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Running head: Community Health Worker Asthma Intervention

A Randomized Controlled Trial of a Community Health Worker Delivered Home-Based Asthma Intervention to Improve Pediatric Asthma Outcomes

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Trial Registration: NCT01003340

ABSTRACT

Objective: The objective of this study was to evaluate the effects of using Community Health Workers (CHWs) to deliver the home-based *Wee Wheezers* asthma education program on asthma symptoms among children with persistent asthma.

Methods: In this randomized controlled trial of 151 children aged 2-9 years with persistent asthma, we assigned 75 to the intervention and 76 to the control. The primary outcome was caregiver-reported asthma symptom days. Secondary outcomes included asthma-related healthcare utilization, caregivers' asthma knowledge, illness perception and management behaviors, MDI-spacer administration technique, and home environmental triggers. Outcomes were collected at baseline, 3-, 6-, 9- and 12-months. A repeated measurements analytic approach with generalized estimating equations was used. To account for missing data, multiple imputation methods were employed.

Results: At 3- and 6-months, improvement in symptom days was not significantly different between groups. However, at 9- and 12-months, the reduction in asthma symptom days was 2.15 and 2.31 days more respectively for those in the intervention group compared to the control. Improvements in MDI-spacer technique, knowledge and attitudes were significant throughout follow-up. Improvement in habits regarding MDI use was significant at 3- and 6-months, and asthma routines were improved at 3-months. However, there was no change in asthma-related healthcare utilization or home environmental triggers.

Conclusion: Using CHWs to deliver a home-based asthma education program to caregivers of children with persistent asthma led to improvements in symptom days and several secondary outcomes. Expanding the use of CHWs to provide home-based interventions can help reduce disparities in children's health outcomes.

Keywords: Children; Community Health Workers; Home Intervention; Wee Wheezers; Education

Introduction:

Asthma is the most prevalent chronic illness affecting children in the United States.[1] With 8.4% of children affected, asthma is the most common reason cited for missed school days and the third leading cause for pediatric hospitalizations.[2] Prevalence rates are even higher among low-income minority children, putting this population at increased risk of adverse outcomes.[3-6] This is especially true for children living in the Bronx, New York, one of the poorest counties in the US with a disproportionately high percentage of minority residents.[7]

Previous studies have demonstrated the effectiveness of home-based asthma education programs in improving health outcomes for low-income children with asthma.[8, 9] While many of these studies used nurses to deliver the intervention, there is a growing body of evidence that using Community Health Workers (CHW) can improve outcomes for underserved populations.[10-13] Previous studies that used CHWs to deliver home-based asthma interventions were effective in improving outcomes for children, improving quality of life for caregivers, and reducing urgent care utilization.[14-17] Studies have also demonstrated that using CHWs to deliver home-based asthma interventions is cost-effective.[18-20] However, many of these interventions focused primarily on controlling exposure to triggers in the home, included expanded roles for the CHW such as multiple home assessments, support activities, and advocacy, or were not randomized and had a short follow-up period.[17, 21-26] Thus, the literature to date does not specifically explore the effects of using CHWs to deliver a comprehensive, validated home-based asthma education intervention that focuses on improving knowledge, illness perceptions and management behaviors among caregivers of children with persistent asthma over a 12-month follow-up period.

This study uses CHWs to deliver the home-based *Wee Wheezers* asthma education program to families of children with persistent asthma. This evidence-based program was tailored to the needs of low-income families living in the Bronx. The purpose of the study was to evaluate the effect of the CHW-delivered intervention on asthma symptoms and several secondary outcomes. Our hypothesis was that participation in this education intervention, which addresses caregivers' knowledge about asthma as well as their attitudes and beliefs about the condition, management behaviors, techniques and routines, and home environmental triggers, would reduce the number of days with asthma symptoms and urgent asthma-related healthcare utilization (**Figure 1**).

Materials and Methods:

Study Design:

This study was a randomized controlled trial (RCT) of children with persistent asthma and their caregivers between July 2009 and December 2013 (clinicaltrials.gov identifier NCT01003340).[27] The study was approved by the Institutional Review Board.

Participants:

Recruitment occurred at two pediatric outpatient healthcare centers (n=139) with similar patient demographics, and a children's hospital emergency department (ED) (n=28). Additional participants responded to flyers (n=14). To be included in the study, participants had to live in the Bronx, be between 2-9 years old with a diagnosis of persistent asthma based on national guidelines,[28] and have a prescription for an inhaled corticosteroid as a Metered-Dose Inhaler (MDI). Participants who were 2 years old at recruitment must have had at least two prior episodes of wheezing that were reversible with beta-agonists. Otherwise, participants needed to have at least one asthma exacerbation in the past year requiring an acute or same-day clinic visit, ED visit, or hospitalization. Primary caregivers also needed to speak English or Spanish and have a phone. Children with chronic pulmonary diseases such as cystic fibrosis, bronchopulmonary dysplasia or a tracheostomy were excluded.

Study Procedures:

Children and their caregivers who met eligibility criteria, signed consent forms (and assent forms for children > 7 years old), and completed the baseline assessment underwent single-assignment, open-label randomization into the intervention or control group. All participants were asked to complete follow-up surveys at 3-, 6-, 9- and 12-months and a follow-up, in-home demonstration of MDI-

spacer administration at 3-, 6- and 12-months. Caregivers received \$5 after completion of the baseline assessment, \$5 after completion of the 3-month survey, \$10 after completion of the 6-month survey and \$15 after completion of the 12-month survey. Children received a small toy or book at each visit as well as a hypoallergenic pillow or mattress cover. In addition to usual care, participants in the control received one visit from a CHW after completion of the study.

Survey Instruments:

The baseline survey included the following sections: (1) Demographics; (2) Caregiver's previous asthma education; (3) Child's asthma history and previous healthcare utilization; (4) Child's asthma symptoms over the past 14 days; (5) Observed assessment of the caregiver's MDI-spacer administration technique; (6) Habits regarding MDI use and adherence; (7) Caregiver's knowledge of pediatric asthma symptoms, triggers and interventions; (8) Caregiver's asthma illness representation (including beliefs, attitudes and emotions related to asthma); (9) Asthma care routines; and (10) Home environmental triggers. Sections 4-10 were repeated at 3-, 6-, and 12-months along with an update on healthcare utilization. Asthma symptoms in the past 14 days and healthcare utilization were also assessed at 9-months.

