mechanisms for our treatment effect. If baseline differences in treatment groups are found in either the mediating or outcome variables, baseline measures will be controlled for in all analyses. Sample mixed-format multilevel equations are provided below, where the nesting of measures (i) within families (j) is accounted for by the random effects u_{0js}: γ_{01} in the Mediator equation is the 'a path', and γ_{10} in the Outcome equation is the 'b path.'

Table 1 Mediators and Outcome Variables

Mediators (Targets)	Outcomes
Coping, Self-Efficacy	Perceived Stress
Family or Social Support	Physiological Stress
Family Conflict Resolution	Anxiety Symptoms
Family Satisfaction	Depressive Symptoms
Family or Social Network	

$$T2Mediator_{ij} = \gamma_{00\_Med} + \gamma_{01\_Med}*TreatmentCondition_j + u_{0j\_Med} + r_{ij\_Med}$$

$$T3Outcome_{ij} = \gamma_{00\_Out} + \gamma_{10\_Out}* T2Mediator_{ij} + \gamma_{01\_Out}*TreatmentCondition_j + u_{0j\_Out} + r_{ij\_Out}$$

The key estimates are the association of the treatment condition with the mediator (γ_{01_Med}, a path) and the association of the T2 mediator with the T3 Outcome (γ_{10_Out}, b path).

Multiplied together, these coefficients form the indirect effect of the treatment on the outcome and are tested for significance via Monte Carlo simulated confidence intervals. All analyses will be performed using Mplus, version 8.[69]

10 DATA COLLECTION AND QUALITY ASSURANCE

10.1 Data Collection Forms

10.1.1 Survey Questionnaire: Trained community research assistants will collect information from participants using attached screening and survey questionnaires and instruction sheets to measure blood pressure, body weight, height, and waist circumferences, and hair samples collection. PI will provide two full days of training to RAs on all aspects of the study procedure, including recruitment procedure, informed consent, screening, pre, and post-assessment survey tools using a questionnaire, anthropometric and blood pressure measurement, hair sample collection and storage procedure, logistics materials, and administrative details. Training sessions include document review, role-play, and practice exercises. We plan to recruit the RAs who worked in our pilot studies to conduct surveys, measure anthropometric parameters and blood pressure, and collect hair samples. The quality of their data collection was excellent in our previous baseline and pilot intervention studies. RAs will complete required human subject research training, including the Collaborative Institutional Training Initiative (CITI) and Good Clinical Practice (GCP).

10.1.2 Screening tool: Trained RAs will use the Patient Health Questionnaire (PHQ-9), a screening questionnaire for depression, to screen the study participants and record each screened participant in the screening log.

10.1.3 Survey questionnaire: Trained RAs will use the survey questionnaire, including various validated scales to measure stress, anxiety and depressive symptoms, coping, social support, social networking, family conflict resolution, and family satisfaction to collect information from the participants at baseline, post-intervention, and 3-month post-intervention. These tools have high internal consistency among the Bhutanese population in our pilot studies (Cronbach's alpha range 0.78 – 0.94).[39]

10.1.4 Body measures: Trained RAs will follow standard procedures mentioned in the "Training Manual for Research Assistant" to measure blood pressure, body weight, height, and waist circumferences of study participants.

10.1.5 Hair samples collection: Trained RAs will follow standard procedures mentioned in the "Training Manual for Research Assistant" to collect hair samples of study participants for the stress biomarker measurement. Hair samples will be cut from the posterior vertex of the scalp, carefully placed in aluminum foil, and stored at room temperature until delivery to Dr. Meyer's laboratory at the University of Massachusetts Amherst. Each sample will be cut to a length of 3 cm (if available) from the root (scalp) end and then processed into the Dr. Meyer's laboratory. Briefly, cut samples will be washed twice in 1 ml of isopropanol to remove external contaminants, including cortisol deposited on the outside of the hair shaft from sweat and sebum. After drying overnight, samples will be ground to be fine powder using a bead mill. 1.5 ml of methanol will be added to each sample, after which the samples will be subjected to slow rotation for 18-24 hours to extract the cortisol. 1.0 ml of the extract will be transferred to a clean tube, dried down using a vacuum evaporator, and then reconstituted in 0.25 ml of assay buffer. Reconstituted extracts will be spin-filtered to remove any residual particulate matter and then frozen at -20C for later assay. The cortisol content of each sample will be analyzed in duplicate along with standards and quality controls using the Arbor Assays commercial ELISA kit. Finally, the assay readout will be converted to pg cortisol per mg hair weight.

