

## BENDING THE MSK COST CURVE:

# A Claims-Validated Case Study on Delivering a 3.7:1 ROI for Commercial Health Plans

## Executive Summary

Sword Health commissioned **Milliman** to **independently review the ROI methodology used in this study.**<sup>1</sup> For fully insured health plans, musculoskeletal (MSK) conditions are one of the fastest-growing and most challenging categories of medical spend. As plans work to manage rising healthcare costs and improve member outcomes, Sword Health provides the market's most validated digital MSK solution. Built on a unique care model that combines AI with licensed clinicians, Sword delivers highly scalable and cost-effective care while ensuring members receive the best possible experience.

This study of **2,459 Thrive members** and **2,459 matched controls** from commercial, fully insured plans demonstrates a clinically proven, scalable platform that directly reduces MSK medical costs. Using a rigorous propensity score-matched cohort and a difference-in-difference (DiD) methodology, our AI Care solution, Thrive, delivered significant, claims-validated savings.

The results confirm that Thrive is more than a physical therapy app; it is a **surgical avoidance and medical cost reduction platform**. By shifting care away from costly, invasive procedures toward effective, accessible, conservative care, Thrive delivers meaningful savings and a superior member experience. This superior experience is reflected in significant clinical improvement, namely: 69% of members no longer report significant pain levels<sup>1</sup>, and members see a 31% average reduction in work impairment, underscoring the program's ability to restore both physical function and productivity<sup>2</sup>.

## Headline Results (PMPY):

**3.7:1** Gross ROI on MSK Spend

**\$2,934** Reduction in MSK Spend

**81** Fewer Surgical Encounters per 1,000 members (driving **\$2,267 of savings** from surgery reduction alone)

## The Commercial MSK Challenge

MSK conditions are a leading driver of medical spend in commercial populations, impacting members in their prime working years and contributing to both high costs and lost productivity. Traditional care pathways often result in a frustrating cycle of specialist visits, costly imaging, and an over-reliance on surgery, even when more effective conservative options are available.

For fully insured plans, this high-cost trajectory is a significant challenge. Members face barriers like taking time off work, travel, and high copays for in-person physical therapy, leading to low adherence and poor outcomes.

1. Milliman did not audit the underlying data, validate savings or ROI, or recalculate results. Link to full report: [milliman.com/en/insight/sword-health-roi-methodology-thrive](https://milliman.com/en/insight/sword-health-roi-methodology-thrive)

## Why the Status Quo Underperforms:

- **Fragmented pathways** default to invasive care without sustained conservative management.
- **Access and adherence barriers** prevent consistent therapy attendance and completion.
- **Invasive procedures** amplify spending, member burden, and recovery time.

By removing these barriers, Sword meets members where they are. In fact, 62% of all therapy sessions are completed after-hours or on weekends<sup>3</sup>, a time when traditional clinics are typically closed.

## Key Findings: Shifting the Care Pathway to Reduce Spend

Thrive reorients the member journey away from high-cost, low-value procedures and toward the right conservative care at the right time. This clinical redirection, powered by our Doctor of Physical Therapy-led care teams and AI, produces claims-validated surgical avoidance and sustainable medical savings.

### Utilization and Spend Changes (PMPY, Difference-in-Differences):

#### Surgery

**\$2,267** savings and **200** fewer encounters

#### Rehab & Therapy

**\$328** savings and **6,127** fewer visits

#### Office Visits

**\$236** savings and **2,680** fewer visits

#### Emergency Room

**\$12** savings and **39** fewer encounters

#### Other MSK Procedures

**\$91** savings and **1,642** fewer services

Together, these shifts generated

**\$2,934** PMPY

in direct MSK savings, flattening the cost curve for our health plan partners.

## Member Value and Sustained Engagement

The program's financial and clinical success is driven by deep member participation and measurable functional improvement. Thrive's convenient digital model eliminates friction, no travel, no waiting rooms, and on-demand sessions, while personalized care plans and dedicated clinical support sustain momentum.

### Clinically Meaningful Outcomes:

Members report significant improvements across multiple domains of life.

