

New Modality for Increasing Strength, Energy and Cognitive Flexibility in Golf and Sports

R.Gagne, EET, CFE, NADEP

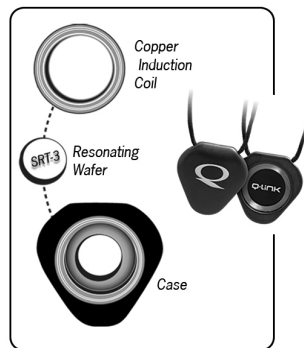
Abstract

The objective was to design a protocol to assess functional changes in strength and cognitive flexibility on individuals who used defined wellness products. The wellness and nutritional industry has been inundated with new products and solutions for individuals claiming to be advantageous in increasing functional performance. Historically these products provided little research and depended upon strictly user testimonials to document change. Clarus Performance Institute contracted MedSource LLC, an independent testing and Research Company in Williamsburg, Virginia, to properly structure and document change with their product from a clinical perspective, to reassure their population of users on the benefits of their technologies. The protocol was designed to incorporate a test / retest structure on the same day as the use of the Clarus' Q-Link® product. Users had no previous exposure of the technologies and / or the testing methodologies. Two industry standard testing modalities were used in the course of our investigation; Computerized MedSource hand strength evaluation and computerized CNS™ cognitive flexibility tests. Both testing methodologies are considered to have a high inter and intra rater reliability with minimal learning curve variation. Accuracy of the strength testing was calibrated to 0.05lbs and results were cross-compared to standard industry norms based on age, sex and gender. Cognitive testing included measures for attention, motor, global response and reaction time. All testing activities were based on industry accepted and published criteria. The results of the same day testing were substantial from three perspectives; one was the overall increase in strength and available energy / decrease in fatigue curves, two was the increase in cognitive functionality in all tested areas, and lastly was the appearance of data related to the specific sport of golf which qualified a consistent appearance of ambidextrous activity (where both hands were equal in strength) yet all individuals were right handed (this would usually dictate a stronger strength measure of approximately 10% on the right side). It seems the professionals in golf made a conscious effort to strengthen their weaker hand/wrist to ensure a balanced swing and grip. This was evident in all test subjects and in all cases tested; benefits of strength and cognitive functional performance were documented with the use of the Q-Link® product.

Overview

The test apparatus chosen for this study were selected based on their relative importance to the field of sport and specifically to that of Golf. All testing tools are clinically accepted and are based upon peer-reviewed published research.

Q-Link® products, manufactured by Clarus Transphase Scientific, Inc., are based on Sympathetic Resonance Technology™ or SRT™ which clarifies the fundamental information pathways between physical matter, linking to its conjunct non-hertzian field. SRT™ has been trusted and enjoyed worldwide for more than 2 decades in the form of Q-Link® Products, a growing range of popular body worn and environmental type products now found in virtually every market segment, designed to enhance well-being, performance and quality of life.



A Golfers' wrist strength plays a large role in the accuracy and the speed of the club head. From setting the club in the proper plane at the top of the swing to support of the club through impact, wrist strength is a key element to the success of the shot. The Golfer needs to build balanced strength in the muscles that control the movements of the wrist throughout the swing. This "balanced" strength is particularly difficult for Golfers due to the fact we live in a right-handed world and most individuals are right hand dominant. It is documented that right hand dominant individuals have a 10% increase in strength on their right hand, whereas left-handed golfers are considered to be ambidextrous. The right-handed Golfers have to make a conscious effort to strengthen and train their non-dominant hand to maintain balance. In the physics of a golf swing, the wrists come second only to the shoulders in terms of power generation. Much is said about the wrist release and the power of the whip in the golf swing. If you do not have sufficient strength in your wrists, they will not give the club the support

needed to move the ball towards the target at impact. Strong and supple wrist motion is key to the forearm rotation needed to finish the impact and send the ball on the proper trajectory. Another factor is the issue of early release due to lack of strength or range of motion in the wrists.