10.1.6 Confidentiality of participants' information and record: All interviews will be conducted with the utmost privacy and confidentiality. Each interested adult participant in the family will be interviewed individually, in a private place where they feel comfortable, by our trained community RAs who have worked with the PI in previous intervention studies. The RAs will ensure audio and visual privacy at these sites and ensure data confidentiality. The RAs will assure each participant that their information will be kept confidential and not shared with anybody, including family members, in any context. Moreover, community interventionists will present the PMP-I interventions in family settings welcoming the participation of all interested family members, including parents

and young (<18 years) and old children (aged 18 years and above), without revealing individual participant's data and mental health status.

Furthermore, the RAs will explain the confidentiality procedure in detail before collecting any data. The RA will share the following guidelines to maintain subject privacy: we will use a numeric code in place of names in all records to ensure confidentiality. The survey materials will be stored in a locked cabinet in the PI's office. Only the PI will have access to the cabinet's key. Data entry will be performed on the PI's office computer (encrypted and password protected) under the full supervision of the PI. All original data will be kept in Box, a secure, networked UMass Amherst data storage system. Study folders will only be accessible by the PI and through the secure on-campus network. De-identified data sets will be used for statistical analyses. Summary data and analysis results will be stored on the PI's UMass office computer or the Box network. The PI herself will do data analysis and documentation.

Data will only be presented in aggregate form in manuscripts or conference abstracts, and no individual respondent will be identified. The questionnaires, transcriptions, and field notes will be kept separate from identifying informed consent and ID information. The master list of participants will be kept under a locked cabinet with access limited to the PI.

10.2 Data Management, Analysis, and Quality Assurance

Baseline and follow-up data will be entered into an Excel database and exported to SAS statistical package for analyses. Privacy and security rules will be applied to protect the confidentiality and security of the data. Security features will be applied at multiple levels, including the data element, user, application, and hosting services, with password protection for data access monitoring. These features will ensure control of access, authentication of users, and transmission security. The field team will be trained in project data maintenance.

10.2.1 Data Safety

Several precautions will be taken to minimize the unintended risk of disclosure of personal information. The protection of data for this study includes the following steps:

- Before conducting the fieldwork, the study protocol and survey measures will be submitted to the Institutional Review Board at the University of Massachusetts Amherst. The study will be initiated only after obtaining approval. All the study members will complete the Good Clinical Practice (GCP) and Collaborative Institutional Training Initiative (CITI) Course in the Protection of Human Research Subjects – online training in research ethics - to ensure that all personnel is compliant with confidentiality training.
- All information collected during the study will remain confidential. Interviewers will reassure participants that numerical codes would be used in place of names in all records to ensure confidentiality. The survey materials (questionnaires, transcriptions, and field notes) will be stored in a locked cabinet in the PI's office. Only the PI will have access to the cabinet's key. Data entry will be done on the PI's office computer (encrypted and password protected) under the full supervision of the PI. The original data will be kept on Box, a secure, networked UMass data storage system, after fieldwork. The folders will only be accessible by the PI through the on-campus network. De-identified data sets will be used for statistical analyses. Summary data and analysis results will be stored on the PI's UMass office computer or the Box network. The PI herself will do data analysis and documentation. Data presented will not include the names of any individuals. All information will be presented in aggregate form in the manuscript or conference abstract, and no individual respondent will be identified. The PI will take responsibility for destroying questionnaires and hard copies of study documents using a paper cutting machine five years after completing data analysis, documentation, and publication.
- Participant information, including name and contact information, will be collected on form separate form from study data at enrollment. Later, this information will be saved in a password-protected file on the PI's office computer. The study identification number or code number assigned to each participant will be retained in the data stored at UMass Amherst. All hard copies will be stored in the locked file cabinet in a locked office and electronic information on the PI's computer using an encrypted and password-protected file. Only the PI will have access to this information. The Master List linking participant ID numbers with identifying information will be destroyed after the completion of data analysis.
- All data stored in computer files will be encrypted and password protected.