Intervention:

Intervention group participants received six bi-weekly one-hour sessions in their home with a CHW who shared their racial and ethnic background. Content for the sessions was adapted from the evidence-based *Wee Wheezers* and *Wee Wheezers at Home* curricula to maximize relevance to low-income minority families in the Bronx. During these sessions, which were geared towards the caregiver and the child, CHWs followed a script with developmentally appropriate materials covering the following topics: (1) Overview of asthma including signs and symptoms; (2) Asthma medications, including management practices, MDI-spacer administration and addressing barriers to adherence; (3) Symptom prevention, including home environmental assessments and information on eliminating triggers; (4) Review of asthma action plans; and (5) Techniques for communicating asthma-related needs to teachers, family members and physicians. Families were also asked to complete assignments between sessions. Materials were written at a 5th grade reading level and were available in English and Spanish.

CHWs participated in a 6-week training course prior to conducting home visits. Training consisted of didactics on asthma, details about the curriculum, and role-playing. CHWs also attended sessions with the Principal Investigator (PI) to discuss cases and challenges, and the PI conducted random field observations to assess the quality of CHW-lead sessions.

Outcomes:

The primary outcome was mean number of asthma symptom days in the past 14 days. Asthma symptom days was defined as the maximum of the following outcomes: number of days when the child experienced daytime symptoms such as wheezing, chest tightness or cough; number of days the child had to slow down or stop activities because of asthma; and number of nights the child woke up due to asthma.[29, 30] Secondary outcomes included asthma-related healthcare utilization, defined as the number of asthma-related hospitalizations, ED visits, or urgent clinic visits; caregivers' asthma knowledge, illness representation, management behaviors and MDI-spacer administration technique, medication adherence, and home environmental triggers.

Measuring Outcomes:

Asthma symptom days and healthcare utilization were self-reported by caregivers. To assess MDI-spacer administration technique, CHWs observed caregivers demonstrate the technique using a toy

and sample MDI-spacer during home visits. Caregivers were given one point for each correctly performed step, out of 10. To guarantee scoring reliability, CHWs completed 5 practice checklists and received 100% agreement on scores with the PI. In addition, a random sampling of demonstrations were video-taped and independently scored by the PI.[31] While a subset of children may have been able to self-administer the MDI-spacer, this aspect of the study focused on caregivers' technique. To assess habits around MDI use and adherence, we used an adapted version of Horne's questionnaire.[32, 33] Caregivers were asked to rate how often their behavior regarding MDI use is consistent with each of 10 statements. Responses were reported on a 5-point Likert scale ranging from never to always (0 to 4), with 4 corresponding to recommended behavior. Overall scores were calculated as the average of those responses. The Asthma Knowledge Questionnaire included 25 true/false questions assessing caregivers' knowledge about pediatric asthma symptoms, triggers and interventions.[34]

Caregivers' illness representation was assessed using sections of the Asthma Illness Representation (AIRS) tool.[35, 36] Sub-scales included in the survey were: (1) beliefs about the nature of asthma symptoms; (2) attitudes towards anti-inflammatory medications; and (3) emotional aspects of medication use. Each section included statements to which caregivers responded on a 5-point Likert scale ranging from strongly agree to strongly disagree (1 to 5). Scores were adjusted so that higher scores represented more agreement with ideal perceptions.

Caregivers also completed the Asthma Routines Questionnaire, an 8-item survey designed to detect effective asthma management routines.[37, 38] Scores for individual responses ranged from 1 to 4 with higher scores reflecting more routinization. In addition to an overall score, calculated as the average of individual responses, there was a medication sub-score and a burden sub-score (higher scores represent feeling more burdened). Finally, caregivers completed a home environment questionnaire which focused on 8 common asthma triggers: smoking, cockroaches, mold/mildew, pets, stuffed animals, carpeting, mice and rats.

Statistical Methods:

Descriptive statistics were generated for all variables, and all analyses followed the intention-to-treat principle. To compare outcomes between the intervention and control group, we used a repeated measurements analytic approach with generalized estimating equations that accounted for within-subject correlation. The model used to assess the primary outcome as well as each secondary outcome was of the form $g(\mu) = \alpha_0 + \delta I + \sum \gamma_i T_i + \sum \beta_i T_i I$, where g is the link function determined by the type of outcome (i.e: identity for continuous variables such as scores for knowledge, adherence, illness representation, and routines; log for count variables such as symptom days, MDI-spacer administration score and home environmental triggers; and logit for dichotomous variables such as urgent clinic visits, ED visits or overnight hospital stays), I is the group indicator (intervention vs. control), and T_i is the indicator for time with $i=1, 2, 3, 4$ corresponding to the 3-, 6-, 9-, and 12-month evaluations (vs. baseline). An overdispersion parameter accounted for heterogeneity between subjects when analyzing count variables. The coefficient β_i corresponding to the group-by-time interaction was the key parameter of interest as it represented the effect of the intervention at each follow-up point. For ease of interpreting count variables, we calculated the model-estimated mean differences between follow-up and baseline, $[FU(x) - BL(x)]$ for each group to estimate a mean change score. The difference in these quantities between the intervention and control represents the magnitude of the intervention effect. To account for missing data, multiple imputation methods with 11 imputations were employed.[39] Rubin's formula was used to estimate standard errors. We report β (coefficient of the interaction terms) as well as corresponding p-values and 95% confidence intervals (CIs). P-values ≤ 0.05 were considered statistically significant. Analyses were conducted using STATA16 (StataCorp LLC, College Station, TX) and SAS©9.4 (SAS Institute Inc, Cary, NC).

Power calculation:

A sample size of 75-76 per group was determined to be sufficient to detect a standardized difference of 0.457 asthma symptom days with 80% power for a two-sided test at the $\alpha=0.05$ level.

Results:

Of the 431 children assessed for eligibility, 151 underwent randomization with 75 allocated to the intervention and 76 allocated to the control (**Figure 2**). Of those enrolled in the intervention, 57 (76%) completed at least 5 of the 6 lessons; 9 (12%) completed 1-4 lessons, and 9 (12%) did not complete any.

The average age of children in the study was 5.7 years; 64% were male and 36% were Black or African American. Most (90%) had either poorly or very poorly controlled asthma and 63% had been hospitalized for asthma. More than a quarter of primary caregivers (27%) had less than a high school education. **Table 1** shows baseline population characteristics by group. A higher percentage of participants in the intervention were Spanish/Hispanic/Latinx compared to the control (83% vs. 68%).

Previous Asthma Education:

Most caregivers (83%) did not have formal asthma education in the past year. While 93% reported that a doctor or nurse explained to them how to use an MDI-spacer, 42% reported that a doctor or nurse had never watched them administer an MDI-spacer to provide feedback.

