Happy Family, Healthy Kids: An Intergenerational Program to Promote Healthy Eating Habits

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Theoretical Framework

The "Happy Family, Healthy Kids" program was grounded in the Actor-Partner Interdependence Model (Cook & Kenny, 2005), the Allostatic Load Model (McEwen, 2000), and the Transactional Theory of Stress and Coping (Lazarus & Folkman, 1987). The Actor-Partner Interdependence Model has been used in lifestyle behavioral and mental health interventions to better understand the intergenerational interactions and relationships inside a family (Braithwaite & Fincham, 2011; Vedanthan et al., 2016). The Actor-Partner Interdependence Model demonstrates the bidirectional relationship between preschoolers and parents: 1) actor effects within preschoolers or parents and 2) partner effects between preschoolers and parents (Cook & Kenny, 2005).

According to the Allostatic Load Model (McEwen, 2000) and the Transactional Theory of Stress and Coping (Lazarus & Folkman, 1987), to respond to stress, individuals first cognitively appraise external stressors according to their harm, threat, or challenge. Then, they respond to the appraised stressors with different coping strategies including problem-focused coping, emotion-focused coping, and avoidant coping. Problem-focused coping focuses on making cognitive and behavioral effort to change a stressful situation in a positive way (Lazarus & Folkman, 1987). Emotion-focused coping involves regulating difficult emotions such as anger, fear, anxiety, depression, frustration, and sadness that are associated with stress (Lazarus & Folkman, 1987). Avoidant coping is a maladaptive form of coping that includes denying or avoiding the stressful situations or feelings to temporarily reduce stress (Penley, 2002). When the selected coping strategies fail to manage the external stressors, the cumulative burden of chronic stress (allostatic load) can lead to poor health outcomes such as obesity, cardiovascular diseases, anxiety, and depression (Guidi et al., 2021; Lazarus & Folkman, 1987; McEwen, 2000).

Fortunately, maintaining a healthy lifestyle, such as having healthy diet, is associated with lower allostatic load, resulting in improved physical and mental health (Forrester et al., 2019; Mattei et al., 2013). Based on information from the theory and models, the "Happy Family, Healthy Kids" program focused on the connections between F/V intake and mental health to strengthen both preschoolers' and parents' adaptive coping strategies (e.g., mindful eating) and reduce maladaptive coping strategies (e.g., emotional eating) to enhance their overall well-being.

Methods

Study Design, Setting, and Sample

A one-group quasi-experimental study was conducted in 13 Michigan Head Start centers across two academic years. In Year 1, three urban Head Start centers (eight classrooms) and three rural Head Start centers (five classrooms) participated. In Year 2, four urban Head Start centers (five classrooms) and three rural Head Start centers (five classrooms) participated. The total enrollment from the 23 Head Start classrooms was 374 preschoolers, and 127 (34%) of the families were initially interested in participating in the study. Of the 127 families, 20 were excluded due to not meeting the inclusion criteria or declining to participate or for other reasons. A total of 107 parent-preschooler dyads were enrolled in the study, but four preschoolers did not receive the program due to being dropped out of the Head Start programs. The study flow diagram is presented in Figure 1.

We recruited parent-preschooler dyads using the following two strategies: 1) Head Start teachers and family engagement specialists shared the recruitment flyer with their classroom families; and 2) at urban settings, the study project manager and trained research assistants recruited participants and answered questions in-person during daycare drop-offs and pick-ups.

A $5 e-gift card was distributed to the families who completed the enrollment and screening survey.

Sample size was estimated using the freely available G*Power software. With the study design being one-group quasi-experimental and a significance level of 0.05, a sample size of 90 would achieve 80% study power to identify a small effect size of 0.30, and a sample size of 102 would achieve 85% power. Inclusion criteria were: 1) child was 3-5 years old and enrolled in a participating Head Start program; 2) parent was the primary caregiver for the child, had at least weekly Internet access, and was willing to use Facebook to participate; 3) dyad was able to speak and understand English; and 4) parental consent and child assent (if child was five years old) were obtained. Preschoolers were excluded if they had any medical conditions preventing them from participating in dietary changes. University Institutional Review Board approved the project, and parents' consent and 5-year-old preschoolers' verbal assent were obtained.