- After the fieldwork, only one set of cleaned data set will be maintained. The file will be kept on a secure UMass data storage system. The folders will be accessible only by the PI through the on-campus network. Summary data and analysis results may be stored on the UMass office network M drive. These files will be removed from the network drive five years after the completion of data analysis, documentation, and publication.

10.2.2 Validity and Integrity

The PI and University of Massachusetts undergraduate RA will monitor the validity and integrity of the data on an on-going basis. The PI and RA will have online meetings every other week with the investigators, and alternate between online and in-person meetings every week with field-team members (community interventionist, field supervisors, and research assistants) throughout the data collection and intervention period, to review the accuracy, quality of the data, coding of data collected, monitoring of protocol, ongoing training, and problem-solving. The PI will meet regularly with the RA to ensure that data are processed appropriately. The study investigators will closely supervise the field-team to maintain quality.

10.2.3 Quality Control Procedures

This manual of operations and procedures has included details of the study procedures to ensure that procedures are implemented correctly and consistently to monitor intervention fidelity. Copies of this study manual will be kept at the University of Massachusetts Amherst, Vanderbilt University, Tennessee, and the study site. All field-team members will undergo thorough training regarding study procedures, including the Protection of Human Research Subjects and Good Clinical Practice. Retraining will be done as necessary.

Quality assurance of data entry consists of proactive tools that are implemented to increase the quality of data processing components. Specifically, these include form design to avoid missing; training of research assistants on the study forms so that they are familiar with the required responses; design of the data entry forms; specifications of the data fields to reflect the nature of the data to be entered; specification of the edit parameters and checking algorithms so that every area is verified as thoroughly as

possible; and validation of the database system to certify that data entered into the data entry screens are accurately recorded in the databases.

For data quality assurance measures, we will conduct training of the RAs on data collection techniques with periodic retraining and immediate review of data collection to be sure that data collection forms are fully complete.

For data quality control measures, we will conduct regular analyses to investigate: the number of missing data items; the number and type of forms that are failing edit; and the distribution of data to identify outliers.

10.2.4 Data Sharing

Data from the study will be shared via the National Database for Clinical Trials (NDTC) related to Mental Illness. For this study, we will assign a global unique identifier (GUID) to each participant. This GUID is generated as a subject ID that allows researchers to share data specific to a study participant without personally identifying identifiable information. The GUID comprises random alpha-numeric characters and is NOT generated from personally identifiable information or protected health information.

Descriptive/raw data will be submitted semi-annually. Access to raw data used in the project will be considered for sharing compliance with the NIH Grants Policy on Sharing Unique Research Resources. Any raw data to be released for sharing will not contain identifiers of the study participants. Data will be made available to users undersigned and properly executed data-sharing agreements, which stipulate the criteria under which data may be used. Criteria include a commitment to using data for research purposes only, commitment to not identifying individual participants, commitment to securing data using appropriate technology, and commitment to destroying or returning data after analyses are completed.

All other data will be submitted at the time of publication or before the end of the grant, whichever occurs first. Investigators will share positive and negative results specific to the outcome measures studied by using the study functionality. Investigators will certify all data quality before submission to NDTC and review data for accuracy after submission. Information about this plan will be included in the informed consent forms in plain language.

10.2.5 Protocol Deviations

The PI will strictly monitor field staffs' protocol compliance while implementing different activities, such as participant enrollment and randomization, intervention compliance, and data collection through onsite supervisions and phone conversations with field staff and participants, including review of records, consent forms, and fidelity monitoring forms using attached protocol deviation log to document them.

PROTOCOL DEVIATION LOG

Protocol Name:_____

Protocol Deviation Code:	Participant Initials	Participant ID#	Date Deviation Occurred: mm/dd/yyyy	Date Protocol Deviation Form Completed: mm/dd/yyyy	Contact Person (if applicable)

PROTOCOL DEVIATION CODES

Consent Form:

7. Missing or not obtained
8. Not signed and dated by participant
9. Does not contain all required signatures
10. Outdated, current IRB-approved version not used
11. Not protocol-specific
12. Does not include updates or information required by the IRB

Randomization:

13. Ineligible participant enrolled and/or randomized
14. Participant randomized prior to determining whether eligible for study
15. Occurs outside protocol window