Cognitive attention, motor response and reaction time are all key components of any athletes overall performance. Focus and attention help to set up the play, while enhanced motor response and reaction time provide a clear functional advantage in initiating and following through with the swing. The speed with which the athlete reacts is a combination of their ability to recognize the required response, the choices available to them, the type of reaction required, practice in responding to this situation, fatigue, and the age of the athlete. Cognitive exercises boost the athlete's capacity to absorb a significant amount of information simultaneously and manage it efficiently by approximately 53 percent on average according to studies at the University of Montreal.

Energy and ability to focus are also key elements of any athletic performance and can be measured indirectly through fatigue analysis during the strength testing and through the outcomes of the cognitive flexibility measures.

Method and Procedure

The primary objective was to determine if there were documented changes noted after the use of the Q-Link® product for a period of 4 to 6 hours. It was important to document the test/retest in a single day to alleviate any concerns from a good/bad day perspective. The procedure for the event was as follows:

- Documented new user with no existing use of the Q-Link® product.
- Entered in demographical information on individual.
- Tested for hand strength, position 2 with the MedSource computerized technology.

- Tested for cognitive function with the CNS Vital Signs Cognitive battery designed for athletic performance testing.
- Provided a Q-Link® product to individual to wear and asked them to return in 4 to 6 hours for a retest.
- Once the individual came back they were retested using the exact same criteria and tools to determine change.

Change was measured on the hand strength for both left and right sides including; co-efficient of variation, percentage strength increase and fatigue analysis of grip over the course of three alternating trials on each hand. Normative cross-section testing was provided with placement of individual against standardized industry accepted norms. Change was measured on the cognitive tests on attention, motor response, global response and reaction time against industry accepted comparables.

The following variables were considered during the cognitive flexibility testing activities:

1. Attention: Reflects how vigilant the individual was in tracking the numbers in the middle of the display ("speed limit" response). The test measures the ability to maintain focus, track information over brief and continuous periods of time thus reflecting whether a

subject can perform attention based mental tasks quickly and accurately.

2. Motor Speed Accuracy: Reflects how well the individual kept the crosshairs on the logo. This test measures perceiving, attending/responding to incoming and changing targets with a mouse by measuring speed, fine motor coordination, and visual-perceptual ability.
3. Global Performance: This was an average of the two scores, Attention and Motor Speed Accuracy. This percentage allows a subject to see an overall "single" number summary score for a quick assessment of performance over a group of serial tests.
4. Reaction Time: Reported the "speed limit" response in milliseconds, the lower the score the better. Like all these tasks, reaction time measurement is relevant to everyday activities such as driving a car, competing in sports, tracking and responding to a set of simple instructions in an appropriate time.

As noted above, Attention, Motor Speed and Global Performance were based on a 100% scale whereby the higher the percentage, the better the performance, whereas Reaction Time was based in milliseconds where the lower the time the better the performance.

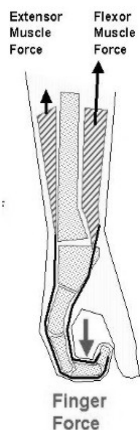
The data was correlated to not only display actual individual performance and comparison to norms but more importantly the change in data between test trials. Inter and intra Rater reliability for all tests were high and learning curves were not determined to be a factor in testing. Further to the standard demographics, gender and occupation were also noted for future correlation.

Participants

73 participants, who were either Golf professionals or active Golfers at a PGA event, were tested once using both testing platforms for both strength and cognitive flexibility. Of the total 16 individuals were tested twice for strength, 3 were females, and 14 individuals were tested twice for the cognitive flexibility of which 2 were females. Both participant groups were tested on the same day. Age variance was from age 22 to age 70. All individuals were healthy subjects with no apparent disability or impairment noted.


Apparatus


MedSource computerized Strength Testing Device Model: HDPG was used due to its computerized accuracy and reproducibility (accurate to 0.05 lbs). System was clinically calibrated prior to testing activities. Calibration was completed using a certified 20lb weight cube and digitally measured through the operating software. The weight was placed on the device and the system calibrated to its measure which ensured accuracy throughout the range of testing as device load cell/transducer is a linear device.



A standard computer, keyboard and mouse were used with the on-line cognitive flexibility evaluation. The computer based cognitive assessment took place in less than five minutes with instruction. All tests were performed in a seated position.

