

Rest Redistribution Sets and Cluster Sets

What these “alternative set structures” and how can you implement them?

Michael C. Zourdos, Ph.D., CSCS
MASS Vol. 8 Issue 2, February 2024

Today's Objectives

1. Define what rest redistribution sets are
2. Determine the difference between rest redistribution sets and cluster sets
3. Discuss the purported utility of rest redistribution and cluster sets
4. Examine how alternative set structures compare to traditional training for:
 - a. *Set-to-set fatigue*
 - b. *Long-term strength*
 - c. *Long-term hypertrophy*
5. Discuss the practical application of implementing alternative set structures

Previous Articles on Rest Redistribution

What are Rest Redistribution Sets, and Should You Use Them?

Volume 7, Issue 1



MASS Research Review · What Are Rest Redistribution Sets, And Should You Use Them?

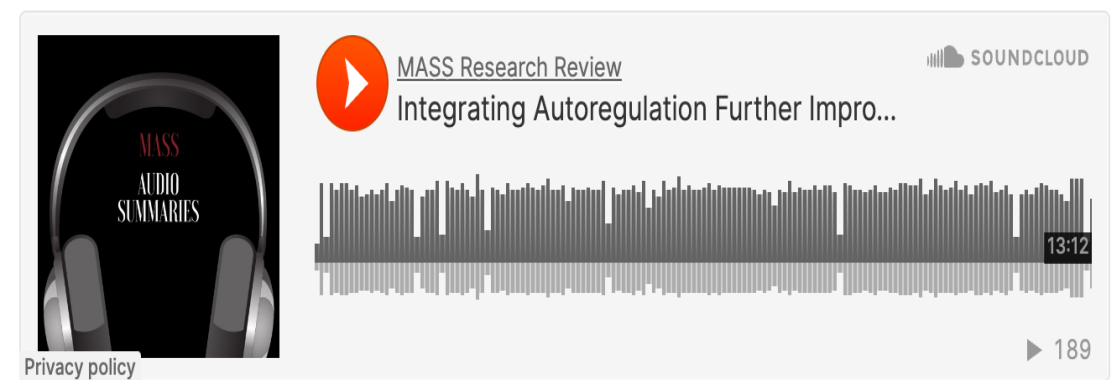
by Michael C. Zourdos

Rest redistribution sets are similar to cluster sets. The idea is to complete fewer reps per set but take less interset rest. Does this strategy maintain velocity and power from set-to-set? If so, is rest redistribution training a good idea for long-term strength gains? This article breaks it down.

[Read Here](#)

Integrating Autoregulation Further Improves the Concept of Rest Redistribution

Volume 7, Issue 5



MASS Research Review · Integrating Autoregulation Further Improves The Concept Of Rest Redistribution

by Michael C. Zourdos

The concept of rest redistribution aims for lifters to maintain velocity from set-to-set by performing few reps per set but with less interset rest. Although this idea is sound, it has yet to be applied on the individual level. This article reviews a new study that integrated autoregulation into rest redistribution sets.

[Read Here](#)

What are Rest Redistribution Sets?

- **Rest redistribution sets:** Taking traditional training and reducing the rest intervals and reps per set, but increasing the number of sets to equate for volume

- **Traditional Set Example**

3 × 6 at 80% of 1RM with 60s rest



- **Rest Redistribution**

9 × 2 at 80% of 1RM with 45s rest

What is the Purported Purpose of Rest Redistribution Sets?

- **The primary purpose is to maintain performance better from set-to-set**
 - Typically measured by velocity and power loss
- Therefore, if someone is interested in strength and power adaptations, they should slow their rate of set-to-set fatigue
- **Consequently, movement velocity should not decrease as much from set-to-set, and by maintaining a faster overall velocity, while doing the same work (volume) strength gains could potentially be better**
- The previous example is just conceptual...
 - *The previous is just a concept, reps don't have to be 2 per set*
 - *Another example:*
 - *3×12 at 75% of 1RM w/120s...*
 - *9×4 at 75% of 1RM w/30s*

What is the difference between rest redistribution and cluster sets?

- With cluster sets, additional rest (a traditional) rest period is added at the end of all clusters; thus, clusters take more time.