IRB:

16. Not reporting a serious complication within 24 hours;
17. Approvals not kept up to date
18. Enrollment and/or treatment occurs prior to IRB approval or during period when on "on hold"
19. Reportable serious adverse events not reported to IRB

Participant

1. Receives wrong treatment
2. Visits occur outside expected follow-up window
3. Entered into another study

Study Data and/or Forms

4. Missing data and/or forms
5. Missing hair samples
6. Forms or data not sent from RAs to field supervisor

11 PARTICIPANT RIGHTS AND CONFIDENTIALITY

11.1 Institutional Review Board (IRB) Review

The study protocol and the informed consent document, and any subsequent modifications will be reviewed and approved by the UMass Amherst IRB.

11.2 Informed Consent Forms

Consent forms will be Institutional Review Board (IRB)-approved, and the participant will be asked to read and review the document. The RAs will explain the research study to the participant and answer any questions that may arise. A verbal explanation will be provided in terms of the participant's comprehension of the purposes, procedures, and potential risks of the study and their rights as research participants. Participants will be informed that participation is voluntary and that they may withdraw from the study at any time, without prejudice, and that the quality of their medical care and other supports will not be adversely affected if they decline to participate in this study. Participants will have the opportunity to carefully review the written consent form and ask questions before signing. The informed consent process will be conducted and documented in the source document (including the date), and the form signed before the participant undergoes any study-specific procedures.

11.3 Participant Confidentiality

All interviews will be conducted with the utmost privacy and confidentiality. Each interested adult participant in the family will be interviewed individually, in a private place where they feel comfortable, by our trained community RAs who have worked with the PI in previous intervention studies. The RA will ensure audio and visual privacy at these sites and ensure data confidentiality. The RA will assure each participant that their information will be kept confidential and not shared with anybody, including family members, in any context. Moreover, we will present our interventions in family settings welcoming the participation of all interested family members, including parents and young (<18 years) and old children (aged 18 years and above), without revealing individual participant's data and mental health status.

Furthermore, the RA will explain the confidentiality procedure in detail before

collecting any data. The RA will share the following procedures to maintain subject privacy: we will use a numeric code in place of names in all records to ensure confidentiality. The survey materials will be stored in a locked cabinet in the PI's office. Only the PI will have access to the cabinet's key. Data entry will be performed on the PI's office computer (encrypted and password protected) under the full supervision of the PI. All original data will be kept in Box, a secure, networked UMass Amherst data storage system. Study folders will only be accessible by the PI and through the secure on-campus network.

De-identified data sets will be used for statistical analyses. Summary data and analysis results will be stored on the PI's UMass office computer or the Box network. The PI herself will do data analysis and documentation. Data will only be presented in aggregate form in manuscripts or conference abstracts, and no individual respondent will be identified. The questionnaires, transcriptions, and field notes will be kept separate from identifying informed consent and ID information. The master list of participants will be kept under a locked cabinet with access limited to the PI.

The hair sample will be stored in a clean, dry aluminum foil with your ID number on top of the aluminum envelope. The hair samples will be stored in the College of Nursing's laboratory during the data collection process. At the end of the survey, the collected hair samples will be sent to the laboratory in UMass Amherst. Hair samples will be processed in the laboratory for cortisol measurement. If the sample remains after measurement procedure completion, it will be disposed of according to the laboratory's safety rules and regulations.

For this study, each participant will be assigned a global unique identifier (GUID). This GUID is generated as a subject ID that allows researchers to share raw data such as numbers or percentages specific to a study participant without exposing personally identifiable information. The GUID comprises random alpha-numeric characters and is NOT generated from personally identifiable information or protected health information. This identifier will be kept separate from your paper consent file and stored in a password-protected electronic file. Descriptive/raw data will be submitted semi-annually. Access to raw data used in the proposed project will be considered for sharing compliance with the NIH Grants Policy on Sharing Unique Research Resources. Any raw data to be released for

sharing will not contain identifiers (such as name, address, birth date, and phone number) of the study participants.