Sample Report



RESULTS


Attention	Motor Speed Accuracy	Global Performance	Reaction Time
90%	70%	80%	565ms
Higher is Better	Higher is Better	Higher is Better	Lower is Better

A perfect score for Attention, Motor Speed Accuracy and Global Performance is 100% for each. Higher scores are better, except reaction time, in which case a quicker or lower score is better.

Attention reflects how vigilant you are in tracking the numbers in the middle of the display ("speed limit" response). The test measures the ability to maintain focus, track information over brief and continuous periods of time thus reflecting whether a subject can perform attention based mental tasks quickly and accurately.

Motor Speed Accuracy reflects how well you keep the crosshairs on the logo. This test measures perceiving, attending/responding to incoming and changing targets with a mouse by measuring speed, fine motor coordination, and visual-perceptual ability.

Global Performance is an average of the two scores, Attention and Motor Speed Accuracy. This percentage allows a subject to see an overall "single" number summary score for a quick assessment of performance over a group of serial tests.

Reaction Time reports the "speed limit" response in milliseconds, the lower the score the better. Like all these tasks, reaction time measurement is relevant to everyday activities such as driving a car, competing in sports, tracking and responding to a set of simple instructions in an appropriate time.

Now that you've taken the first Q-Link Challenge, and we have a baseline to compare future test results against, the next step is to integrate a Q-Link product into your life.

Once you make this purchase, make note of your order number--you'll need it to access the second half of the Q-Link Challenge. Once you receive your product, wear it consistently for at least two weeks. When ready for the next test, visit www.qlinkgolf.com/challenge with your Q-Link order number and follow the instructions.

*Remember, you must purchase from www.qlinkgolf.com to gain access to the second test and, only body worn Q-Link products, when worn as directed, are suitable for use in the Q-Link Challenge Process.

We are committed to research and to providing ongoing objective and factual evidence to support our technology and thank you for taking the Q-Link Challenge™.

www.qlinkgolf.com/challenge

Results

The following data tables display the outcomes from both the tested groups over the defined period of 4 to 6 hours. Pre and post results were computer generated and analyzed for accuracy and completeness.

Chart One: Hand Strength Evaluation

(lbs)	(lbs)		(lbs)	(lbs)					Completed
Trial 1	Trial 2	%	Trial 1	Trial 2	%	RH Dom.	M/F	Fatigue Ratio	Cognitive Testing
L Side	L Side	Increase	R Side	R Side	Increase				
116.3	124.3	6.878762	112.7	122.3	8.5181899	R	M	Decreased	Yes
78.7	94.7	20.33037	83	90	8.4337349	R	M	Decreased	Yes
78.7	88.7	12.70648	74.3	83	11.709287	R	M	Decreased	Yes
92.7	99.7	7.551241	98.3	100	1.7293998	R	M	Decreased	Yes
77	74.3	-3.506494	70.3	73	3.8406828	R	M	Decreased	Yes
121	130.7	8.016529	109.3	124.3	13.723696	R	M	Decreased	Yes
63.3	67	5.845182	55.3	61.3	10.84991	R	F	Decreased	Yes
66.3	68.3	3.016591	63	67.7	7.4603175	R	M	Decreased	Yes
67.3	70.7	5.052006	73.7	86	16.689281	R	M	Decreased	No
87.7	89.3	1.824401	79	78.3	-0.8860759	R	M	Decreased	No
39.3	40.7	3.562341	26	29	11.538462	R	F	Decreased	No
52	56.3	8.269231	48.7	52.7	8.2135524	R	M	Decreased	No
131	138	5.343511	135	140	3.7037037	R	M	Decreased	No
82.7	88.7	7.255139	84	87	3.5714286	R	F	Decreased	No
105	105	0	113.7	119.7	5.2770449	R	M	Decreased	No
61	62.3	2.131148	67	70.3	4.9253731	R	M	Decreased	No

