FOOD IS MEDICINE

IN MENTAL HEALTH,

A Pilot Study

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A Pilot Study

by

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We would like to thank residential counselors at Mental Health Connecticut and the youth volunteers at Healing Meals Community Project for their commitment, time and efforts on this project. We especially want to thank the participants in the pilot study for their time and contribution to our collective learning.

FOOD IS MEDICINE IN MENTAL HEALTH

Purpose. Mental Health Connecticut (MHC) and Healing Meals Community Project (Healing Meals), both private, non-profit organizations, have collaborated in implementing a pilot project delivering nutritious meals with care to individuals living with mental health conditions. Quality of diet can serve as either a risk factor or a protective factor in the etiology, onset, management, and outcome of mental health conditions. Unfortunately, adults living with mental health conditions are more likely than those without such conditions to have unhealthy diets or experience food insecurity (i.e., lack a consistent base of balanced, nutritious meals). The co-occurrence of a mental health condition with food insecurity is more likely for individuals who also report social isolation and high stress. Interrelated with these factors, individuals living with mental health conditions also experience relatively high rates of physical illnesses or disease. As an initial step, our pilot study explores the practicality of a novel intervention for addressing poor diet, food insecurity, and interrelated risk factors.

Participant: "Being in this study, my whole way of thinking about nutrition has been turned around."

Participants. Participants received residential support services from Mental Health Connecticut (MHC). In addition to living with mental health conditions, there was a range of other, co-existing health concerns among participants including chronic physical conditions, indicators of low quality diet, food insecurity, and social isolation.

Intervention. MHC counselors delivered five meals weekly to participants for six or more weeks. The nutritious meals were prepared by the Healing Meals team of youth/adult volunteers and an executive chef. A hand-written note extending a friendly greeting and well wishes from a volunteer cook was included with deliveries.

What was learned. Using the Food is Medicine model to support lifestyle change in diet for individuals living with mental health conditions is a highly workable approach that shows potential for addressing a constellation of risk factors. Six of nine participants (66%) completed the study, and the majority consumed all the meals. There was improvement in one or more indicators of well-being for all but one participant. All participants had a strong, positive emotional reaction to the "personalized" hand-written notes. Most importantly, every participant reported increased knowledge of, and a positive attitude and behavioral change in diet, meal routines, and shopping/cooking habits. Positive response to the intervention by some participants can be related to concerns for health and well-being; for others, the stronger influence appeared to be the social connections that were created through the intervention. Rate of adjustment to change in diet could also potentially be related to stage of recovery at the start of the study (e.g., perception of living a positive life).

Questions raised. How can we build on what has been learned to develop a model that has a significant, long-lasting impact on well-being and related health outcomes at the individual and community level? In addition to focus on change in diet and food security, what additional components can be incorporated to build social connection? What would be the expected changes (increases and decreases) in service utilization? Who are the critical stakeholders in supporting a model that is sustainable?

WHAT'S IN THIS REPORT

Background and Purpose

Research findings in nutritional psychiatry (Miller, 2015; Selhub, 2015) and nutritional psychology (Clay, 2017), both newly emerged disciplines, show that quality of one's diet can serve as either a risk factor (unhealthy diet) or a protective factor (healthy diet) in the etiology, onset, management, and outcome of mental illnesses (Clay, 2017; Jacka et al., 2017; Newman, 2019; Sathyanarayana et al., 2008). Unfortunately, people living with some of the most prevalent mental health conditions – depression, anxiety, bipolar disorder, schizophrenia, and obsessive-compulsive disorder, are more likely to have a nutritionally deficient diet (Sathyanarayana et al., 2008). Moreover, adults living with mental illnesses are more likely than those without such a condition to experience food insecurity (Martin et al., 2015; Tarasuk et al., 2013) as well as other, related determinants of ill health (e.g., lack of social support, isolation, low wages, housing instability, and lack of transportation) (Burchi et al., 2011 , 2017). For individuals living with mental illnesses who also report having weak community belonging and high levels of stress, the co-occurrence of mental illness and food insecurity is even greater (Martin et al., 2015).

Food insecurity, independent of other social determinants of health, has been found to be a strong predictor of mental health service utilization across all service types including hospitalizations, emergency department visits, and psychiatrist and primary care physician visits (Tarasuk et al., 2018). Additionally, people who experience enduring mental illness (e.g., depression, schizophrenia, and bipolar disorder), as compared to the general population, have much higher rates of other chronic illnesses including obesity, diabetes, dyslipidemia, and cardiovascular disease (Graham et al., 2014; Tarsuk, 2013)). For example, among individuals with schizophrenia, diabetes is 2-4 times higher than the general population (Bushe & Holt, 2004); and similarly, for individuals living with depression, there is a 60% increased risk of developing type 2 diabetes (Mezuk et al., 2008). Regardless of which comes first (mental illness, food insecurity, or physical diseases), the co-existence of these problems have a profoundly disproportionate effect on healthcare budgets.

In extreme cases, food insecurity means going hungry because you can't afford enough food; however, food insecurity also includes the inability to afford balanced meals, being worried that food will run out before having the money to buy more, having to skip meals, having to compromise on nutrition, and relying on food pantries and soup kitchens. In the opposite, food security means having 1) a reliable and consistent base of quality food, 2) sufficient resources to produce or purchase food; 3) knowledge to choose and prepare food that results in good nutrition; and 4) a stable and sustained ability to access and utilize food (Burchi et al., 2011; Dean-Assael & Arias, 2017).

There is growing evidence demonstrating that nutritious meal interventions for people with medically involved illnesses (e.g., Medicare/Medicaid beneficiaries) improve health outcomes and patient satisfaction, and lower healthcare costs (Berkowitz et al., 2018; Ceres Community Project, 2019; Gurvey et al., 2013; Health Partner Plans, 2017). Can nutritious meals delivered with care for individuals living with mental health conditions have similarly improved outcomes?

Mental Health Connecticut and Healing Meals Community Project have combined efforts in implementing a pilot delivering nutritious meals to individuals with mental health conditions who are receiving residential support services. The intention is to use research to develop the model for large scale implementation. Our pilot study explores if this approach to promoting healthy diets for people with mental health conditions is feasible. Is it possible to recruit and retain participants in the intervention? What is the rate of adherence to the intervention (i.e., change in diet)? What is the rate of adherence to the research protocols? What are participants' progress and experience with the intervention over time? Moving forward, what are the research questions and outcomes of interest?

Description of Intervention and Pilot Study

INTERVENTION: FOOD IS MEDICINE

Mental Health CT (MHC) is a private, non-profit, community-based organization that provides residential support services for individuals who are living with mental health conditions. Healing Meals Community Project (Healing Meals), A Ceres Affiliate Partner, Is a non-profit agency that prepares and delivers 100% organic meals for families with a serious health concern.

Since 2016, Healing Meals has been preparing and delivering organic meals for individuals and families living with cancer, diabetes, or autoimmune disease. Meals are prepared by youth volunteers alongside an adult mentor and an executive chef, and are delivered by volunteer 'delivery angels.' Healing Meals' dual mission is to provide organic meals to people in health crisis while empowering and fostering compassion among volunteers.