- **Pain & Function:** 69% of members with significant pain at baseline no longer report it after the program<sup>4</sup>, and 63% no longer have moderate or severe limitations in their daily activities<sup>5</sup>.
- **Mental Health:** The program also addresses the psychological burden of MSK pain, with 42% of members no longer reporting moderate to severe depression<sup>6</sup> and 38% no longer reporting moderate to severe anxiety<sup>7</sup>.
- **Work Productivity:** Members experience a 31% reduction in overall work impairment, gaining an average of 3.9 productive work hours per week<sup>8</sup>.

### Exceptional Engagement & Satisfaction:

The program's convenient and effective model drives industry-leading adherence.

- **Higher Adherence:** Members complete an average of 16.1 sessions per user<sup>9</sup>, a level of engagement far above traditional physical therapy.
- **High Satisfaction:** Members rate the program an average of 9.0 out of 10 for overall satisfaction<sup>10</sup>.



## What Enables Sustained Engagement:

- **Frictionless Access:** Home-based, on-demand sessions that fit members' lives.
- **Personalized Progression:** AI-powered feedback and customized plans from a Doctor of Physical Therapy.
- **Coaching and Accountability:** Human connection that fosters motivation and program completion.

## Return on Investment: Validated and Transparent

The financial case for Thrive is compelling and claims-validated. On a per-member-per-year basis, the program delivers significant medical cost reductions. For every dollar invested in the Thrive program, health plans realize **\$3.70 in gross MSK savings**.



## Study Design and Methods

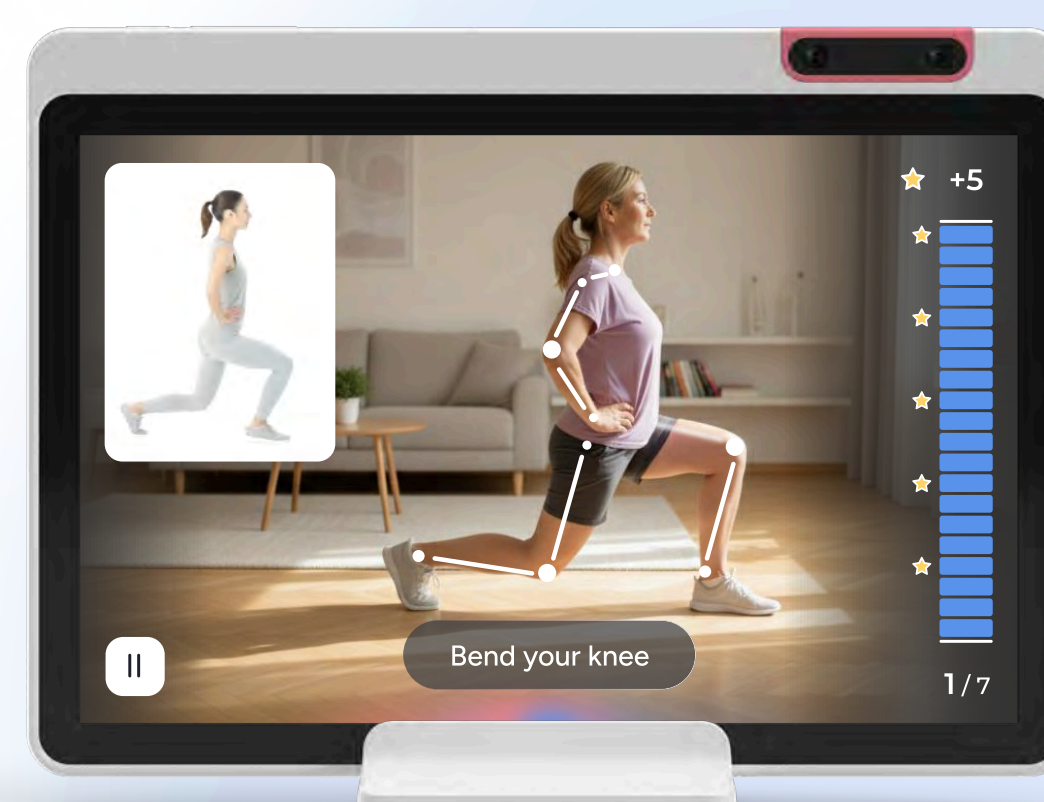
The analysis behind these findings used rigorous statistical methods to ensure reliability and isolate Thrive's causal impact on medical claims.