We will send de-identified study data to the National Institute of Mental Health Data Archive (NDA) during and after the study. Experts at the NIH who know how to keep participant's data safe. The study researchers will make every attempt to protect participant's identities. The study data provided to NDA may help researchers worldwide learn more about mental health and help others who have mental health problems. NIMH will also report to Congress and on its website about the different studies using NDA data. The participant will not be contacted directly about the study data they contributed to NDA. During the study, the participant can decide that they do not want their study data to be added to the NDA. The participant can still participate in this research study even if they decide that they do not want their data to be added to the NDA.

A Certificate of Confidentiality covers this research from the National Institutes of Health. The researchers with this Certificate may not disclose or use information, documents, or hair samples that may identify participants in any federal, state, or local civil, criminal, administrative, legislative, or other actions.

A description of this study will be available on http://www.ClinicalTrials.gov. This Web site will not include information that can identify the participant. At most, the Website will consist of a summary of the results when they are available. The participant can search this Web site at any time. The registration number for this study is NCT04453709.

11.4 Confidentiality Limits

We will keep all information from participants confidential. There are certain exceptions to this rule, as permitted by law and professional ethics. Our experience is that these exceptions will arise infrequently. They will include: a) We may disclose confidential information when we judge that there is a strong possibility of serious harm being inflicted by a participant on another person or themselves, and we are unable to develop a plan with the participant to ensure safety; b) Should a participant disclose information relating to probable child abuse, elder abuse, or abuse of a vulnerable adult (for example, someone who is developmentally disabled or mentally ill, or who has a disabling illness), we may be required to notify state authorities.

11.5 Study Discontinuation

The study may be discontinued at any time by the UMass Amherst IRB or National Institute of Mental Health as part of their duties to ensure that research participants are protected.

12 ETHICAL CONSIDERATIONS

The study protocol is approved by the Institutional Review Board (IRB) of the University of Massachusetts Amherst. Working in partnership with the UMass research community, the Human Research Protection Office (HRPO) and the IRB are responsible for protecting research participants' rights and welfare. Guided by the principles outlined in the Belmont Report: Ethical Principles and Guidelines for the Human Subjects of Research (link is external), the HRPO strives to ensure that research is conducted under the auspices of the University of Massachusetts Amherst complies with all federal, state, and local regulations.

13 PUBLICATION OF RESEARCH FINDINGS

Publications of this trial's results will be governed by the policies and procedures developed by the National Institutes of Health. Any presentation, abstract, or manuscript will be made available for review by the National Institutes of Health before publications. The peer-reviewed article accepted for publication will be submitted to the NIH Manuscript Submission System to receive the PMCID number. Progress reports will include PMCID reference numbers when citing applicable papers authored or arising from NIH-funded research. All publications will be entered into the PI's MyNCBI account using the bibliography management tool My Bibliography.