- Traditional Set Example

3 × 6 at 80% of 1RM with 60s rest



- Rest Redistribution

9 × 2 at 80% of 1RM with 45s rest



- Cluster Sets (longer training sessions)

*6 × 2 at 80% of 1RM with 20s rest after each rep
Then, 60s rest after each set*

What is the difference between rest redistribution and cluster sets?

- Cluster Sets

- *The purpose of cluster sets, is similar to rest redistribution*
- *That is, to maintain performance – specifically velocity and power – better from set-to-set*
- *Together, rest redistribution and cluster sets are often referred to as "alternative set structures" or are said to be "manipulating set structure"*
- *Although not the exact same (i.e., longer total rest with clusters) they are often analyzed together in meta-analyses/systematic reviews*

Overview of Alternative Set Structure Literature

Systematic Reviews and Meta-Analyses

Jukic et al. 2020

Jukic et al. 2021

Davies et al. 2021



Acute Effects

Chronic Effects

Jukic et al. – *Effects of "Alternative Set Structures" on intrasession fatigue*

Meta-Analysis > Sports Med. 2020 Dec;50(12):2209–2236.

doi: 10.1007/s40279-020-01344-2.

Acute Effects of Cluster and Rest Redistribution Set Structures on Mechanical, Metabolic, and Perceptual Fatigue During and After Resistance Training: A Systematic Review and Meta-analysis

Ivan Jukic¹, Amador García Ramos^{2 3}, Eric R Helms⁴, Michael R McGuigan⁴,
James J Tufano⁵

Findings – Based on 32 studies (Acute Effects):

Variable	Effect Size vs. Traditional Set Training	Training Type Favored
Average Velocity	0.60	Alternative Set Structures
Peak Velocity	0.41	Alternative Set Structures
Average Power	0.33	Alternative Set Structures
Peak Power	0.38	Alternative Set Structures
Reduction of Lactate	1.61	Alternative Set Structures

Jukic et al. — *Effects of "Set Structure" on Long-Term Outcomes*

Meta-Analysis > Sports Med. 2021 May;51(5):1061-1086. doi: 10.1007/s40279-020-01423-4.

Epub 2021 Jan 8.

The Effects of Set Structure Manipulation on Chronic Adaptations to Resistance Training: A Systematic Review and Meta-Analysis

Ivan Jukic¹, Bas Van Hooren², Amador García Ramos^{3 4}, Eric R Helms⁵,
Michael R McGuigan⁵, James J Tufano⁶

Findings – Based on 17 studies:

Variable	Effect Size vs. Traditional Set Training	Training Type Favored
Strength	-0.06	No Meaningful Difference
Hypertrophy	-0.03	No Meaningful Difference
Muscular Endurance	0.33	Traditional Sets
Vertical Jump	0.18	Alternative Set Structures

Davies et al. – *Effects of altering “Set Structure” on Long-Term Outcomes*

Meta-Analysis > Sports Med. 2021 Apr;51(4):707-736. doi: 10.1007/s40279-020-01408-3.

Epub 2021 Jan 21.

Chronic Effects of Altering Resistance Training Set Configurations Using Cluster Sets: A Systematic Review and Meta-Analysis

Timothy B Davies¹, Derek L Tran^{2 3 4}, Clorinda M Hogan², G Gregory Haff^{5 6},
Christopher Latella^{5 7}

Findings – Based on 29 studies:

Variable	Effect Size vs. Traditional Set Training	Training Type Favored
Strength	-0.05	No Meaningful Difference
Hypertrophy	-0.05	No Meaningful Difference
Power	0.02	No Meaningful Difference
Muscular Endurance	-0.07	No Meaningful Difference

Discussion of Meta-Analyses

- **Overall Takeaways**

- Acute kinematics are maintained better with alternative set structures (no surprise)
- However, long-term adaptations remain unaffected (even power to some extent)
- Proximity to failure is considerably different between alternative and traditional set structures
 - Could have downstream effects
 - Session RPE, enjoyment, readiness to train
- Decision to use traditional or alternative set structures could come down to preference to some extent

Additional Thoughts – Proximity to Failure

- Additional Thoughts – Proximity to Failure
 - *It's interesting that training closer to failure with traditional set training does not seem to enhance adaptations compared to alternative set structures*

Cuevas Alberto et al. 2022: Effort-based set and session RPE
Squat + Bench Press Training – Great Per-Set (but not session) RPE