Healing Meals is based on the belief that food is medicine. All meals are made from organic whole grains, legumes, fresh wild caught fish, local pasture raised poultry, fresh fruits and vegetables. Only unrefined oils, natural sugars, sea salt, and organic herbs and spices are used. Healing Meals follows the American Institute of Cancer recommendation: two-thirds of each plate consists of plant-based whole foods.

In place of Healing Meals' delivery angels, MHC residential counselors delivered the meals to study participants. Five meals were delivered one time weekly during their regular meeting time (i.e., Friday afternoons). Meals were delivered in recyclable containers carried in insulated bags, and typically included one chicken, one fish, two vegetarian, and one "heavy" soup, along with side dishes, and one quart of immune broth. Each meal had a label with ingredients. A hand-written note by one of the volunteers was also included with meal deliveries extending a friendly greeting and well wishes for enjoying the meals.

PILOT STUDY: SINGLE SUBJECT DESIGN

In order to explore if the Food Is Medicine model as described and implemented by Healing Meals is feasible for people living mental health conditions, we employed a single subject design. The single subject design has three components: repeated measurement, a baseline phase, and an intervention phase (i.e., weekly delivery of 5 nutritious meals). Specifically, survey data and other information were collected by phone every two weeks throughout both the baseline and the intervention phase. The assumption is that if the intervention is effective, it should be possible to see a change from the period prior to intervention to the period during the intervention for a given individual.

By examining individual participant's progress and experiences with the intervention over time, we simultaneously studied the feasibility of implementing and evaluating the 'Food Is Medicine' model (i.e., recruitment, retention, adherence, and evaluation measures) when employed with individuals living with mental health conditions.

The pilot study occurred over a six month period (May-October 2019). Each of three residential counselors at MHC identified clients (N=9) who were stable in that they were consistently available, showed up at scheduled appointments, and had no planned or known treatment changes. The counselors briefly described the pilot study and the logistics and philosophy of the program to clients (i.e., reviewed program materials) during a regular meeting session at their home. Residential counselors introduced the researchers to the individuals in a face-to-face meeting to review the pilot study details, obtain consent, and begin data collection.

The length of the baseline phase was staggered across three participant groups to control for any external events: The baseline was extended for Group 2 until the intervention for Group 1 was stable, and similarly, the intervention phase for Group 3 did not begin until the intervention for Group 2 became stable.

Data Collection Procedures and Measures

Different measures and methods were used to track participants' progress and experience with the intervention over time: Participants completed surveys and an interview protocol during the initial meeting, and then over the phone every two weeks for the entire six months of the pilot study (i.e., starting at baseline through the intervention phase). Calendars were provided to participants to mark the dates scheduled for calls and for meal delivery. As noted in the previous section, the intervention phase for Group 2 began six weeks after the start of Group 1 and the intervention phase for Group 3 began six weeks after the start of Group 2. All three groups ended the intervention phase together at the end of the study.

Collected Data and Measures

Demographic and Health Information: Individual level data were obtained from MHC on 1) age, gender, race, and ethnicity; 2) mental health diagnosis, any medications to address mental health condition, and receipt of therapy services; and 3) other health conditions.

Determinants of well-being: Information on any life transitions, program participation and service utilization, family support, and social connections were documented every 2 weeks (as described by participants when completing surveys and questionnaires).

Eating, Cooking and Food Shopping Habit Survey: Adapted from Healing Meals Intake Form. Every 4 weeks participants were asked about: factors considered when making decisions about what to eat; day-to-day diet; confidence in cooking; accessibility to quality food; and beliefs about healthy eating.

Nutrition/Diet Questionnaire: Every 2 weeks participant's were asked about meal routines, involvement in nutrition or food-related programs, changes in nutrition and diet, and reliance on soup kitchens or food pantries.

Experience with Intervention. During the intervention phase, participants were asked about feedback on logistics of delivery, meals, and when they consumed meals.

Feedback and Observations by Residential Counselors: Counselors completed a weekly documentation form on what they learned from participants' comments and response to the intervention (e.g., adherence to intervention; likes/dislikes about particular meals; any change in the way the participants feel or changes in their eating, cooking, or food shopping habits). The research team and residential counselors met on 3 separate occasions to review participant progress and integrate what was learned.

General Well-Being Scale (GWB, Fish, 2011): Collected every 2 weeks. Consists of 18 items measuring a person's sense of well-being. The survey gives a total score for General Well-being and three subscale scores: **a) *Psychological Distress*** (8 items) assesses nervousness/anxiety, control of/fear of losing one's mind, sadness, stress, and emotional stability; **b) *Well-being and Vitality*** (6 items) measures feelings in general, happiness, waking feeling rested, interest in daily life and energy level; and **c) *General Health*** (4 items) measures concerns about somatic symptoms and general health (Taylor et al., 2003). Total score ranges from 0-110; a shift in cut-off range has practical, clinical significance (i.e., is a meaningful change).

Cut-Off	General Well-being
81-110	Positive Well-being
76-80	Low Positive
71-75	Marginal Distress
56-70	Stress Problem
41-55	Distress
26-40	Serious Distress
0-25	Severe Distress

For each participant, at every data collection time point, the GWB total and subscale scores were plotted in graphs across baseline and intervention phases (see p. 9-14). The total score on the GWB was also summarized into a single observation for each of the phases using the average score for that phase. We visually inspect each set of participant graphs (A, B, C, D, E, F) to see if there was observable change and interpret the scores within the context of what was learned from all other data as above outlined.

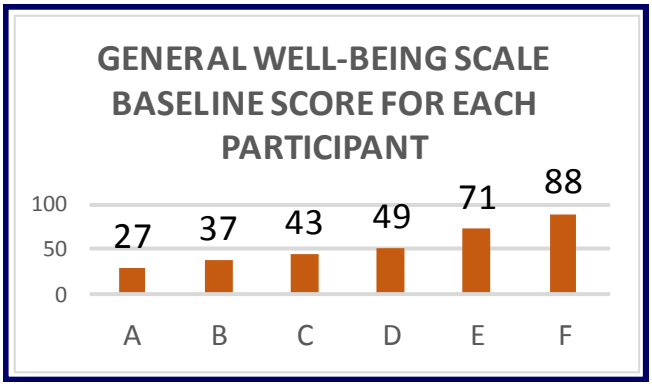
Summary of Findings

Participants

The age range of the seven female and two male participants (N=9) was 38 to 64 years. Six participants were diagnosed with major depression, and three were diagnosed with bipolar disorder. All but one participant was taking psychotropic medication under the care of a psychiatrist, and all were receiving some form of therapy. Other diagnosed and self-reported health conditions included chronic pain or joint inflammation, spinal stenosis, fibromyalgia (musculoskeletal pain), migraine headaches, diabetes, obesity, acid reflux, digestive and other unexplained stomach problems, eating problems, chronic fatigue, and quick to fatigue. Two participants received nursing services.

