



**LIVEWELL HEALTH**

*your partner in successful aging*

## Using Power Output Analysis to Predict an Increased Need for Care

Power output is now considered one of, if not the, most highly regarded metric when predicting overall longevity, healthspan and independence. It is well understood that the greater one's absolute and relative power output, the greater the chances of them continuing to live and independent, active life. Of course, extraneous variables may alter this outcome. For example, one may score extremely well on a single squat performance demonstrating elevated rate of force development (power) but they may be limited to one repetition due to a lung condition that causes shortness of breath. One limited to a single repetition will of course struggle with activities of daily living as many are not simple one movement tasks.

Through the use of VALD ForceDecks we are able to capture a number of metrics that are then utilized to develop an exercise program. We can also use the derived metrics to understand progression and regression should that be occurring. One might think progression is the only positive that can occur, however, simply slowing decline to rates slower than the traditional decline is quite beneficial as well.

Unfortunately there is not a large set of data that can determine normative values with regard to absolute and relative force output. At LiveWell Health we use data collected internally to produce normative values as we await more research to develop age, condition and functional status specific norms with regard to power output. We have access to the normative decline that occurs on a yearly basis based on one's age. This information was gathered via the Copenhagen Sarcopenia Study. We have included those results below.

Figure 1

Age	(n)	Body Mass (kg)	Age	(n)	Body Mass (kg)
<i>Women</i>			<i>Men</i>		
20–29 y	(98)	62.9 ± 8.0	20–29 y	(59)	82.1 ± 10.9
30–39 y	(74)	66.2 ± 11.3	30–39 y	(51)	84.0 ± 14.0
40–49 y	(96)	68.7 ± 11.3	40–49 y	(83)	82.9 ± 10.3
50–59 y	(109)	70.8 ± 13.2	50–59 y	(96)	85.6 ± 13.1
60–64 y	(56)	69.0 ± 10.6	60–64 y	(56)	87.8 ± 12.1
65–69 y	(74)	70.9 ± 12.4	65–69 y	(62)	88.8 ± 17.3
70–74 y	(72)	68.5 ± 12.0	70–74 y	(55)	84.4 ± 13.0
75–79 y	(79)	68.4 ± 11.9	75–79 y	(72)	80.5 ± 14.5
80–84 y	(35)	64.8 ± 12.3	80–84 y	(26)	78.1 ± 9.9
≥ 85 y	(36)	60.1 ± 9.3	≥ 85 y	(16)	73.9 ± 11.3

As seen in Figure 1, the study consisted of 1,305 individuals, ranging from the ages of 20-93. We were most concerned with those over the age of 50, which is represented in this study at a rate of 65%.

Figure 2 illustrates the average absolute power decline within each age cohort.