"Happy Family, Healthy Kids" Program

Table 1 demonstrates the three components of the 14-week healthy eating and stress management program. Each participating family received a crockpot and a program "Healthy Tasty Cookbook" to promote healthy family meals at home, an adult and a child MyPlate plates to encourage appropriate portion size and healthy eating habits, and a community resource booklet to share community resources on healthy eating (e.g., local farmers markets) and stress management (e.g., mindfulness classes, local trails for walking in nature).

Measurements and Data Collection

As demonstrated in Table 2, reliable and valid instruments were selected to assess program outcomes at two time points: baseline and post-program. Parents completed an online survey measuring their nutrition knowledge, self-efficacy, support, child feeding

beliefs/attitudes/practices, food resource management behavior, perceived stress, coping strategies, dietary intake, home eating environment, emotional eating, and food insecurity via Qualtrics. A face-to-face appointment was scheduled with each parent-preschooler dyad to objectively measure their height to the nearest 0.1cm using the Shorr board, weight to the nearest 0.1kg using the Seca 874 scale, % body fat to the nearest 0.1% using the BF-689 body fat/body water monitor for preschoolers and BC-533 InnerScan body composition monitor for parents, and parents' BP to the nearest 1mmHg using the Omron HEM-705-CP digital BP monitor.

For height, weight, and % body fat measurements, participants were asked to remove shoes, socks, or bulky clothes. To avoid interference with height measurements, participants were asked to remove their accessories or change hairstyles (no ponytail) when applicable. If a participant refused, trained data collectors would obtain the height measurment as well as measure hairdo height (using small, flexible plastic ruler) and record both types of information on the data collection form. Each participant's biological sex, age, and height in cm were entered into the monitor for measuring % body fat. Trained data collectors then instructed participants to step onto the monitor surface and align feet with the four electrodes. The protocol by the American Heart Association (2020) was followed for BP measurement. Parents' left arms were used for BP measurement unless having a prior surgery or injury.

To increase reliability for measuring height, weight, % body fat, and BP, two measurements were taken. A third measurement was taken when the first two measurements differed by ≥0.5 cm for height, ≥0.5 kg for weight, ≥1% for % body fat, and ≥5 mmHg for BP. The data collection process was repeated by another data collector when the third mesurement was ≥0.5 cm, ≥0.5 kg, ≥1%, and ≥5 mmHg away from the first two measurements. The average of the two closest measurements was calculated as the final value. The online SAS program for

Centers for Disease Control and Prevention Growth Charts (2021) was applied to calculate preschoolers' BMI for age and sex.

In Year 2, an instrument called the Veggie Meter® was utilized to assess skin carotenoids as an indicator for F/V intake. Biologically, carotenoid levels in serum/plasma have been used as a biomarker to estimate F/V intake (Ferrari et al., 2005). However, this invasive approach due to the drawing of blood can generate needle-related stress, anxiety, insecurity, and fear among participants (Soares da Silva, 2016). The skin carotenoid score measured by resonance Raman spectroscopy (the Veggie Meter®; Longevity Link, Salt Lake City, UT) was proposed as a non-invasive biomarker for F/V intake given its high correlation (r=0.70-0.72) with carotenoid levels in blood plasma/serum (Aguilar et al., 2014; Jahns et al., 2014). To assess skin carotenoids in this study, each participant's non-dominant index finger was used, and the average of three scans was recorded as the final score.

Table 1. The 14-week "Happy Family, Healthy Kids" program

Component	Descriptions
A 14-week parent component	• A 14-week Facebook-based program with weekly videos and flyers providing life stress management and eating behavioral change strategies and 4 weekly habit-formation tasks to create a happier and healthier home environment for preschoolers. • 3 virtual meetings (weeks 1, 7, & 14) to establish personal connections and communication networks among parents, discuss strategies, and share community resources to support behavioral changes at home. • 3 motivational text messages (Monday, Wednesday, Friday) per week for 14 weeks to increase parents' motivation for making healthy eating behavioral changes at home and encourage them to positively manage stress.
A parent-preschooler learning component	Sending weekly preschooler letters (total 13 letters) to each parent privately via Facebook messenger by the research team to share the preschooler's experiences of learning at school and his/her stated interests for a healthy diet at home, and to ask parents to respond to the letters.
A 14-week Head Start center-based preschooler component	Helping preschoolers establish mindful healthy eating habits via weekly healthy diet participatory learning (e.g., food taste test activity) following the "Eat My ABCs" curriculum.

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