Determinants of Well-being

Five of the six participants retained in the study discussed feeling isolated, lonely, and alone, and/or having no family support or contact. Three of the participants spoke on their experience of depression, how it impacts their day to day capacity to "get organized" and how it relates to feeling isolated. Life stressors included ongoing concerns about having enough money (i.e., relying on food pantry for food), moving residences, death of a pet, health concerns, and family medical emergencies. Three participants spoke of experiencing a trauma-related stress response (currently or recent past). The table below shows the average total GWB score across the baseline phase for each of the participants: 2 scored in the Severe Distress range, 2 scored in the Distress range, 1 in the range of Marginal Distress, and 1 scored in the Positive Well-being range.



Recruitment and Retention

Two of the nine participants dropped out in the beginning (one before starting and another after 2 weeks of receiving and refusing the meals). Two participants experienced a mental health crisis and were hospitalized (1 dropped out and 1 resumed once back at home). Given the range and severity of the clinical issues among participants, 66% is a high retention rate. Collaboration with the residential counselors - program personnel who were familiar with and trusted by participants, and utilizing the residential counseling services already in place, was a critical component for recruitment, retention, and implementation.

Adherence to Intervention/Change in Diet

All but one participant consumed all the meals, generally one meal per day. Participants were also consistently available for phone calls (or would reschedule in advance). Four participants missed one data collection time point, and one participant missed two.

Summary of Participant's Progress and Experience:

Data collection for each participant (A, B, C, D, E, F) are analyzed and presented in case illustrations on the following pages. Below list summarizes what has been learned across cases illustrations (continues on page 14).

- There was improvement in at least one or more indicators of well-being as measured by the GWB scale for all but one participant. For some participants, it was highly plausible that the self-reported change on indicators of well-being was due to the intervention, while in other cases, other influences were at least equally plausible. It is also reasonable to expect that positive effects on well-being, if any, would become more clear (larger/stable) with more time receiving the intervention. Specifically, given 1) the clinical issues of the population, 2) the underlying constructs of the measure (i.e., psychological distress, vitality, general health), and 3) the nature of the intervention, improvement in well-being would not necessarily occur in even a three-month period. More time (e.g., to

stabilize across other life events), as well as a stricter adherence to the diet (i.e., 3 nutritious meals per day).

- All participants had a strong, positive emotional reaction to the "personalized" hand-written notes. Three participants, all of whom expressed deep feelings of isolation (i.e., a sense of not belonging) spoke on the nurturing effect the notes had on them.

"I save all the notes—they come in an envelope that has my name on it...I feel I am connected to the people who make [the meals]. It's like a family thing, it's really nice."

- Overall, the nutritious meals were a dramatic shift in diet. To varying degrees (and varying degrees of awareness), participants spoke on either current or recent history of poor diet and eating habits. Understandably, the meals required significant adjustment and change in taste, more so for some participants than others depending on their dietary experience and knowledge of nutritious food at the start of the study. Although everyone had at least three "favorites," participants spoke about the food being "too foodie," "too fancy", or even too healthy.
- In some but not all instances, the rate of a participant's adjustment to the change in diet appeared to be related to their stage of recovery at the start of the study (e.g., their perception of leading a positive).
- Remarkably, every participant, no matter their diet at baseline or their level of adjustment to the intervention, reported an increased knowledge of what a healthy diet looks like, and an awareness of the importance of eating a healthy diet (e.g., "I am more open to new foods." "I am more mindful of what I eat."). Moreover, every participant reported some form of behavior change in diet, meal routines, or shopping and cooking habits.

As a result of participating in the study, all participants reported a change in eating habits, either eating full meals, eating three meals per day, eating meals at the table, eating meals at regular times, or simply enjoying eating more.

- However, four of the six participants made repeated comments on the expense of a healthy diet. "...I stop at the organic section, even if it's just to look at it. I just can't afford it." One participant reported a dramatic shift in diet (i.e., from processed food to only fresh, whole foods) but also continued to have to rely on the local food pantry for food.

What study participants had to say about Food Is Medicine in Mental Health:

"The food could get you healthier physically but the note could be more important than the food." By the end of the intervention, "I loved the cards...I loved the nurturing."

"It's made me mindful about what I've been eating...I am making better food choices. It makes me realize that I haven't really been eating meals…[Now] it's more like dining. I sit down and eat my food on a plate."

"I am more open to trying different meals...I tried a rutabaga the other day, bought it and cooked it. It wasn't bad!" We even bought fresh fruit...I definitely eat healthier."

"Eating these meals says to me, 'Hey, you can be eating a lot better."...But it's kind of hard...I'm only one person."

"I've made it a goal to grab at least one organic food when I go to the grocery store, if the budget allows."

"I actually eat like a human being [now]. Eating that food made me think about cooking, about food like an everyday thing, not like, 'I have to do this.'"

PARTICIPANT A

Was there an observable change in well-being and/or in diet-related views and behavior?

A. Experience at Baseline and Intervention Phase

Determinants of well-being: Participant A has a life-long history of dealing with chronic physical and mental health conditions, sometimes to point of being incapacitated. Often reported being in a low mood. Expressed concern and stress about lack of money. Is connected to only one family member who was in ill health. Depends on others for transportation (e.g., for groceries); "I don't really go anywhere", "nothing much to do." In the past, has relied on local soup kitchen and food pantry for food.

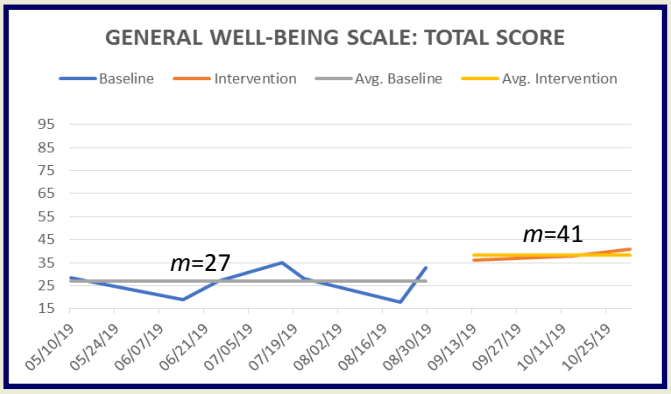
Eating, cooking, food shopping habits during baseline phase: Discussed a long history of eating problems, "struggling with weight" and significant weight changes; reported eating very little for days on end with periodic over-eating. Diet included TV dinners and 'life' drinks (e.g., Propel or Arizona teas). Highly irregular eating patterns, ate late night and/or snacked in bed. Regularly discussed the benefits of organic food, but less than 25% of food purchases were organic, "not by choice" but because too expensive. Elaborates on this: when in grocery store will ask self, "What am I *not* going to buy?"

Adherence to Food Is Medicine intervention: Participant A consumed all the meals, one meal per day; tried the immune broth but did not like or drink it further.