Age	Absolute LEP	Allometric LEP	Relative LEP	Age	Absolute LEP	Allometric LEP	Relative LEP
<i>Women</i>				<i>Men</i>			
20-24 y	0.0 ± 0.2	0.0 ± 0.2 <sup>#</sup>	0.0 ± 0.3	20-24 y	0.4 ± 0.3	0.7 ± 0.3 <sup>#</sup>	0.3 ± 0.3
25-29 y	0.0 ± 0.2	0.0 ± 0.2 <sup>#</sup>	0.0 ± 0.3	25-29 y	0.4 ± 0.3	0.6 ± 0.3 <sup>#</sup>	0.3 ± 0.3
30-34 y	0.0 ± 0.2	0.0 ± 0.2 <sup>#</sup>	0.0 ± 0.3	30-34 y	0.4 ± 0.3	0.6 ± 0.3 <sup>#</sup>	0.3 ± 0.3
35-39 y	0.0 ± 0.2	0.0 ± 0.2 <sup>#</sup>	0.0 ± 0.3	35-39 y	0.4 ± 0.3	0.6 ± 0.3 <sup>#</sup>	0.3 ± 0.3
40-44 y	0.0 ± 0.2 <sup>#</sup>	0.0 ± 0.2 <sup>#</sup>	-1.4 ± 0.3*	40-44 y	-1.1 ± 0.4* <sup>#</sup>	-0.9 ± 0.4* <sup>#</sup>	-1.3 ± 0.3*
45-49 y	-1.5 ± 0.2*	-1.4 ± 0.2*	-1.5 ± 0.3*	45-49 y	-1.1 ± 0.5*	-1.0 ± 0.5*	-1.4 ± 0.3*
50-54 y	-1.6 ± 0.3*	-1.5 ± 0.3*	-1.6 ± 0.4*	50-54 y	-1.2 ± 0.5*	-1.0 ± 0.5*	-1.5 ± 0.3*
55-59 y	-1.8 ± 0.3*	-1.6 ± 0.3*	-1.7 ± 0.4*	55-59 y	-1.3 ± 0.5*	-1.1 ± 0.5*	-1.6 ± 0.4*
60-64 y	-1.9 ± 0.3*	-1.7 ± 0.3*	-1.9 ± 0.4*	60-64 y	-2.0 ± 0.4*	-1.9 ± 0.3*	-1.7 ± 0.4*
65-69 y	-2.1 ± 0.3*	-1.9 ± 0.3*	-2.1 ± 0.5*	65-69 y	-2.2 ± 0.4*	-2.1 ± 0.4*	-1.9 ± 0.4*
70-74 y	-2.4 ± 0.4*	-2.1 ± 0.4*	-2.3 ± 0.5*	70-74 y	-2.5 ± 0.4*	-2.3 ± 0.4*	-2.1 ± 0.5*
75-79 y	-2.7 ± 0.4*	-2.3 ± 0.4*	-1.5 ± 0.6*	75-79 y	-2.9 ± 0.5*	-2.6 ± 0.5*	-2.3 ± 0.5*
80-84 y	-3.1 ± 0.5*	-2.6 ± 0.5*	-1.7 ± 0.6*	80-84 y	-3.4 ± 0.6*	-3.0 ± 0.5*	-2.7 ± 0.6*
≥85 y	-3.7 ± 0.6*	-3.0 ± 0.5*	-1.8 ± 0.7*	≥85 y	-4.1 ± 0.7*	-3.6 ± 0.6*	-3.1 ± 0.7*

Figure 2

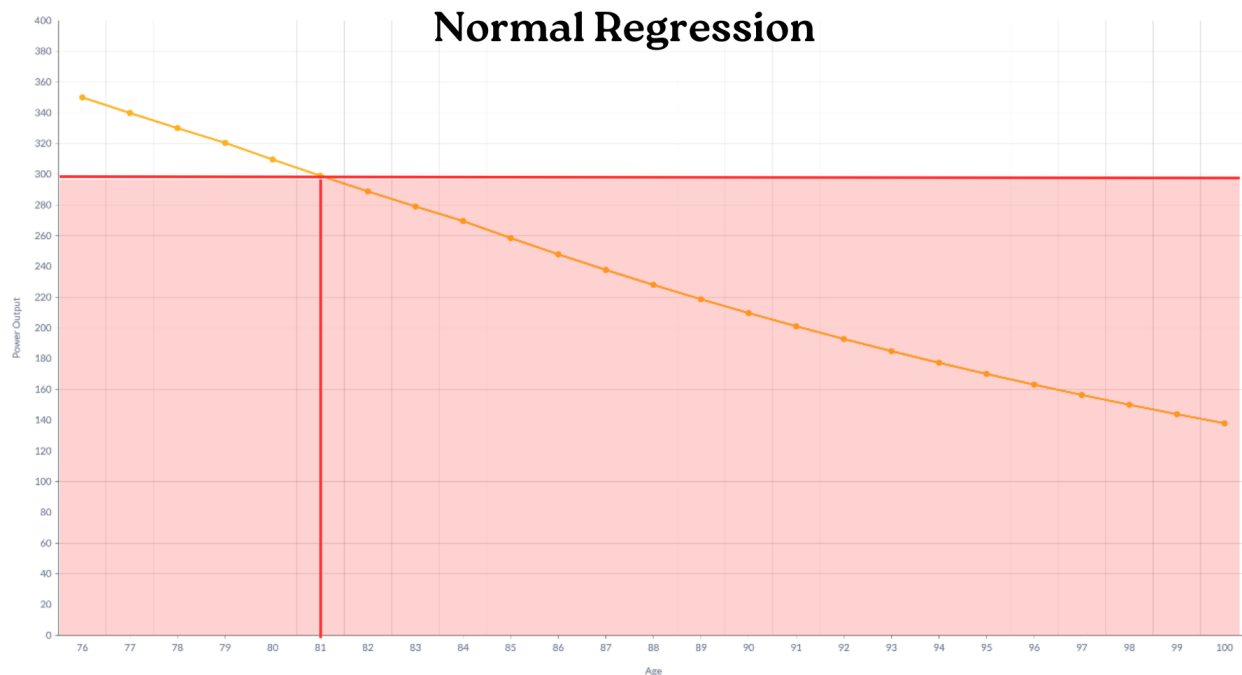
Therefore when we input a power output value measured at evaluation we can understand how this individual might progress over the years. Any sort of deviation from the line with reassessment will show progression or regression. A reliable metric to understand if the exercise program has been beneficial.