Asthma Symptom Days:

At baseline, participants in the control group (n=75) had a mean of 5.0 symptom days in the past 2 weeks while those in the intervention (n=76) had a mean of 6.7. At 3-month follow-up, mean symptom days in both groups decreased to 3.3. While there was a larger decrease in symptom days in the intervention group, there was no significant difference in mean change over time for asthma symptom days in the intervention compared to the control at 3- or 6-month follow-up ($p=0.204$ and $p=0.626$). However, at 9-months, the reduction in symptom days was 2.15 days more for those in the intervention ($\beta=-0.43$; 95% CI: -0.86 to -0.01; $p=0.044$); and at 12-months, the reduction was 2.32 days more for those in the intervention compared to the control ($\beta=-0.47$; 95% CI: -0.92 to -0.03; $p=0.038$). At 12-month follow-up, mean symptom days in the control group was 3.9 compared to 3.3 in the intervention group. (**Figure 3**).

Healthcare Utilization:

At baseline, all caregivers (n=151) reported that their child had at least one encounter (at a hospital, ED or clinic) for urgent treatment of asthma in the past 12 months; 81% reported that their child visited a doctor's office or clinic for urgent asthma treatment in the past 12 months; 79% reported that their child visited the ED for urgent asthma treatment in the past 12 months; and 37% reported that their child had an overnight hospital stay for asthma treatment in the past 12 months. However, there was no significant difference in change over time in the odds of having an urgent clinic visit, ED visit or overnight hospital stay due to asthma between groups during the 12-month follow-up.

MDI-Spacer Administration:

Average number of correctly performed steps (out of 10) among those who completed the baseline assessment (n=147) was 6.51. At 3-month follow-up, participants in the intervention group improved

by 2.14 steps more than those in the control ($\beta=0.30$; 95% CI: 0.21 to 0.38; $p<0.001$) with those in the intervention correctly performing 8.29 steps vs. 6.67 in the control. At 6- and 12-months the magnitude of the change was lower but the difference between groups remained significant. At 6-months, those in the intervention group improved by an additional 1.76 steps compared to the control ($\beta=0.26$, 95% CI: 0.15 to 0.36; $p<0.001$) and at 12-months those in the intervention group improved an additional 1.59 steps compared to the control ($\beta=0.23$; 95% CI: 0.13 to 0.33; $p<0.001$) so that at 12-months those in the intervention correctly performed 7.86 steps vs. 6.79 in the control (**Figure 4**).

Habits Regarding MDI Use and Adherence:

Average score on the medication adherence scale (ranging from 0 to 4) was 2.92 ($n=151$). At 3-month follow-up, those in the intervention group improved by 0.32 points more on average than those in the control ($\beta=0.32$; 95% CI: 0.08 to 0.56; $p=0.009$); and at 6-months, those in the intervention group improved by 0.30 points more than those in the control ($\beta=0.31$; 95% CI: 0.01 to 0.60; $p=0.045$). However, at 12-months, improvement for those in the intervention group was no longer significantly different from the control (**Figure 5**).

Asthma Knowledge:

Average score on the knowledge questionnaire at baseline was 18.25 ($n=151$) out of 25. At 3-month follow-up, participants in the intervention group improved by 1.81 points more than those in the control ($\beta=1.81$; 95% CI: 0.85 to 2.77; $p<0.001$). The improvement remained significantly greater in the intervention group at 6- and 12-months. Those in the intervention improved by 2.06 points more ($\beta=2.06$; 95% CI: 1.14 to 2.99; $p<0.001$) and 1.53 points more ($\beta=1.53$; 95% CI: 0.62 to 2.45; $p=0.001$) at 6- and 12-months, respectively (**Figure 6**).

Asthma Illness Representation:

At baseline, the average AIRS symptom sub-score (on a scale from 1 to 5 with 5 representing ideal perceptions) was 2.93 ($n=150$), the average attitudes sub-score was 2.94 ($n=149$), and the average emotions sub-score was 3.49 ($n=151$). At 3-months, improvement in the symptom sub-score was 0.29 points greater for those in the intervention compared to the control ($\beta=0.29$; 95% CI: 0.01 to 0.57; $p=0.039$) and at 6-months, it was 0.44 points greater for those in the intervention group compared to the control ($\beta=0.44$; 95% CI: 0.10 to 0.77; $p=0.010$). However, at 12-months, the difference between groups was no longer significant.

The intervention group had significantly greater improvement in the attitudes sub-score compared to the control throughout follow-up. At 3-, 6-, and 12-months, improvement was 0.30 points greater ($\beta=0.30$; 95% CI: 0.07 to 0.53; $p=0.012$), 0.44 points greater ($\beta=0.44$; 95% CI: 0.18 to 0.71; $p=0.001$), and 0.38 points greater ($\beta=0.39$; 95% CI: 0.13 to 0.64; $p=0.003$) respectively in the intervention compared to the control. Improvement in the emotions sub-score, was not significantly different at any follow-up timepoint.

Routines:

At baseline, the average routines score (on a scale from 1 to 4 with higher scores reflecting more routinization) was 2.99, the average medication sub-score was 3.11, and the average burden sub-score was 2.32 ($n=150$). At 3-month follow-up, improvement in the overall score was 0.16 points greater in the intervention group compared to the control ($\beta=0.16$; 95% CI 0.01 to 0.30; $p=0.031$). However, the difference was no longer significant at 6- or 12-months (**Figure 7**). Similarly, improvement in the medication sub-score was 0.28 points greater in the intervention compared to the control at 3-months ($\beta=0.28$; 95% CI: 0.06 to 0.50; $p=0.012$); however, the difference was no longer

significant at 6- or 12-months. Differences in the burden sub-score were not significant at any of the follow-up intervals.

Environmental Triggers:

At baseline, average number of home environmental triggers was 2.34 out of 8 with a range from 0-7 (n=151). Improvement in number of triggers was not significantly different between groups in any follow-up period.

Discussion:

This RCT examined the effect of a CHW-delivered home-based asthma education program on children's asthma symptoms. The hypothesized conceptual model was that the education program would improve caregivers' knowledge about asthma, which would positively impact their beliefs and attitudes about the illness, help establish routines to improve adherence and management behaviors, and reduce environmental triggers in the home. According to our proposed model, a combination of these factors would ultimately lead to reductions in children's asthma symptom days and preventable healthcare utilization.