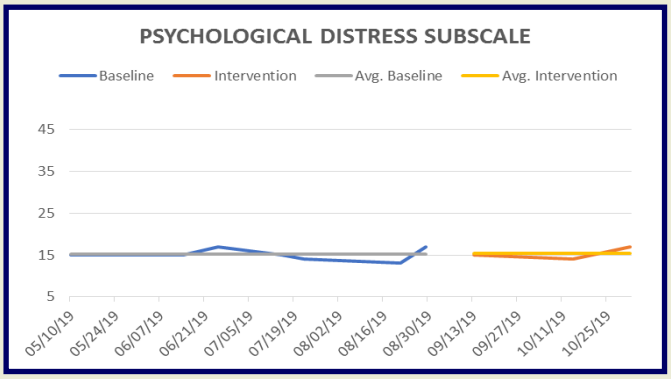
Change in self-reported well-being from pre to post intervention: As shown in Graph 1, Participant A's average total score on the General Well-being scale from pre to post intervention increased from Severe Distress (*m*=27) to Distress (*m*=41). This was a clinically significant improvement. Interestingly, inspection of Graphs 2, 3, and 4, show that while Participant A scored similarly on Psychological Distress (Graph 2) from pre to post, the clinically significant improvement occurred in Well-being and Vitality (Graph 3) and General Health (Graph 4).

Feedback and behavioral change during intervention phase: Within just a week of receiving healthy meals, Participant A reported that "it made me look forward to eating." Also reported, "I have been trying to eat earlier: breakfast at 11:00, lunch at 4:00, dinner at 9:00. This is a big difference from eating dinner at midnight. My goal is to try and not eat dinner past 7:30." "I love my note this week. I want to meet the person writing these notes. Can I send a card back?...The food could get you healthier physically but the note could be more important than the food." By the end of the intervention, "I loved the cards...I loved the nurturing." Reported getting tired of some of the food items (lentils, root vegetables) but overall, "I actually eat like a human being [now]. Eating that food made me think about cooking, about food like an everyday thing, not like, 'I have to do this.'"

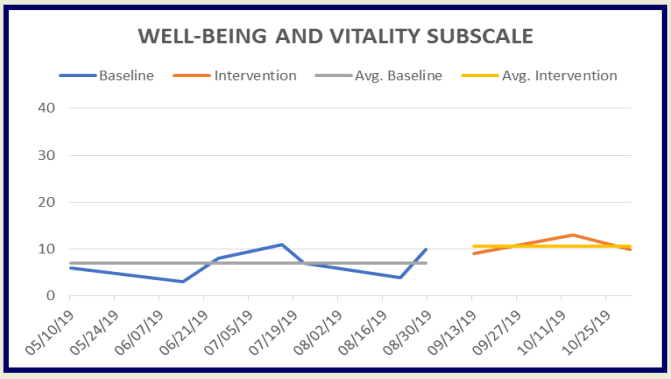
PARTICIPANT A: GRAPH 1



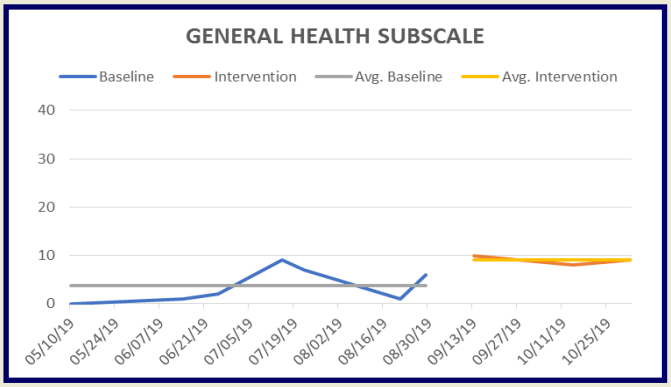
PARTICIPANT A: GRAPH 2



PARTICIPANT A: GRAPH 3



PARTICIPANT A: GRAPH 4



PARTICIPANT B

Was there an observable change in well-being and/or in diet-related views and behavior?

B. Experience at Baseline and Intervention Phase

Determinants of well-being. Long history of depression; chronic fears about dying, and getting hurt (e.g., in a car accident). Is part-time employed with independent transportation. Sometimes relies on local soup kitchen and food pantry for food. Spends time with family on weekends at their home; spoke often on feeling 'lonely at night, it's hard—I struggle. During the day I keep busy."

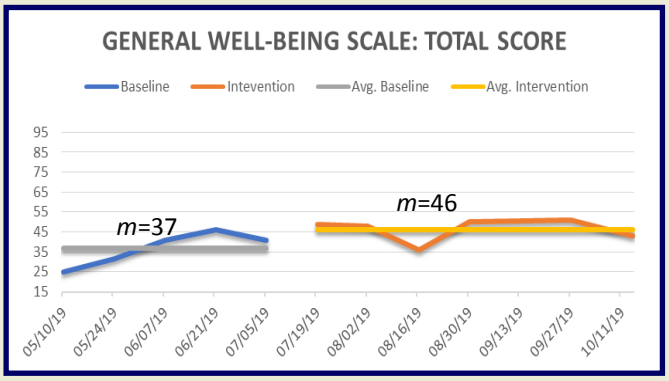
Eating, cooking, food shopping habits during baseline phase. Has had significant weight gain in the past and worked with physician and a dietician (as part of a nutrition program) to 'try and figure it out." With change in medication, diet, and exercise, Participant B reported losing weight over past year. "But I can still eat better...I see all this food and I go for it and regret it later." Does not feel confident cooking food. "I can't get organized to shop healthy...It's hard for me. My depression gets in the way. I don't buy fresh vegetables because they go bad. I don't know how to cook them...I don't like to cook for one person...Sometimes [family member] will give me leftover food. Sometimes I don't have enough time to eat. ..If I skip a meal maybe I'll lose weight."

Adherence to Food Is Medicine intervention. Participant B consumed all or portions of one or two meals each day. Liked immune broth warm, for colder months (not summer), and did not consume much of it.

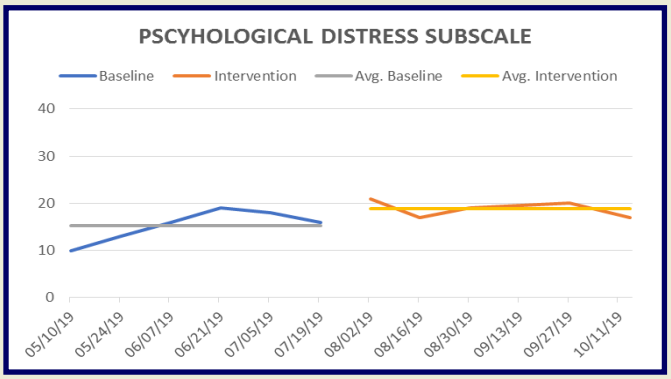
Change in self-reported well-being from pre to post intervention. As shown in Graph 1, Participant B's average total score on the General Well-being scale from pre to post intervention increased from Severe Distress (*m*=37) to Distress (*m*=46). This was a clinically significant improvement. Visual inspection of graphs on subscale scores show that while Participant B's experience of Psychological Distress (Graph 2) and Well-being and Vitality (Graph 3) improved, ratings on General Health (Graph 4) did not. Participant B continued to have concerns about somatic symptoms and general health from pre to post.