In this specific example we sought to understand when one might be in need of additional support. For the sake of this analysis we utilized the need for an assistive device for ambulation as our key indicator.

After collecting data throughout the southwest Florida community it was well noted that those who utilized an assistive device most often had power output measures below 300 watts (80%). In this analysis we provide the normal trajectory without hospitalization, we also provide various examples of individuals and the starting points before and after hospitalization in order to show the potential effects.

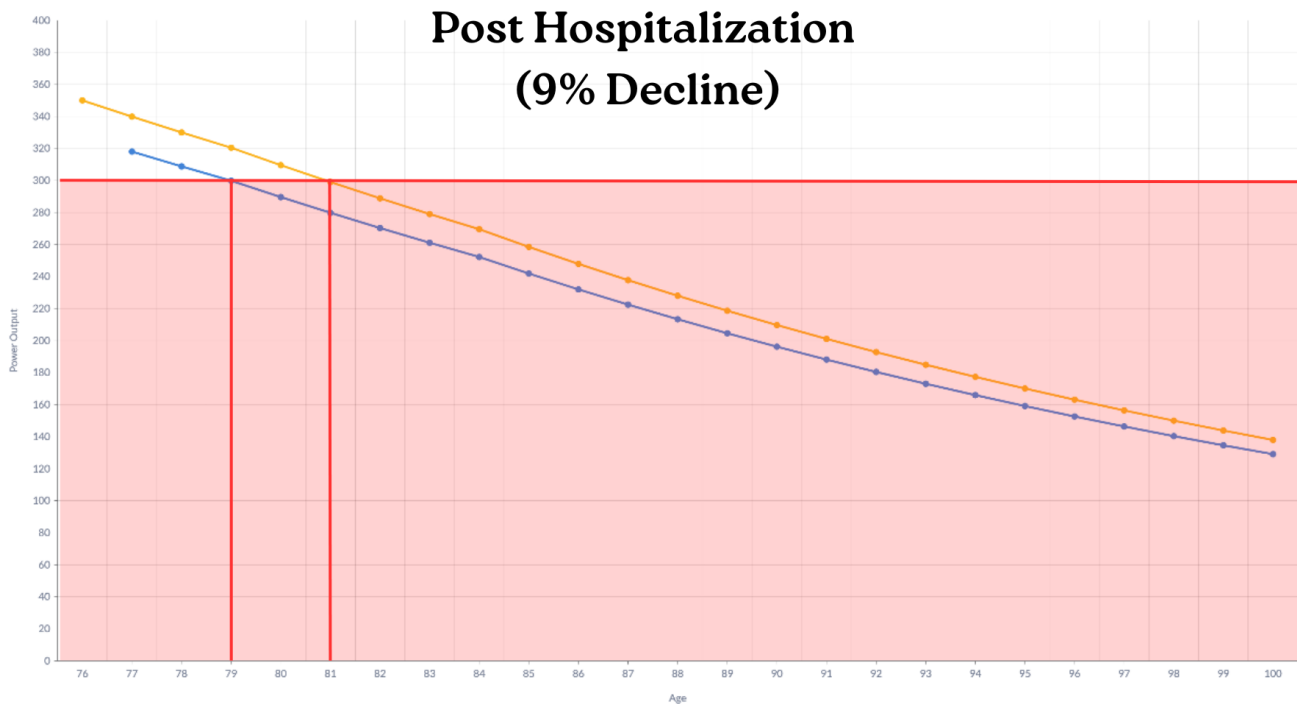
Continue below to see each example.