- **Study Design:** The study employed a retrospective cohort analysis of **2,459** Thrive members and **2,459** 1:1 matched controls who received only traditional care.
- **Inclusion Criteria:** Participants were commercially fully insured members aged 18–64 with an MSK condition who completed at least one Thrive session. All participants had continuous eligibility for 6–12 months prior to the index date and for 6-12 months following the intervention for baseline comparability and sufficient post period for downstream utilization effects.

- **Propensity Score Matching (PSM):** To ensure comparability, PSM was used without replacement to construct statistically identical treatment and control groups. Matching was based on **over 100 covariates**, including demographics, MSK history, comorbidities and baseline spend/utilization.
- **Difference-in-Difference (DiD) Analysis:** A DiD approach was applied to measure changes in spend and utilization over time, isolating the program's impact from external time-based trends. Reported PMPY savings reflect extrapolated results when less than a full 12 months of post-intervention data was available.
- **Baseline Balance:** A comprehensive balance assessment confirmed high-quality matching. All **106** standardized mean differences (SMDs) were well below the 0.1 threshold, indicating robust comparability and minimizing confounding bias.

## Conclusion: A Strategic Imperative for Commercial Health Plans

Thrive is more than an MSK solution; it is a strategic lever for achieving core commercial plan objectives. By shifting care upstream, away from avoidable surgery and toward effective conservative management, plans can finally bend the MSK cost curve, restore member function, and elevate the member experience. The claims-validated savings, paired with proven engagement, make a powerful case for Sword Health as the premier partner for MSK care management. Ultimately, the claims-validated savings are a direct result of a program that members value, one that not only reduces their pain but also improves their productivity and restores their overall quality of life.



# Appendix

MSK-Specific PMPM Spend in the Post-Period  
for Sword Health Versus Control Group

Service Category	Sword Group	Control Group	Difference	P-value
Surgery	\$68.4	\$261.0	\$193.0	<0.0001
Rehab & Therapy	\$17.0	\$48.1	\$31.0	<0.0001
Office	\$19.3	\$43.2	\$23.8	<0.0001
Imaging	\$8.7	\$18.2	\$9.5	<0.0001
ER	\$2.5	\$4.3	\$1.9	0.002
Total	\$116.0	\$375.0	\$259.0	

MSK-Specific Service Utilization (per 1k  
Beneficiaries) in the Post-Period for Sword  
Health Versus Control Group

Service Category	Sword Group	Control Group	Difference	P-value
Surgery	50	132	82	<0.0001
Rehab & Therapy	1,576	4,155	2,578	<0.0001
Office	1,001	2,168	1,167	<0.0001
Imaging	513	1,058	545	<0.0001
ER	31	52	20	0.006

# Balance Measures

Covariate balance between the treatment and control groups was evaluated using standardized mean differences (SMDs). An absolute standardized mean difference of less than 0.1 indicates that the groups have acceptable balance.

## Balance Metrics

Variable	Type	Diff. Adj	Threshold
Age	Continuous	-0.03	Balanced, <0.1
MSK Pre-Program Spend	Continuous	-0.01	Balanced, <0.1
MSK Pre-Program Visits	Continuous	-0.02	Balanced, <0.1
PT Pre-Program Spend	Continuous	0.02	Balanced, <0.1
PT Pre-Program Visits	Continuous	0.00	Balanced, <0.1
Rehab/Therapy Pre-Program Spend	Continuous	-0.02	Balanced, <0.1
Rehab/Therapy Pre-Program Visits	Continuous	-0.02	Balanced, <0.1
Total Cost of Care Pre-Program Spend	Continuous	0.02	Balanced, <0.1
Total Cost of Care Pre-Program Visits	Continuous	0.00	Balanced, <0.1
Surgery Pre-Program Spend	Continuous	-0.01	Balanced, <0.1
Surgery Pre-Program Visits	Continuous	0.00	Balanced, <0.1
Office Pre-Program Visits	Continuous	-0.04	Balanced, <0.1
Office Pre-Program Spend	Continuous	-0.04	Balanced, <0.1
ER Pre-Program Visits	Continuous	-0.02	Balanced, <0.1
ER Pre-Program Spend	Continuous	-0.03	Balanced, <0.1
State Indicators (All 50 States + DC)	Binary		All Balanced, <0.1
Care Progression Indicators (5 types)	Binary		All Balanced, <0.1
MSK Index Condition (12 body parts)	Binary		All Balanced, <0.1