Feedback and any behavioral change during intervention phase. At start of intervention: "There are all different kinds of food, lots of vegetarian meals which is interesting because I've never eaten vegetarian before. I finish meals every week., I don't want to waste it. It's a big change in diet." By end of intervention: "Food is really good...Eating these meals says to me, 'hey, you can be eating a lot better. You can be eating a lot more vegetables'...but it's kind of hard because I'm only one person." Reported preference for the fish, the chicken and the vegetable soup but some meals are "hard to get into because they are extra, extra, extra, healthy...The notes are cute, shows that someone cares, it's nice to get them."

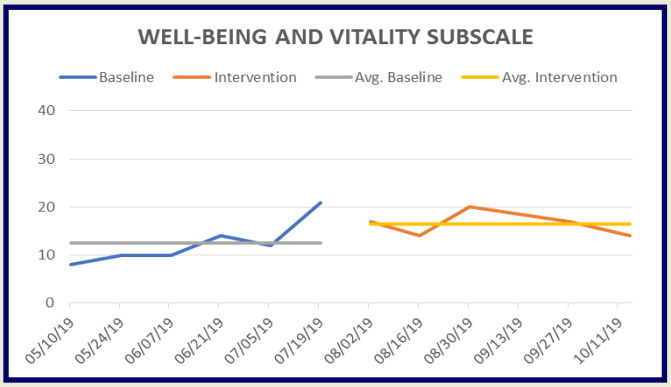
PARTICIPANT B: GRAPH 1



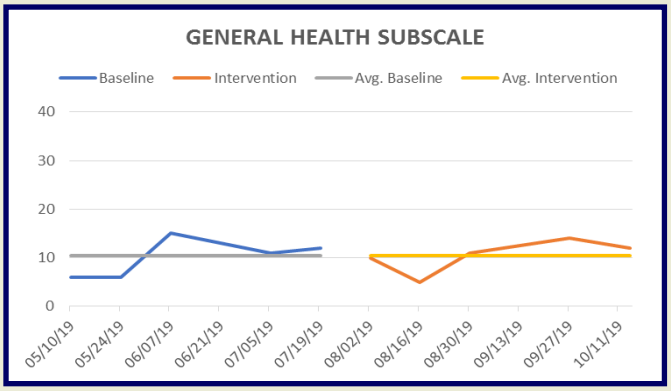
PARTICIPANT B: GRAPH 2



PARTICIPANT B: GRAPH 3



PARTICIPANT B: GRAPH 4



PARTICIPANT C

Was there an observable change in well-being and/or in diet-related views and behavior?

C. Experience at Baseline and Intervention Phase

Determinants of well-being. Participant C has a family history of depression and as an adult has lived with severe ("paralyzing") depression for prolonged periods of time. Also experiences back pain and digestive problems. Just after starting Food Is Medicine Intervention, Participant C experienced a major life stressor that led to "going through the last thirty years of my forgotten life, including a chunk of time that I don't even remember."

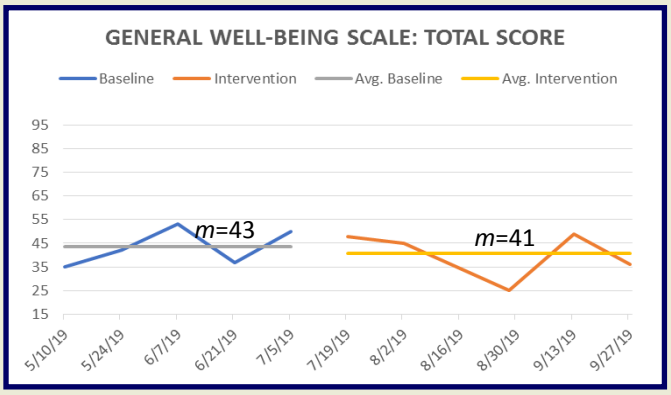
Eating, cooking, food shopping habits during baseline phase. Participant C reported that "I eat out most of the time," and is not confident cooking. Had attended a nutrition group the prior year but "did not feel it was good use of my time"; tried a few times to develop a consistently healthy diet...it's just not something that I have been practicing... nothing structured." Often ate "on the run," or "standing up and eating out of the package."

Adherence to Food Is Medicine intervention. Participant C consumed majority of the meals, one per day, but would remove items that "stomach did not react well to" (i.e., salmon, peppers, onions)." During last two weeks of intervention phase, Participant C also consumed food items such as soda, candy, and pizza. Participant related this to life stressor that created instability.

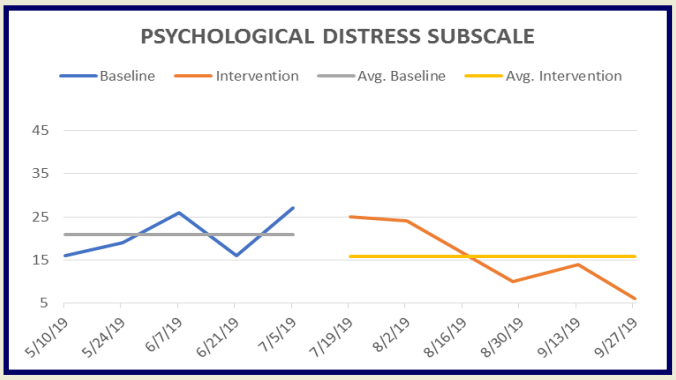
Change in self-reported well-being from pre to post intervention. As shown in Graph 1, average total score on the General Well-being scale remained in the Distress range from baseline (*m*=43) to intervention phase (*m*=41). Visual inspection of subscale scores show that while Participant C's experience of Psychological Distress (Graph 2) and General Health, (Graph 4) had a marked decrease, there was improvement in Well-being and Vitality (Graph 3). Participant C's pre to post scores are difficult to interpret outside the context of the major life stressor/change that occurred for this participant (and not just the intervention), during which time the participant had an improved sense of purpose and connection with family while still having "a lot of grief coming up."

Feedback and any behavioral change during intervention phase. "It's made me mindful about what I've been eating. I have food at home, things that I bought rather than having nothing I really want to eat." Instead of purchasing a burger while out at an event, brought a homemade lunch. "I am making better food choices." It makes me realize that I haven't really been eating meals…[Now] it's more like dining. I sit down and eat my food in a plate." And "sharing a meal [with family] is kind of novel." "Some meals are a little too 'foodie,' heavy on strong spices...I don't like the salmon." "The notes are thoughtful, very kind, makes you think people care."