The most informative utilization of this metric, and the trend line that goes along with it is the change that can be seen. We see this individual was assessed at the age of 76. Following the 'normal' regression we see they will not cross the 300 Watt threshold until the age of 81. Based on our estimates, this may be a period on which this particular individual may need an assistive device, or potentially a period in which family members need to step in to assist.



In this scenario the family may choose to wait until further decline occurs to enact various services due to the decline threshold not occurring for an additional five years. However, what the family fails to recognize, which many families do, is the possibility of an adverse event. This may come in the form of a fall, a hospitalization, or an illness such as COVID-19 that does not ultimately take one's life, but does cause a serious decline.

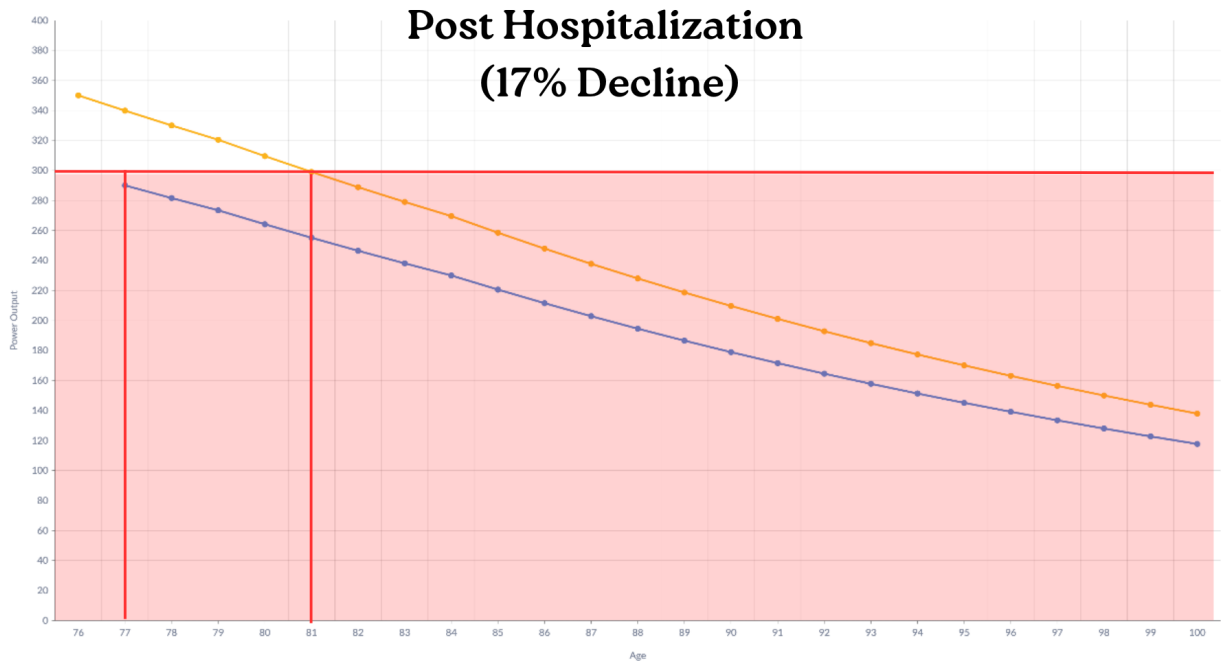
We have shared in previous research reviews that an extended hospitalization may cause a power decline upwards of 17%. This particularly study, although small, noted power loss averages ranging from 9-17%. We have decided to show both, best case and worst case scenario below.