Consistent with prior reports, our study found that the home-based education intervention successfully reduced average number of asthma symptom days.[18, 30, 40] However, the effect was not immediately noticeable; while there was no significant difference between groups at 3- and 6-month follow-up, those in the intervention demonstrated a statistically and clinically significant improvement of more than 2 symptom days compared to the control at 9- and 12-months. Conversely, many secondary outcomes including asthma knowledge, MDI-spacer administration, attitudes about asthma, perceptions about symptoms and management routines were significantly improved earlier, at 3-months. This suggests that some of these secondary outcomes, which are farther upstream in our conceptual model, may be "leading indicators" for improved health outcomes. In other words, it may take time for increased knowledge, updated attitudes and beliefs, and improved management behaviors and routines to translate into meaningful reductions in symptoms.

Improvements in caregivers' asthma knowledge (an important component of health literacy)[41] was significant at all follow-up intervals. This is noteworthy since studies have demonstrated an association between caregivers' health literacy and children's health outcomes.[42, 43] However, previous studies examining the use of CHWs to deliver asthma education saw mixed results related to improving caregivers' knowledge.[14, 24] One possible explanation for these differing results is that the types of education programs and the tools used to measure knowledge differed across studies. Other studies differed on whether improving knowledge had a significant impact on behavior.[24, 34] The researchers who developed the questionnaire used in this study reported that improvement in the knowledge score alone was not associated with significant changes in behavior.[34] This suggests that while teaching facts about asthma is necessary, it is not sufficient to improve health outcomes.

In addition to asthma knowledge, our intervention also tracked changes in illness perceptions including beliefs, attitudes and emotions related to asthma, habits around medication adherence and routines related to asthma management. While attitudes were improved at each follow-up, beliefs about symptoms, adherence habits and routines improved initially, but the effects wore off by 12-months. This suggests that refresher sessions may be necessary to maintain effects long-term. It also suggests that the intervention could be improved with greater emphasis on establishing and reinforcing positive habits and routines, perhaps using evidence-based approaches to encouraging behavior change, such as changing the physical environment to promote optimal behaviors or

thinking through specific plans for challenging scenarios that might arise.[38, 44] Finding ways to effectively target negative emotions may also be beneficial.

The secondary outcome with the most noteworthy improvement throughout follow-up was caregivers' MDI-spacer administration. At baseline, 42% of caregivers reported that a doctor or nurse had never provided feedback on their technique. After this intervention, on average, caregivers correctly performed an additional 1-3 out of 10 steps. The importance of having healthcare providers watch caregivers demonstrate their technique and provide feedback has been noted previously.[45] However, a commonly reported barrier is insufficient time during visits.[45] The success of this intervention highlights that this unmet need can be addressed through CHW home-visits.

In addition to relieving some of the burden on physicians and nurses who are pressed for time during clinic visits, using CHWs to deliver home-based asthma education has been shown to be cost-effective.[18-20] As an additional benefit, a study that solicited parental feedback found that CHW home-visits were well-received, and parents listed enhanced asthma education among the program's strengths.[46] Another study found that CHW home-visits better met patients' needs than in-clinic sessions with certified asthma educators.[47]

Though our primary outcome of asthma symptom days was significantly reduced at 9- and 12-months, there was no significant difference in asthma-related healthcare utilization between groups during follow-up. However, previous studies reported a reduction in unscheduled healthcare visits after participating in a home-based CHW intervention.[14, 18, 23-26, 40, 48] A possible explanation for this difference is that our data for number of urgent visits relied on caregivers' recall and was not confirmed with medical records. Another possibility is that studies which reported significant reductions focused more on environmental triggers, which may be stronger drivers of unscheduled healthcare visits.[18, 23-26]

While our intervention included education on identifying home environmental triggers, it did not include the comprehensive environmental interventions used in other studies. The fact that our intervention did not result in significant reductions in triggers suggests that education about triggers alone is not sufficient to reduce exposure. As one article noted, success in reducing home environmental triggers was associated with the level of resource provision.[16] For example, some studies provided smoking cessation programs, services to address mold and pest control, and other intensive trigger-focused interventions.[21, 23-26, 30, 49]

A major strength of this study was the randomized controlled design. It also included a 12-month follow-up period and measured multiple secondary outcomes to elucidate factors that may contribute to children's asthma outcomes. However, this study was subject to limitations. First, it was not possible to blind subjects to group assignment. Second, data were based on caregiver self-report which may have introduced recall bias. This may be particularly problematic for symptom days and healthcare utilization. Using surveys to measure adherence is also problematic as caregivers often over-estimate adherence.[50, 51] Third, the Hawthorne effect may have contributed to improved outcomes in both groups. Finally, this study was conducted on low-income, minority children in the Bronx and may not be generalizable. Future studies should focus on interventions that reinforce long-term habits and routines and explore optimal timing for refresher visits to sustain effects long-term.

Conclusion:

Using CHWs to deliver a home-based asthma education program led to significant improvements in asthma symptoms at 9- and 12-months post-intervention. Improvements in caregiver MDI-spacer administration, knowledge and attitudes about asthma, management routines, and adherence habits

were noticeable at 3-months, suggesting that these may be leading indicators of symptom improvement. However, improvements in routines and adherence did not last past 6-months, suggesting a need for refresher sessions to guarantee sustainability. The intervention's success in reducing symptom days among low-income minority children suggests that expanding the use of CHWs to provide home-based interventions can help reduce disparities in pediatric asthma outcomes.