Variable	Type	Diff. Adj	Threshold
Member Gender	Binary		All Balanced, <0.1
Diagnosis: Hypertension	Binary	0.02	Balanced, <0.1
Hypertension Pre-Program Spend	Continuous	-0.02	Balanced, <0.1
Diagnosis: Heart Condition	Binary	0.01	Balanced, <0.1
Heart Condition Pre-Program Spend	Continuous	0.02	Balanced, <0.1
Diagnosis: Diabetes	Binary	0.01	Balanced, <0.1
Diabetes Pre-Program Spend	Continuous	-0.01	Balanced, <0.1
Diagnosis: Obesity	Binary	0.00	Balanced, <0.1
Obesity Pre-Program Spend	Continuous	0.00	Balanced, <0.1
Diagnosis: Mental Health	Binary	0.00	Balanced, <0.1
Mental Health Pre-Program Spend	Binary	0.00	Balanced, <0.1
Diagnosis: Substance Use	Binary	0.00	Balanced, <0.1
Substance Use Pre-Program Spend	Binary	0.00	Balanced, <0.1
Diagnosis: Autoimmune	Binary	-0.02	Balanced, <0.1
Autoimmune Pre-Program Spend	Continuous	-0.02	Balanced, <0.1
Diagnosis: Neurological	Binary	-0.01	Balanced, <0.1
Neurological Pre-Program Spend	Continuous	0.03	Balanced, <0.1
Diagnosis: Respiratory	Binary	0.00	Balanced, <0.1
Respiratory Pre-Program Spend	Continuous	0.00	Balanced, <0.1
Diagnosis: HIV	Binary	0.00	Balanced, <0.1
HIV Pre-Program Spend	Continuous	0.02	Balanced, <0.1
Diagnosis: Osteomyelitis	Binary	0.00	Balanced, <0.1
Osteomyelitis Pre-Program Spend	Continuous	0.01	Balanced, <0.1

# Balance Summary

**Balanced variables (<0.1):** 106

**Not balanced (>0.1):** 0

All covariates meet the pre-specified threshold for balance, ensuring strong comparability between treatment and control cohorts.

# Sample Sizes

Group	Control	Treated
All	120,570	2,465
Matched	2,459	2,459
Unmatched	118,111	6

# References

1. Sword Internal Thrive Analysis, July 2024 to June 2025. Among members that reported a pain level of 4+ at baseline, and reported below 4 or had a 30% change from baseline during their last clinical reassessment
2. Sword Internal Thrive Analysis, July 2024 to June 2025. Calculated from self-reported improvements in work presenteeism and absenteeism (derived from the Work Productivity and Activity Impairment Questionnaire)
3. After hours represents 6PM-8AM M-F, when physical therapy offices are typically closed
4. Among members that reported a pain or symptoms level of 4+ at enrollment, and reported below 4 during a clinical reassessment (scale 0-10) (n = 7237)
5. Among those who reported a 4 or above on the Work Productivity and Activity Impairment Questionnaire-Question 6 at enrollment, and now report below 4 on their last reassessment (n = 3215)
6. Among members that reported a PHQ9 (Patient Health Questionnaire) of 10+ at enrollment, and reported below 10 during a clinical reassessment (n = 571)
7. Among members that reported a GAD7 (Generalized Anxiety Disorder) of 10+ at enrollment, and reported below 10 during a clinical reassessment (n = 621)
8. Work Impairment calculated from self-reported improvements in work presenteeism and absenteeism (derived from the Work Productivity and Activity Impairment Questionnaire). Increase in productive working hours calculated from self-reported improvements in work presenteeism and absenteeism (derived from the Work Productivity and Activity Impairment Questionnaire) and converted to an estimated increase in productive working hours
9. Among those that completed at least one Sword session.
10. Sword Fully Insured Book of Business, 3,249 respondents between July 2024 and June 2025