14 REFERENCES

1. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behav.* Dec 1983;24(4):385-396.
2. Derogatis LR, Lipman RS, Rickels K, Uhlenhuth EH, Covi L. The Hopkins Symptom Checklist (HSCL): a self-report symptom inventory. *Behav Sci.* Jan 1974;19(1):1-15.
3. Gee GC, Ryan A, Laflamme DJ, Holt J. Self-reported discrimination and mental health status among African descendants, Mexican Americans, and other Latinos in the New Hampshire REACH 2010 Initiative: the added dimension of immigration. *Am J Public Health.* Oct 2006;96(10):1821-1828.
4. Gee GC, Spencer M, Chen J, Yip T, Takeuchi DT. The association between self-reported racial discrimination and 12-month DSM-IV mental disorders among Asian Americans nationwide. *Soc Sci Med.* May 2007;64(10):1984-1996.
5. Gee GC, Spencer MS, Chen J, Takeuchi D. A nationwide study of discrimination and chronic health conditions among Asian Americans. *Am J Public Health.* Jul 2007;97(7):1275-1282.
6. Lum TY, Vanderaa JP. Health disparities among immigrant and non-immigrant elders: the association of acculturation and education. *J Immigr Minor Health.* Oct 2010;12(5):743-753.
7. Wadsworth T, Kubrin CE. Hispanic suicide in US metropolitan areas: examining the effects of immigration, assimilation, affluence, and disadvantage. American Journal of Sociology. 2007;112:1848–1885. *American Journal of Sociology.* 2007;112:1848–1885
8. *New Insights on How Mental Health Is Influenced by Acculturation and Immigration Status. Rockville, Md: National Institute of Mental Health; 2007.* .
9. Takeuchi DT, Alegria M, Jackson JS, Williams DR. Immigration and mental health: diverse findings in Asian, black, and Latino populations. *Am J Public Health.* Jan 2007;97(1):11-12.
10. Takeuchi DT, Zane N, Hong S, et al. Immigration-related factors and mental disorders among Asian Americans. *Am J Public Health.* Jan 2007;97(1):84-90.
11. Bhattacharya G, Schoppelrey SL. Preimmigration beliefs of life success, postimmigration experiences, and acculturative stress: South Asian immigrants in the United States. *J Immigr Health.* Apr 2004;6(2):83-92.
12. Miller MJ, Yang M, Farrell JA, Lin LL. Racial and cultural factors affecting the mental health of Asian Americans. *Am J Orthopsychiatry.* Oct 2011;81(4):489-497.
13. Karasz A, Gany F, Escobar J, et al. Mental Health and Stress Among South Asians. *J Immigr Minor Health.* Nov 15 2016.
14. Safdar S, Lay CH. The relations of immigrant-specific and immigrant nonspecific daily hassles to psychological distress controlling for psychological adjustment and cultural competence. *Journal of Applied Social Psychology.* 2003;33(2):299-320.
15. Stephenson M. Development and validation of the Stephenson Multigroup Acculturation Scale (SMAS). *Psychol Assess.* Mar 2000;12(1):77-88.
16. Carlson EB, Rosser-Hogan R. Cross-cultural response to trauma: a study of traumatic experiences and posttraumatic symptoms in Cambodian refugees. *J Trauma Stress.* Jan 1994;7(1):43-58.

17. Marshall GN, Schell TL, Elliott MN, Berthold SM, Chun CA. Mental health of Cambodian refugees 2 decades after resettlement in the United States. *JAMA.* Aug 3 2005;294(5):571-579.
18. Porter M, Haslam N. Predisplacement and postdisplacement factors associated with mental health of refugees and internally displaced persons: a meta-analysis. *JAMA.* Aug 03 2005;294(5):602-612.
19. Breslau J, Borges G, Hagar Y, Tancredi D, Gilman S. Immigration to the USA and risk for mood and anxiety disorders: variation by origin and age at immigration. *Psychol Med.* Jul 2009;39(7):1117-1127.
20. Abe-Kim J, Takeuchi DT, Hong S, et al. Use of mental health-related services among immigrant and US-born Asian Americans: results from the National Latino and Asian American Study. *Am J Public Health.* Jan 2007;97(1):91-98.
21. Derr AS. Mental Health Service Use Among Immigrants in the United States: A Systematic Review. *Psychiatr Serv.* Mar 2015;67(3):265-274.
22. Wang PS, Lane M, Olfson M, Pincus HA, Wells KB, Kessler RC. Twelve-month use of mental health services in the United States: results from the National Comorbidity Survey Replication. *Arch Gen Psychiatry.* Jun 2005;62(6):629-640.
23. Weine SM. Developing preventive mental health interventions for refugee families in resettlement. *Fam Process.* Sep 2011;50(3):410-430.
24. CDC. Suicide and suicidal ideation among Bhutanese refugees--United States, 2009-2012. *MMWR Morb Mortal Wkly Rep.* Jul 5 2013;62(26):533-536.
25. Pernice R, Trlin A, Henderson A, North N, Skinner M. Employment status, duration of residence and mental health among skilled migrants to New Zealand: results of a longitudinal study. *Int J Soc Psychiatry.* May 2009;55(3):272-287.
26. Diwan S. Limited English proficiency, social network characteristics, and depressive symptoms among older immigrants. *J Gerontol B Psychol Sci Soc Sci.* May 2008;63(3):S184-191.
27. Salant T, Lauderdale DS. Measuring culture: a critical review of acculturation and health in Asian immigrant populations. *Soc Sci Med.* Jul 2003;57(1):71-90.
28. Escobar JI, Vega WA. Mental health and immigration's AAAs: where are we and where do we go from here? *J Nerv Ment Dis.* Nov 2000;188(11):736-740.
29. Hwang WC, Myers HF. Major depression in Chinese Americans: the roles of stress, vulnerability, and acculturation. *Soc Psychiatry Psychiatr Epidemiol.* Mar 2007;42(3):189-197.
30. Hwang WC, Chun CA, Takeuchi DT, Myers HF, Siddarth P. Age of first onset major depression in Chinese Americans. *Cultur Divers Ethnic Minor Psychol.* Feb 2005;11(1):16-27.
31. Chou KL. Pre-migration planning and depression among new migrants to Hong Kong: the moderating role of social support. *J Affect Disord.* Apr 2009;114(1-3):85-93.
32. Tonsing KN, Tse S, Tonsing JC. Acculturation, perceived discrimination, and psychological distress: Experiences of South Asians in Hong Kong. *Transcult Psychiatry.* Feb 2015;53(1):124-144.
33. Lay C, Nguyen T. The role of acculturation-related and acculturation non-specific daily hassles: Vietnamese-Canadian students and psychological distress. . *Canadian Journal of Behavioral Science.* 1998;30(3):172-181.
34. Chae DH, Takeuchi DT, Barbeau EM, Bennett GG, Lindsey J, Krieger N. Unfair