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Declaration of Interest

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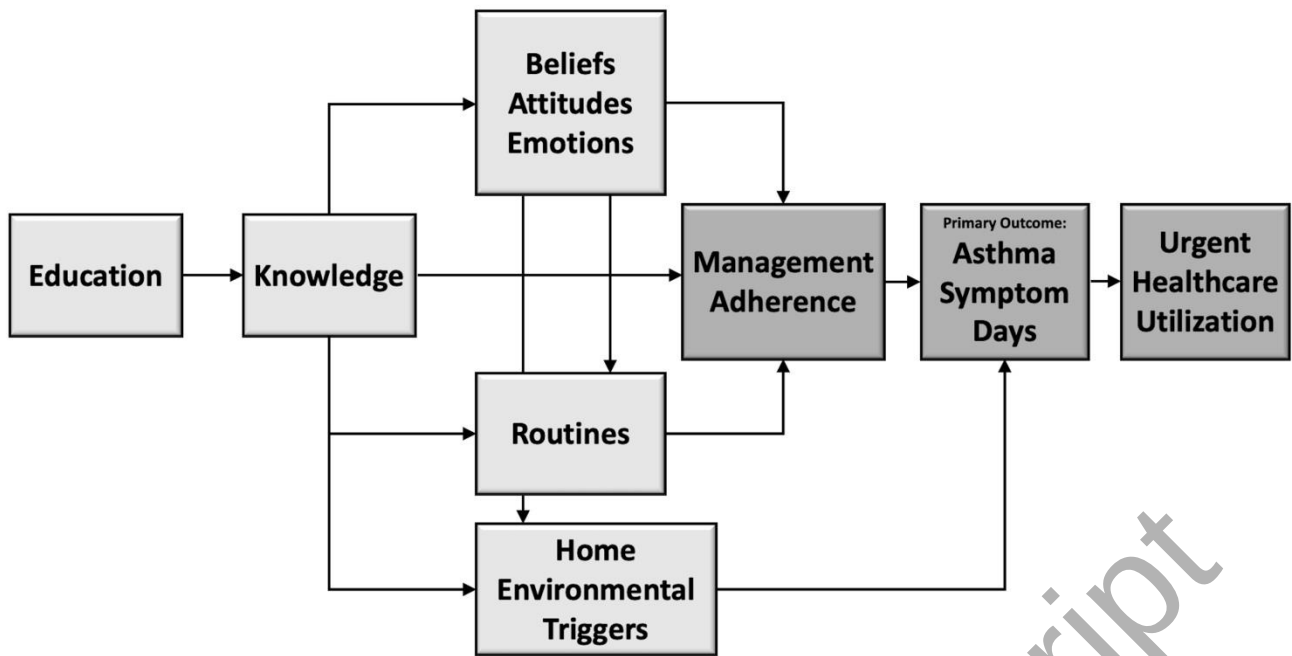