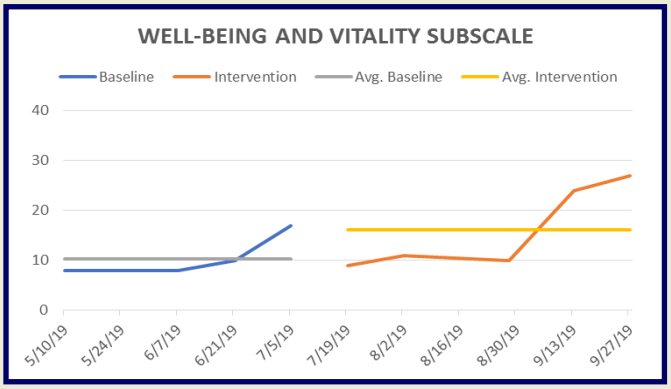
PARTICIPANT C: GRAPH 1



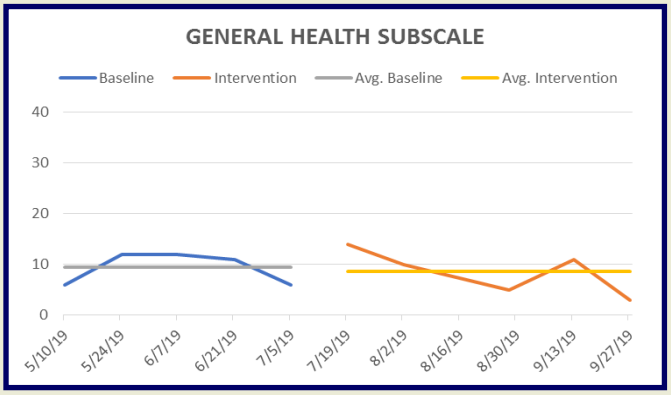
PARTICIPANT C: GRAPH 2



PARTICIPANT C: GRAPH 3



PARTICIPANT C: GRAPH 4



PARTICIPANT D

Was there an observable change in well-being and/or in diet-related views and behavior?

D. Experience at Baseline and Intervention Phase

Determinants of well-being. Participant D experiences recurring severe depression, and also lives with chronic, debilitating pain due to lifelong physical condition exacerbated with age (e.g., generally only leaves home for short trips/errands). Did not discuss family connections, but has long term friendship that is mutually supportive.

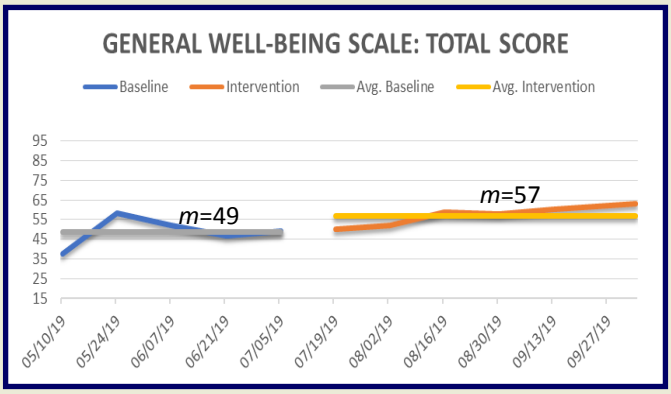
Eating, cooking, food shopping habits during baseline phase. Participant D is not very confident cooking food but receives support for this from a friend. On survey, Participant D reported 'not sure' that eating healthy foods was important. Sometimes just eats one meal per day, breakfast midmorning. "I'm not hungry."

Adherence to Food Is Medicine intervention. Participant D consumed many but not all of the meals, usually "sometime between lunchtime and four o'clock." Meals that Participant D did not like were thrown away or given to neighbor's dog. Also inquired about calories in meals.

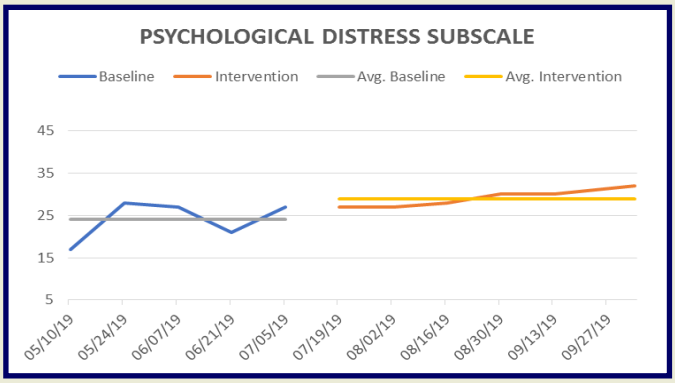
Change in self-reported well-being from pre to post intervention. As shown in Graph 1, Participant D's average total score on the General Well-being scale increased from Distress (*m*=49) at baseline to Stress Problem (*m*=57) during intervention phase. This was a clinically significant improvement. Visual inspection of graphs indicate that Participant D experienced an improvement in all three areas, Psychological Distress (Graph 2), Well-being and Vitality (Graph 3), and General Health, (Graph 4). Although total GWB and subscale scores indicate a significant positive change, it is our interpretation that it was unlikely due to (or not strictly due to) Food Is Medicine intervention per Participant's mixed feedback/ adherence to the intervention. Rather, Participant D reported other significant life events/changes, initiated shortly after start of intervention, that were likely the main source of positive shift on well-being.

Feedback and any behavioral change during intervention phase. Participant D reported trying all the meals. "Some food is really good, some food sounds good but 'yuck.'" "Chicken was very tasty," "rice salad is very good" "beet and carrot burgers are delicious, my favorite!" But also commented "sometimes the food is too fancy," would scrape off "what was on it." Asked several times, "Why don't' they make more comfort food?" Reported "Notes are awesome!", "I was surprised by the hand-written notes. Makes it more personal." When the intervention came to an end, stated "I'm glad it's over but I would give it an overall positive rating...I am more open to trying different meals...I tried a rutabaga the other day, bought it and cooked it. It wasn't bad! We even bought fresh fruit...I definitely eat healthier."

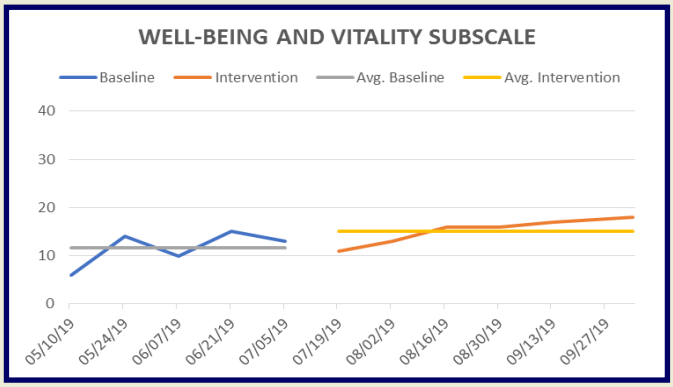
PARTICIPANT D: GRAPH 1



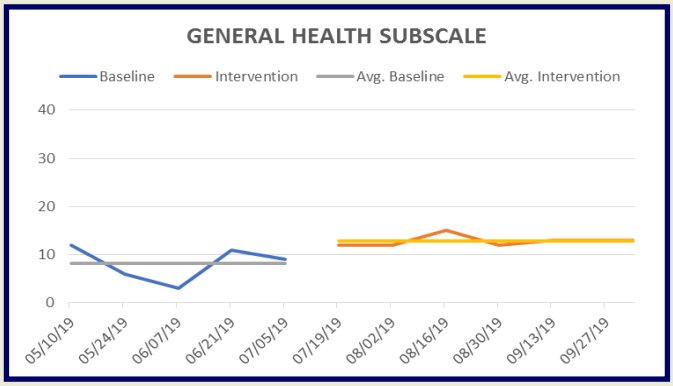
PARTICIPANT D: GRAPH 2



PARTICIPANT D: GRAPH 3



PARTICIPANT D: GRAPH 4



PARTICIPANT E

Was there an observable change in well-being and/or in diet-related views and behavior?