Variable	Per Set RPE	Session RPE
<u>Traditional</u> 3 × 6 w/3min	SQ: 6.9 ± 0.7* BP: 6.8 ± 0.8*	6.9 ± 1.2
<u>Rest Redistribution</u> 9 × 2 w/45sec	SQ: 6.2 ± 0.8 BP: 6.6 ± 0.9	6.7 ± 1.0
<u>Cluster</u> 3 × 6 w/30s after 2 reps 3min after each set	SQ: 6.2 ± 0.8 BP: 6.4 ± 0.7	6.6 ± 1.5

Additional Thoughts - Implementation

Implementation

- *When does this apply?*
 - *Team sport or explosive athletes*
 - *Maybe as priming exercise?*
 - *Maybe as a form of postactivation potentiation?*
 - *Staying engaged - shorter rest can help with this (i.e., enjoyment and focus)*
- *Also, “no difference” does not mean better or worse*
 - *So, this shouldn’t mean we throw away these concepts for strength or hypertrophy*
 - *In fact, they may work better (or worse) in some individuals*
 - *If you are fatigued one day, they may serve as a “less stressful” per set configuration to get the same work in*
 - *Someone may prefer this on main exercises and perform traditional sets or something more difficult (e.g., rest-pause or drop sets) on assistance movements*

Additional Thoughts – Autoregulation of Alternative Set Structures

Implementation – Not an all-or-none principle

- Since long-term adaptations tend to be similar between alternative set structures and traditional sets ALL STRATEGIES CAN BE USED
- For example:
 - *Rest redistribution for strength work on squats to avoid failure*
 - *But, traditional sets on assistance work*
- Another Option:
 - *Main lifts: Alternative set structure*
 - *Multi-joint assistance (e.g., DB shoulder press): Traditional sets*
 - *Single-joint assistance (e.g., biceps curls): rest-pause or drop sets*

Conceptually:

- *Rest redistribution aims to maintain velocity and RIR (performance) from set-to-set*
- *However, there are large interindividual variations in the rate of fatigue from set-to-set*
- *Thus, 9×2 at 80% of 1RM may be a 6 RIR for some, but could be a 1-2 RIR for others by the final set*
- *Therefore, like any prescription, it can be autoregulated to best fit the individual*

Prescription Goal:

- *Have a set prescription as a starting point for rest redistribution, BUT...*
- *Also, have a target RIR*
- *Stop each set at that target RIR*
- *May stop sets early / may add load as it continues*
- *Here's an example...*

Figure 3 Example of Rest Redistribution With Autoregulation

1. Change 3 × 6 at 80% of 1RM with 3 min of interset rest into 9 × 2 at 80% of 1RM with 90s of interset rest.



2. Begin performing sets. Even though there is the goal of 2 reps, stop each set at 2-3 RIR or 2 reps (whichever comes first).



3. If after 5 sets the lifter is performing 2 reps at ≥ 5 RIR, then increase the load 2.5 – 5% and complete the rest of the sets.

*1RM = One-repetition maximum.
RIR = Repetitions in Reserve*

Additional Thoughts

- ▶ Overall

- ▶ Alternative set structures don't offer an inherent physiological advantage for long-term strength and hypertrophy
- ▶ But, they can still be useful
- ▶ They manage fatigue, and if you are worried about technique breakdowns on the main lifts, they could allow for more deliberate or focused practice
 - ▶ Deadlift singles?

- ▶ Practically

- ▶ Perhaps manage effort-based RPE
- ▶ Could help stay focused
- ▶ Not an all-or-none principle
 - ▶ Manage fatigue on the main lifts and allow for some fun programming strategies on assistance movements
- ▶ Can autoregulate the prescription

- ▶ Although cluster sets do lengthen training time

Applications and Takeaways

- ❖ Overall, nothing is magic. These alternative set structures (rest redistribution and cluster sets) are just a way to manage fatigue from set-to-set. Fatigue management can be improved more, on the individual level, but autoregulating the alternative set structure prescription. Moreover, utilizing rest redistribution and cluster sets is not an all-or-none principle. Using these strategies on high-skill exercise can be a good way to avoid extreme technique breakdowns.
- ❖ Long-term adaptations are not different between traditional and alternative set structures, but practical considerations (e.g., technique, session RPE, proximity to failure, total training time, etc.) should all be taken into account and the choice of which prescription method to use should be goal-dependent.