treatment, racial/ethnic discrimination, ethnic identification, and smoking among Asian Americans in the National Latino and Asian American Study. *Am J Public Health.* Mar 2008;98(3):485-492.
35. Crabtree SA, Wong H. "Ah Cha"! The racial discrimination of Pakistani minority communities in Hong Kong: An analysis of multiple, intersecting oppressions. . *British Journal of Social Work.* 2012;1:1-19.
36. Frost S. Building Hong Kong: Nepalese labour in the construction section. . *Journal of Contemporary Asia.* 2004;34(3):364-376.
37. Ku HB. Body, dress and cultural exclusion: Experiences of Pakistani women in "global" Hong Kong. *Asian Ethnicity.* 2006;7:285-302.
38. Weine SM, Muzurovic N, Kulauzoic Y, Besic S, Lezic A, Mujagic A, et al. Family consequences of political violence in refugee families. *Family Process.* 2004;43:147-160.
39. Poudel-Tandukar K, Jacelon CS, Rai S, Ramdam P, Bertone-Johnson ER, Hollon SD. Social and Emotional Wellbeing (SEW) Intervention for Mental Health Promotion Among Resettled Bhutanese Adults in Massachusetts. *Community Mental Health Journal (In Press).* 2021.
40. Poudel-Tandukar K, Jacelon CS, Chandler GE, Gautam B, Palmer PH. Sociocultural Perceptions and Enablers to Seeking Mental Health Support Among Bhutanese Refugees in Western Massachusetts. *Int Q Community Health Educ.* Apr 2019;39(3):135-145.
41. Poudel-Tandukar K, Jacelon CS, Gautam B, Bertone-Johnson E, Palmer PH. Problem or emotion focused engagement coping strategies and stress among Bhutanese immigrants in Massachusetts. Annual Meeting of American Public Health Association (APHA), San Diego, CA, USA. November 14 – 18, 2018. (Abstract Number: 409838).
42. AHRQ. *Agency for Healthcare Research and Quality (AHRQ). Disparities Within Serious Mental Illness. Rockville, MD: AHRQ; 2016. Available at https://www.effectivehealthcare.ahrq.gov/ehc/products/619/2236/mental-illness-dispari¬ties-report-160524.pdf. Last accessed February 2017* 2016.
43. WHO. *Prevention of mental disorders. Effective interventions and policy options. Summary report. A report of the World Health Organization, Department of Mental Health and Substance Abuse in collaboration with the Prevention Research Center of the Universities of Nijmegen and Maastricht. World Health Organization, Geneva, 2004.* 2004.
44. Shaw SJ, Huebner C, Armin J, Orzech K, Vivian J. The role of culture in health literacy and chronic disease screening and management. *J Immigr Minor Health.* Dec 2009;11(6):460-467.
45. Airhihenbuwa CO, Ford CL, Iwelunmor JI. Why culture matters in health interventions: lessons from HIV/AIDS stigma and NCDs. *Health Educ Behav.* Feb 2014;41(1):78-84.
46. Derr AS. Mental health service use among immigrants in the United States: a systematic review. *Psychiatr Serv.* 2016;67(3):265-274.
47. McGuire TG, Mianda J. New evidence regarding racial and ethnic disparities in mental health: policy implications. *Health Affairs.* 2008;27(2):393-403.
48. *World Health Organization. Problem Management Plus (PM+): Individual psychological help for adults impaired by distress in communities exposed to adversity. (Generic field-trial version 1.0). Geneva, WHO, 2016.*
49. Dawson KS, Bryant RA, Harper M, et al. Problem Management Plus (PM+): a WHO transdiagnostic psychological intervention for common mental health problems. *World*