The illustration above indicates a two-year acceleration of the process. Recall, the 9% decline was best case scenario when referring back to the research study. Therefore the discussions, decisions and plans that were said to be made over a period of five years now must occur within three years. While that may not feel like a stark difference, the challenging aspect arises when adult children are caring for elderly parents, while also supporting their own children.

Questions that may arise:

- What do Mom and Dad's finances look like?
- Do they have a plan in place for what their aging journey looks like?
- Will Mom and Dad need to move in with me?
- Will I need to support my parents financially as well?
- How does caring for my parents look like while I live in another state?
- I'm still 10 years from retirement, I can't give up my career to care for them, what will I do?



The illustration above indicates a four-year acceleration of the process. Therefore the discussions, decisions and plans that were said to be made over a period of five years now must occur within one year. This is where many families find themselves, within crisis mode. Unfortunately these cases occur more often than anyone would like to admit.

However, scenarios like these can be drastically avoided through constructive, proactive planning. Now more than ever adult children must recognize they need to act as soon as they notice one slip from their parents normal level of function. This may come in the form of physical or cognitive function. Many find these conversations difficult to have because they are unaware of how to approach such.

Being an organization that focuses on health and wellness, specifically within the physical aspects we recommend going about it differently than ways that many do.

Many approach the situation later than we would like, therefore many are fighting with aged parents who have already begun to lose particular hobbies, activities or even minimal levels of physical function. This conversation is more of a challenge because many aged parents will fight with, "what's the point?", or "I've already lost the ability to do so, and I've been fine without it, why would I fight to get it back?"

You see, though there are points to be made that can 'win' this argument. It's a losing battle. At this point various services can be enacted but many parents will hold resentment toward their children for doing so.

Instead we recommend families begin those conversations far sooner. Instead, come at from a perspective of you wanting them to enjoy time together or time with their grandchildren. Let's paint a picture:

"Dad, I've been thinking, I want my children to have a fantastic relationship with you because I think it's important they know who raised their own dad. I want you to have the ability to take them golfing or play on the ground with them. I think it would be best if we got you involved in some sort of physical activity program"

Instead of highlighting the things one has already lost, get out in front of those issues, showcase what life could look like if a parent went against the grain a bit and redefined what normal aging looked like.

Adding physical activity in one way or another may be the first, and easiest step in the process because it is the least intrusive. Whether a parent begins an exercise class, or has a personal trainer by their side, this is often only going to interrupt their day to day for about an hour a day. On the contrary, when one waits until the true decline has taken hold, this may mean home care services being in 4-6 hours a day. This creates a whole new dynamic within the home.

We end with this, have the conversation early, find ways that are the least intrusive on their day to day, but do so in a way that is going to have lasting impact.



We are using the data collection and the above methods to understand how we are altering the course of each member's future.

The information gathered is a combination of data from LiveWell Health members where they were assessed using [VALD ForceDeck](#) technology.

Questions, comments and concerns can be directed towards Founder and Chief Executive Officer, Andrew Sokolowski.

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Article references can be found at:

<https://academic.oup.com/biomedgerontology/article/75/7/1369/5707093>