E. Experience at Baseline and Intervention Phase

Determinants of well-being. A number of years ago Participant E experienced a traumatic event "and after that nothing has been the same." This led to a history of chronic mental health conditions. Participant E is also living with a serious physical condition. Although connected with family, Participant E has limited support from family, most of whom live outside the area.

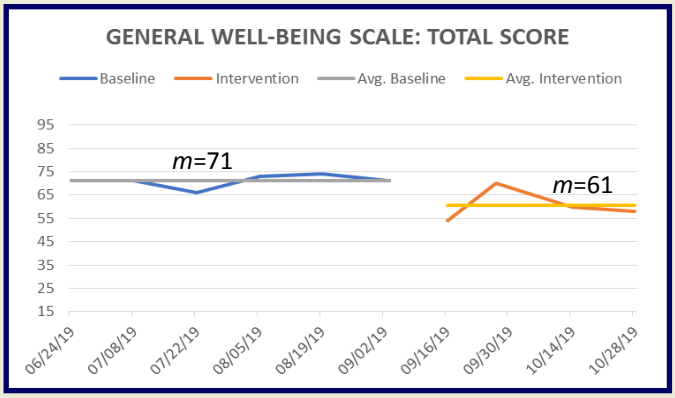
Eating, cooking, food shopping habits during baseline phase. Has a very restricted diet due to chronic health conditions. Attended a nutrition group for a short period of time; however, had to stop attending due to transportation issues. Participant feels confident about her cooking ability and tries to stay away from "greasy and salty foods, and sodas." Stated, "I would love to consume more organic foods, but I can't afford it."

Adherence to Food Is Medicine intervention. Participant E consumed most of meals, one meal per day. Participant E particularly "liked the vegetables and chicken," but not the soup. "I am not a soup person."

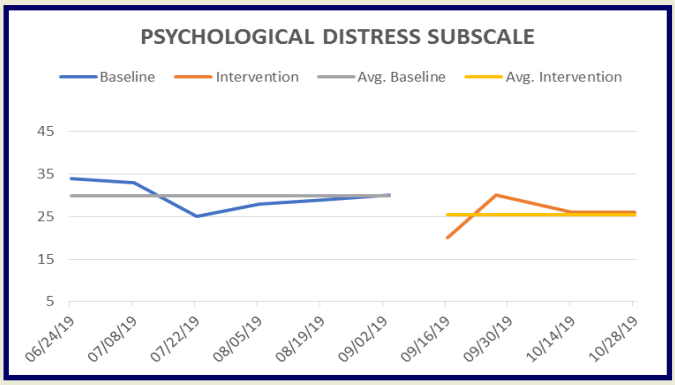
Change in self-reported well-being from pre to post intervention. As shown in Graph 1, Participant E's average total score on the General Well-being scale decreased from Marginal Distress (m=71) at baseline to a Stress Problem (m=61) during the intervention phase. This was a clinically significant decrease in self-reported wellbeing. Visual inspection of graphs shows that there was a decrease across all three subscales, Psychological Distress (Graph 2), Well-being and Vitality (Graph 3), and General Health. As the study progressed, this participant became more comfortable with the researcher as evident by more elaborated and detailed responses. We conclude that self-reported information from later interviews/ surveys were more consistent with this participant's true subjective well-being.

Feedback and any behavioral change during intervention phase. "It's a lot of food but I tried not to waste it. I hate wasting food." Following the second food delivery, "I felt so inspired that I decided to go to the grocery store to buy an organic broth. I wish I could buy more organic food, but I can not afford it." "I always wanted to buy more organic foods because I know organic is good for you but participating in this study made me more aware. Now, when I go to the grocery store, I stop by the organic section, even if it's just to look at it. I just can't afford it." Participant has made it "a goal to grab at least one organic food when I go to the grocery store, if the budget allows." Found the note cards "very beautiful," and specifically commented on how they were personalized "I like that detail."

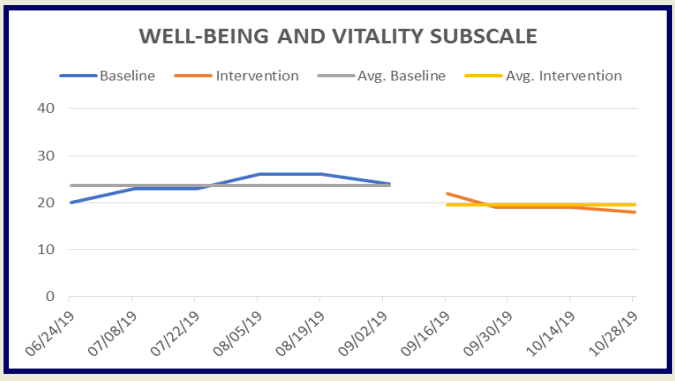
PARTICIPANT E: GRAPH 1



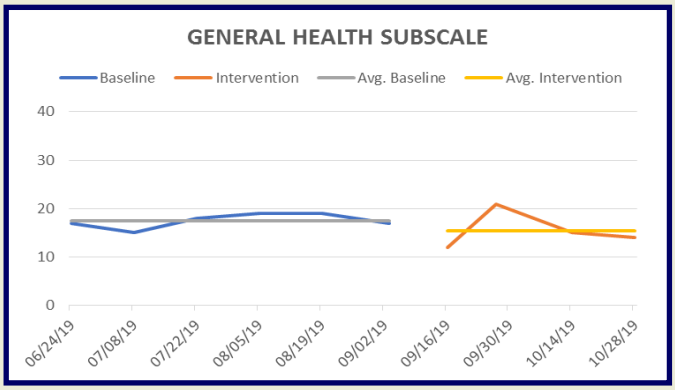
PARTICIPANT E: GRAPH 2



PARTICIPANT E: GRAPH 3



PARTICIPANT E: GRAPH 4



PARTICIPANT F

Was there an observable change in well-being and/or in diet-related views and behavior?

F. Experience at Baseline and Intervention Phase

Determinants of well-being. Participant F has experienced recurring depression and other mental health challenges, along with related hardships and overall poor quality of life. Participant F has relied on food pantry and soup kitchens for food for many years. For past several years, Participant F has been "actively trying to reduce my anxiety and take control of my life… surrounding myself with good people…I've been through some serious hard time times but my life is awesome right now." Participant F is not in contact with family but participates in a range of wellness services and programs, specifically a nutrition program that includes guidance from a registered nurse. "It came to my awareness that I can change things just by changing my eating habits."