Figure 1: Conceptual model

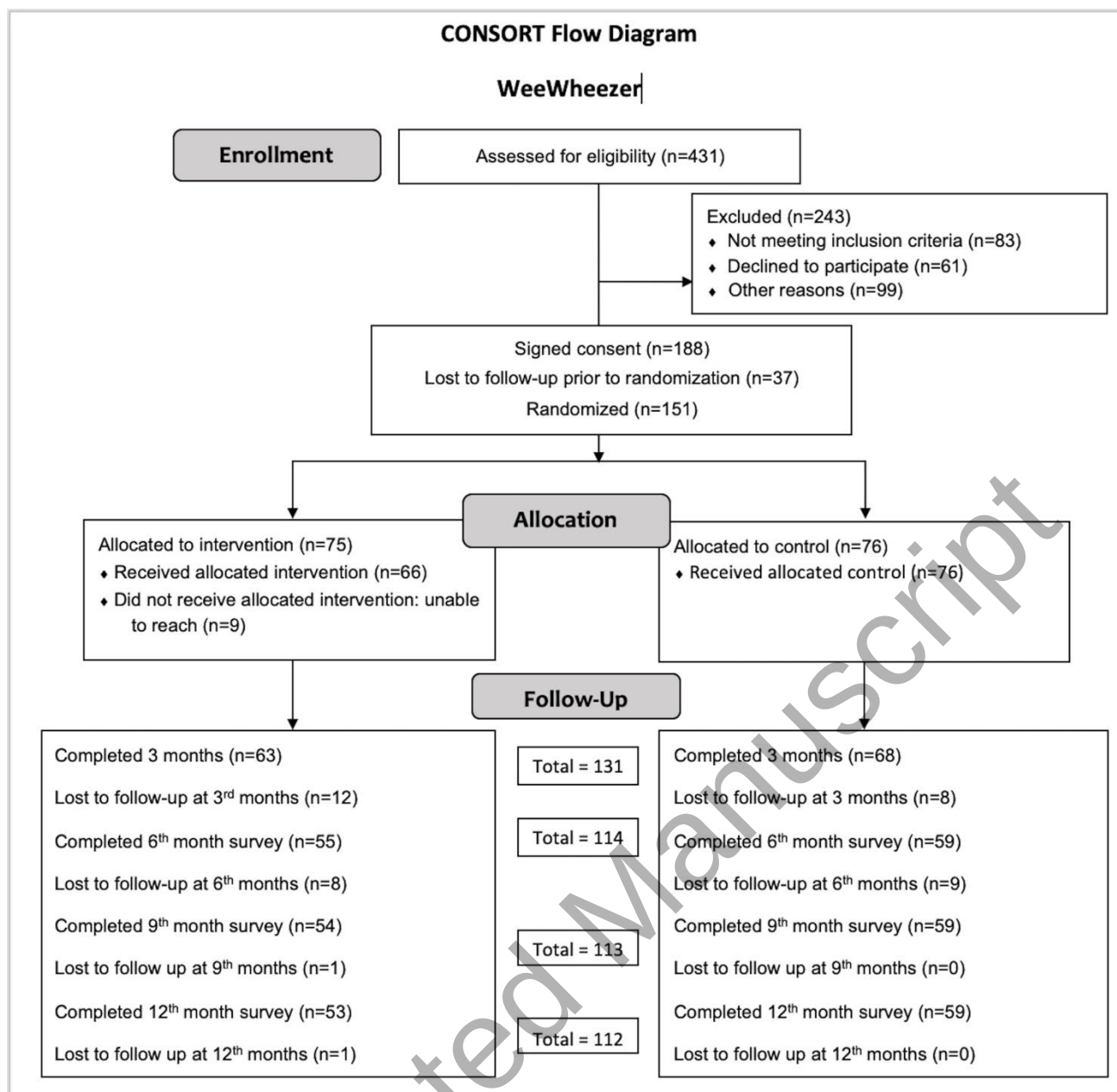


Figure 2: Consort Flow Diagram

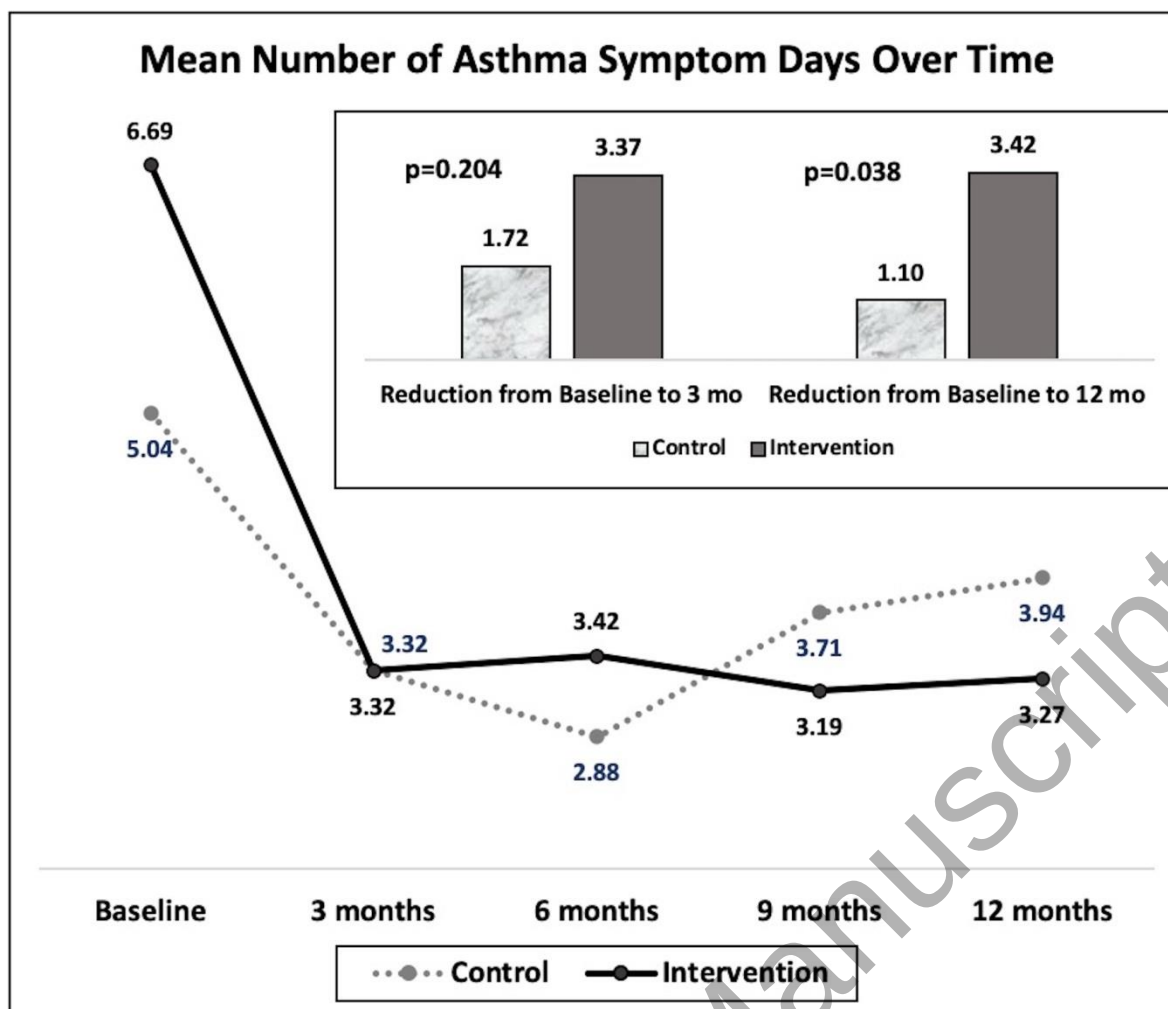


Figure 3: Mean Number of Asthma Symptom Days Over Time

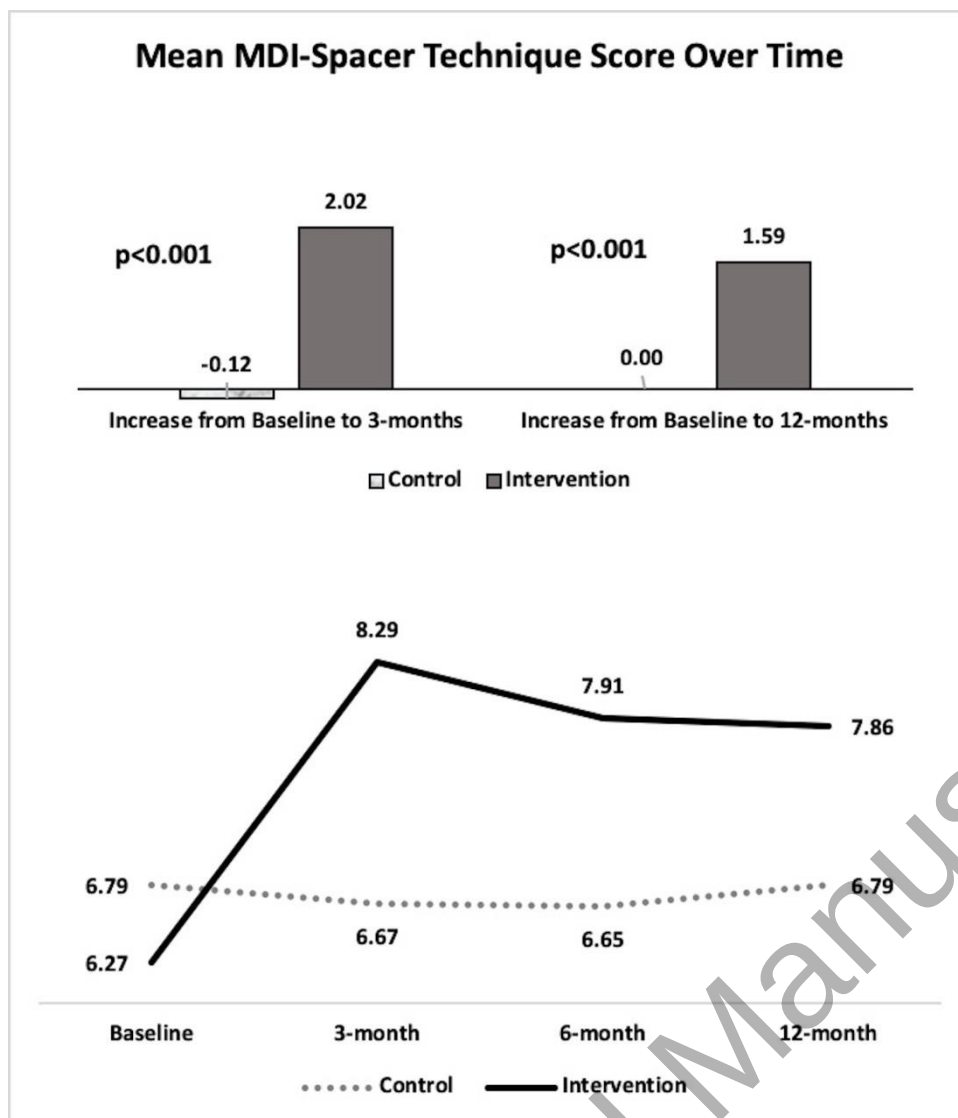


Figure 4: Mean MDI-Spacer Technique Score Over Time

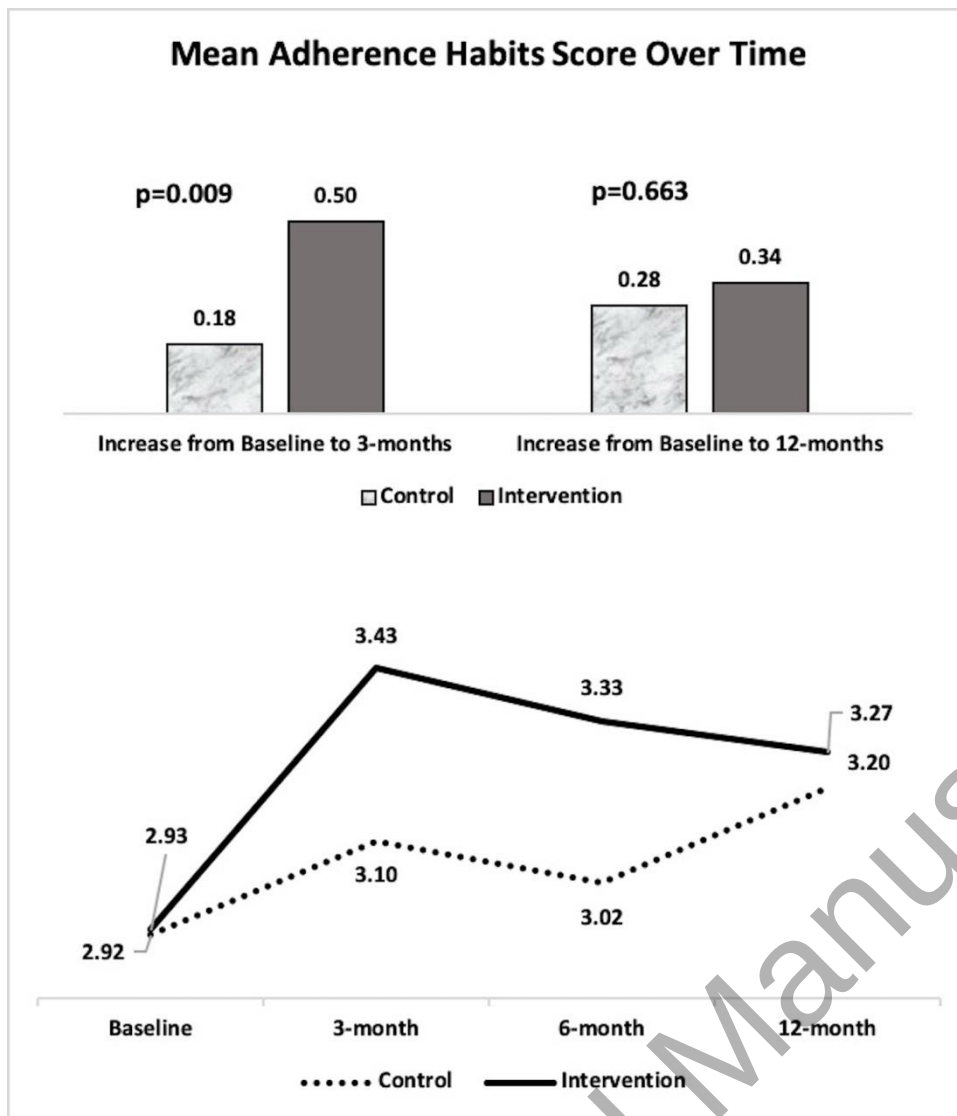


Figure 5: Mean Adherence Habits Score Over Time

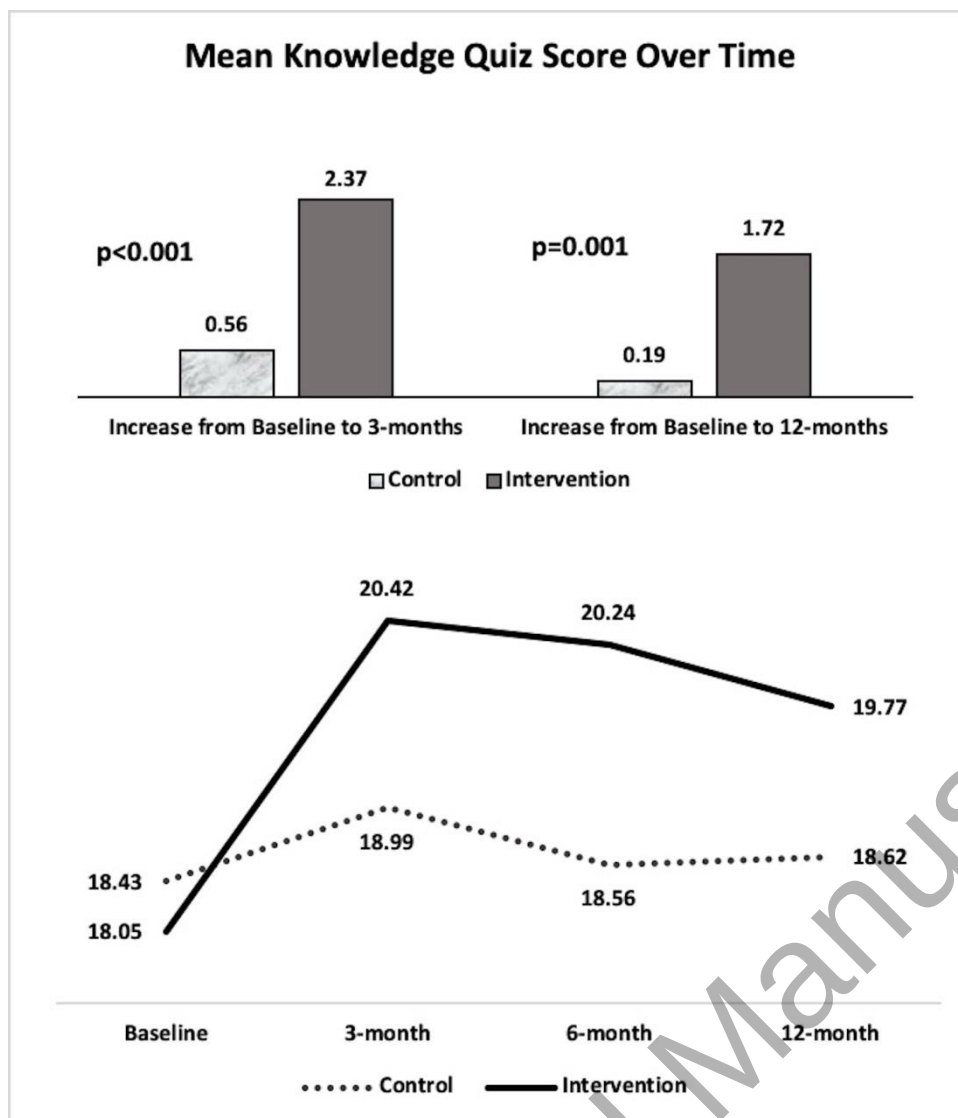


Figure 6: Mean Asthma Knowledge Score Over Time

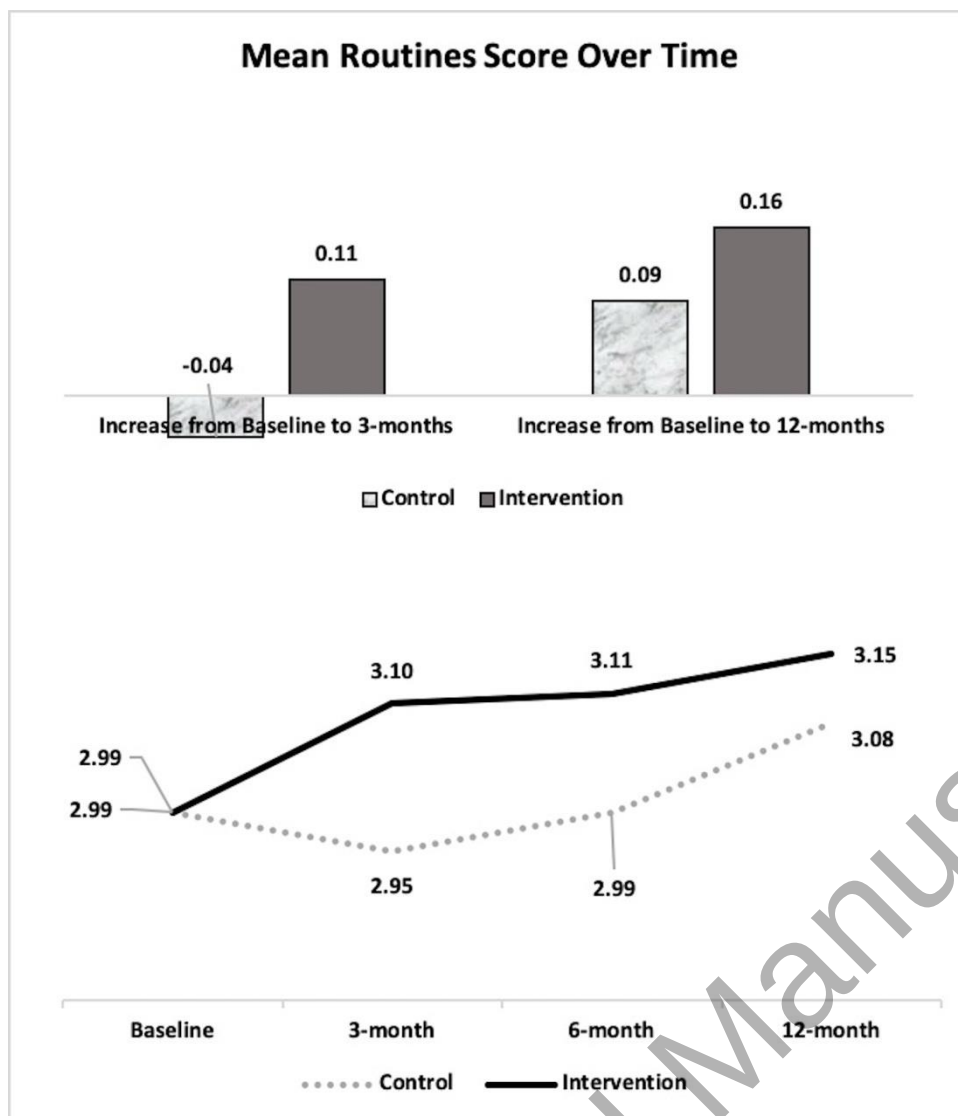


Figure 7: Mean Routines Score Over Time

Table 1: Baseline Demographic Characteristics

Characteristic	Overall (n=151)	Control (n=76)	Intervention (n=75)	P- value
Child’s Age, years (SD)	5.7 (2.0)	5.7 (2.0)	5.6 (2.0)	0.75