Psychiatry. Oct 2015;14(3):354-357.
50. Thapa SB, Hauff E. Psychological distress among displaced persons during an armed conflict in Nepal. *Soc Psychiatry Psychiatr Epidemiol.* Aug 2005;40(8):672-679.
51. Meyer J, Novak M, Hamel A, Rosenberg K. Extraction and analysis of cortisol from human and monkey hair. *J Vis Exp.* Jan 24 2014(83):e50882.
52. Meyer JS, Novak MA. Minireview: Hair cortisol: a novel biomarker of hypothalamic-pituitary-adrenocortical activity. *Endocrinology.* Sep 2012;153(9):4120-4127.
53. Green J, Thorogood N. Qualitative methods for health research. Thousands Oaks, CA, USA: SAGE Publishing; 2014. 2014.
54. Tobin DL. *Coping strategies therapy for bulimia nervosa. Washington, DC: American Psychological Association Press, 2000.*
55. Chesney MA, Neilands TB, Chambers DB, Taylor JM, Folkman S. A validity and reliability study of the coping self-efficacy scale. *Br J Health Psychol.* Sep 2006;11(Pt 3):421-437.
56. Zimet GD, Dahlem NW, Zimet SG, Farley GK. The Multidimensional Scale of Perceived Social Support. *Journal of Personality Assessment.* 1988;52(1):30-41.
57. Zimet GD, Dahlem NW, Zimet SG, Farley GK. The multidimensional scale of perceived social support. *Journal of Personality Assessment.* 1988;52:30-41.
58. Lubben J, Blozik E, Gillmann G, et al. Performance of an abbreviated version of the Lubben Social Network Scale among three European community-dwelling older adult populations. *Gerontologist.* Aug 2006;46(4):503-513.
59. Roskos PT, Handal PJ, Ubinger ME. Family Conflict Resolution: Its Measurement and Relationship with Family Conflict and Psychological Adjustment. *Psychology.* 2010;1(5):370-376.
60. Olson DH, Wilson M. *Family Satisfaction. In Olson, D.H., and colleagues. Families: What Makes Them Work. Newbury Park, CA: Sage Publishing.*; 1982, 1989.
61. Khan MN, Hamdani SU, Chiumento A, et al. Evaluating feasibility and acceptability of a group WHO trans-diagnostic intervention for women with common mental disorders in rural Pakistan: a cluster randomised controlled feasibility trial. *Epidemiol Psychiatr Sci.* Jul 10 2017:1-11.
62. Kraemer HC, Mintz J, Noda A, Tinklenberg J, Yesavage JA. Caution regarding the use of pilot studies to guide power calculations for study proposals. *Arch Gen Psychiatry.* May 2006;63(5):484-489.
63. Raudenbush, S. W., et al. (2011). Optimal Design Software for Multi-level and Longitudinal Research (Version 3.01) [Software]. Available from www.wtgrantfoundation.org.
64. Raudenbush S, W., Bryk. AS. Hierarchical Linear Models: Applications and Data Analysis Methods. 2nd ed. Thousand Oaks: Sage Publications. 2002.
65. Baron RM, Kenny DA. The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. 51(6), 1173. *Journal of personality and social psychology.* 1986;51(6):1173.
66. Hayes AF. *Beyond Baron and Kenny: Statistical mediation analysis in the new millennium. Communication monographs, 76(4), 408-420.*; 2009.
67. Hayes AF. *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach. Guilford Publications.*; 2017.
68. Preacher KJ, Zyphur MJ, Zhang Z. A general multilevel SEM framework for assessing

multilevel mediation. *Psychological Methods.* 2010;15(3):209.
69. Muthén LK, Muthén B. *Mplus. The comprehensive modelling program for applied researchers: user's guide, 5.*; 2019.