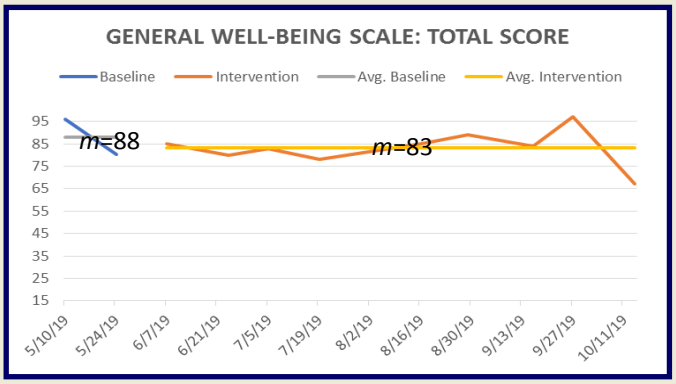
Eating, cooking, food shopping habits during baseline phase. Participant F started the nutrition program just prior to start-up of pilot study, and discussed significant changes in diet: no white bread, white rice, or potatoes, no soda or 'life' drinks, only whole grains, fresh fruits and vegetables, chicken, fish (no red meat), water as main beverage. "I feel great!" "I'm losing weight."

Adherence to Food Is Medicine intervention. Consumed all meals, generally one meal per day at dinner. Also continued to periodically rely on food bank/pantry.

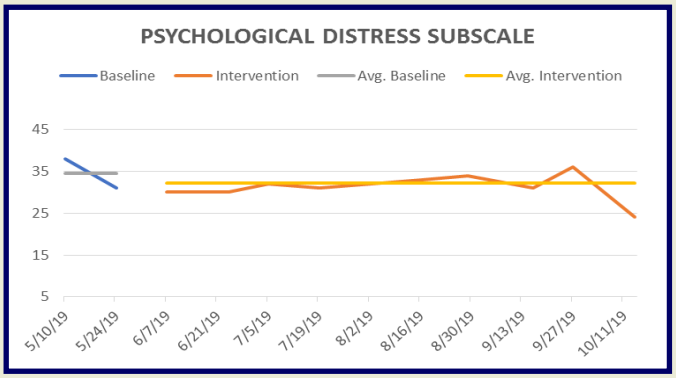
Change in self-reported well-being from pre to post intervention. As shown in Graph 1, Participant F's average total score on the General Well-being scale remained in the Positive Well-being range from baseline (*m*=88) to intervention (*m*=83). While there was a slight decline in Participant C's experience of Psychological Distress (Graph 2), there was an increase in General Health, (Graph 4) from pre to post. Experience of Well-being and Vitality (Graph 3) remained the same. Visual inspection of graphs show that there was a significant decline in scores at last data collection during which Participant F participated in event that triggered a trauma response.

Feedback and any behavioral change during intervention phase. At start of intervention: "I've adjusted to the meals. Sometimes I add a little to them, dress them up, add spice, but absolutely love them." By end of intervention continued with improved eating habits (and with nutrition program). "...my whole way of thinking about nutrition has been turned around." "I'm buying better food but it's more expensive...But I did it and I made it." Continues to rely on food pantry as well. Also: "I save all the notes—they come in an envelope that has my name on it. It definitely makes it a more personal experience. I feel I am connected to the people who make [the meals]. It's like a family thing, it's really nice."

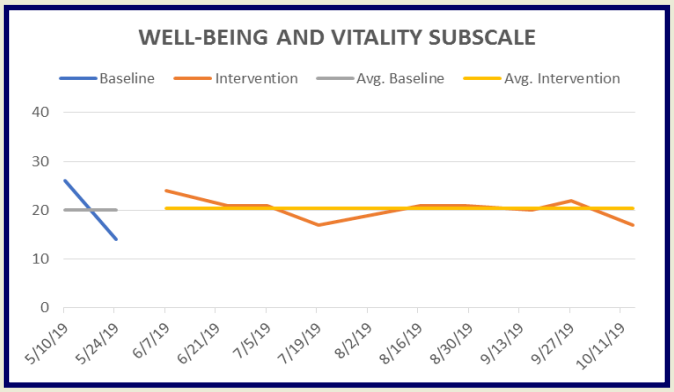
PARTICIPANT F: GRAPH 1



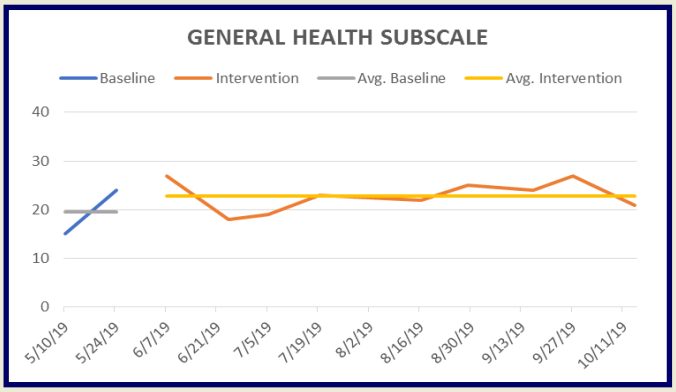
PARTICIPANT F: GRAPH 2



PARTICIPANT F: GRAPH 3



PARTICIPANT F: GRAPH 4



CONCLUSION AND NEXT STEPS

CONCLUSIONS

- Delivery of nutritious meals serves a critical need for this population. Participants were not only living with serious mental health conditions, there were also indicators of poor diet and/or food insecurity for all participants (a significant risk factor in the management of mental health conditions). Participants were also living with any combination of chronic physical conditions, stressful life transitions, trauma histories, and social isolation.
- Using the Food is Medicine model to promote and support lifestyle change in diet for individuals living with mental health conditions is a highly workable intervention approach. Even within the short span of the pilot project and only with the minimum intervention (e.g., delivery of one meal per day as opposed to all three meals), we saw positive change in diet-related attitudes and behavior.

Study Participant: "It came to my awareness that I can change things just by changing my eating habits."

- Positive response to the intervention by some of the participants can be related to concerns for health and well-being; for others, the stronger influence appeared to be the social connections that were created through the intervention. Although each component can have a differential effect, altogether they facilitated engagement and change.
- Adjustment and change happened at different rates. While prior knowledge of nutritious food appeared to make a difference, in at least one instance, a participant's quick adjustment to the nutritious meals was related to their stage of recovery at the start of the study (i.e., perception of leading a positive life, as illustrated in above quote).

NEXT STEPS

- Develop and leverage cross-sector (or cross-agency) collaboration and support by focusing on nutrition and the promotion of food security and healthy diet among people living with mental health conditions *as a common agenda*. Include people living with mental health conditions in the collaboration and planning.
- Take into consideration that even the stakeholders who provide services (and not just those receiving services) will have different levels of understanding of nutritious meals and the importance of nutrition for people living with mental health conditions. The front line staff (e.g., residential counselors), in particular, will have significant influence on participant response to any intervention.
- For sustainability, include psychoeducational components (relation between nutrition and mental health), practical component (shopping and cooking), and social component (e.g., food prep /education, mentoring, advocacy roles).
- Focus on food security and improving conditions that lead to poor diet and hunger: a reliable and consistent base of quality food; resources to produce and purchase food; knowledge to choose and prepare food that results in good nutrition; and a stable and sustained ability to access and utilize food.
- Important intervention outcomes to aim for in the next stage of program development and research (e.g., pre-post design) are 1) change in diet related behaviors and attitudes, 2) level of food insecurity/security (as described in above bullet), 3) social isolation, 4) indicators of general well-being, 5) mental health recovery stage (e.g., perception of living a good and positive life); and then, longer term, 6) health outcomes; and 7) service utilization.

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