Gender (male)	97 (64%)	49 (64%)	48 (64%)	0.95
Spanish/Hispanic/Latino	114 (76%)	52 (68%)	62 (83%)	0.04
Black/African American (Non-Hispanic)	33 (22%)	21 (28%)	12 (16%)	0.08
Caregiver’s Age, years (SD)	32.6 (7.7)	32.5 (6.9)	32.7 (8.5)	0.75
Caregiver Employed	63 (42%)	32 (42%)	31 (41%)	0.92
Caregiver’s Schooling:				
<High School	41 (27%)	21 (28%)	20 (27%)	0.95
Highschool/GED	43 (28%)	23 (30%)	20 (27%)	
1-3 years college	48 (32%)	23 (30%)	25 (33%)	
4 years college or more	19 (13%)	9 (12%)	10 (13%)	
Ever Hospitalized for Asthma	95 (63%)	49 (64%)	46 (61%)	0.69
Asthma Control:				
Well Controlled	14 (9%)	7 (10%)	7 (10%)	0.59
Not Well Controlled	67 (46%)	35 (48%)	32 (43%)	
Very Poorly Controlled	66 (45%)	31 (42%)	35 (47%)	
Urgent asthma treatment (past 12 months):				
Doctor’s Office/Clinic	122 (81%)	63 (83%)	59 (79%)	0.51
Emergency Department	118 (79%)	55 (72%)	63 (85%)	0.06
Overnight Hospital Stay	56 (37%)	29 (38%)	27 (36%)	0.78
Environmental Trigger Exposures:				
Smoker in the home	41 (27%)	23 (30%)	18 (24%)	0.39
Cockroaches in the home	72 (48%)	41 (54%)	31 (41%)	0.12
Mold in the home	53 (35%)	30 (39%)	23 (31%)	0.26
Pets in the home	52 (34%)	29 (38%)	23 (31%)	0.33
Stuffed animals in bed	49 (32%)	27 (36%)	22 (29%)	0.42
Carpets in the bedroom	22 (15%)	12 (16%)	10 (13%)	0.67
Mice in the home (past 12 months)	58 (38%)	29 (38%)	29 (39%)	0.95
Rats in the home (past 12 months)	7 (4.6%)	4 (5.3%)	3 (4.0%)	0.71