Chart Two: Cognitive Flexibility

AGE	GENDER	OCCUP.	ATTENTION 1	ATTENTION 2	MOTOR 1	MOTOR 2	GLOBAL 1	GLOBAL 2	REACTION 1	REACTION 2
51	Female	Golfer	95	98	77	82	86	90	632	668
70	Male	Golfer	90	95	66	67	78	81	680	612
56	Male	Golfer	95	93	66	67	81	80	619	658
22	Male	Golf Pro.	83	93	64	58	74	76	801	660
44	Male	Golfer	90	95	74	72	82	84	723	663
46	Male	Golfer	78	80	74	75	76	78	722	753
60	Male	Golfer	95	75	71	62	83	69	775	814
38	Male	Golfer	78	93	68	71	73	82	679	631
63	Male	Golfer	93	100	67	70	80	85	654	766
61	Male	Golfer	100	100	74	75	87	88	643	672
62	Male	Golfer	78	83	67	61	73	72	722	698
65	Female	Golfer	100	98	60	67	80	83	604	612
26	Male	Golf Pro.	98	100	77	78	88	89	614	607
42	Male	Athlete	80	88	72	77	76	83	747	744

Discussion

The following results, although demonstrated on a golf specific participant base, can be extrapolated to a wider athletic audience. All athletes involved in sports that require hand function and general cognitive flexibility would be relational.

1. Strength results demonstrated an average increase of 5.892 percent on the left side and 7.456 percent on the right (dominant) hand side. The range of increase was 1.82 to 20.33 percent and on the right side was documented from 1.0 to 13.72 percent. It should be noted that individuals in many cases displayed a larger increase on either the right or left sides depending upon multiple facts including individual reported historical injuries or reported tenderness due to recent muscle strains or sprains. It was interesting to note that none of the individuals reported issues of concern until the data was reviewed with them and then they documented the problems in functionality. They all perceived their areas of concern were rehabilitated and effectively not an issue anymore.
2. Fatigue Curves and Available Energy results through graphical analysis of the strength curves over time with six alternating trials clearly displayed a decrease in fatigue response on all of the repeated trials. This is indicative of an increased energy level and a more "conditioned" response. This is a clear measure of better performance and a standard athlete response usually demonstrated after training exercises and recovery.
3. Consistency of measures (co-efficient of variation) demonstrated throughout the testing activities were all below the 12% defining mark, which is indicative of a consistent and reliable effort by each individual.
4. Dominance of the participants were all reported as right handed which in a normal population would mean the right hand would be on average 10% greater in strength than the left hand. As noted in the collected data, the right hand of the tested subjects was actually lower than the left hand in 56% of the cases. This is highly unusual and is actually a score associated with a left handed or ambidextrous individual. After discussion, it was noted that the golfers took a specific interest in strength training on their left side to compensate for their strength imbalance and subsequently over trained in many cases causing a reverse imbalance. In the extreme cases, the golfers noted that their "game" had recently been less than normal and that this may have been a significant factor.
5. Attention was noted in repeat trials as being increased in 71% of the cases with a range of 2 to 8% increase in those noted. Attention and focus during the game of golf and sports in general is an integral factor in positive performance.
6. Motor Response was noted in repeat trials as being increased in 79% of the individuals tested with an increase ranging from 1 to 7%.
7. Global Performance showed an increase in attention and motor response in 79% of cases tested and retested.
8. Reaction Time measures displayed that 64% of the individuals being tested and retested decreased (i.e. improved) there relative reaction time. Decrease (improvement) in reaction time ranged from 1.14% to 17.6% for the participant group.

In their normal workouts, athletes regularly evaluate their physical performance, but until now there has been no tool that could rate their cognitive and strength performance accurately and quickly. If an athlete feels both physically and mentally ready, that can only have a positive influence on his or her performance. It is concluded from the tested measures that the Q-Link® product has a proven and documented increase in general performance in the areas tested. The results portray that the Q-Link® product is an effective wellness modality that can be used to increase both hand strength and cognitive flexibility.

The next directive would be to expand these results to include measures with other sport specific candidates, a larger test base as well as the incorporation of placebo groups. All athletes strive for optimum functional fitness and products such as these offer a documented alternative or enhancement to existing routines. Every athlete looks for an edge in competition and whenever your cognitive flexibility or strength can be modified to help you excel then that certainly is an advantage, especially in a non-invasive approach.

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The Author

RAY GAGNE, EET, CFE, NADEP

Mr. Gagne has worked extensively in the area of sports medicine technology design and development. Starting with the Olympics in the 1980's he had developed an extensive line of modalities used to expedite recovery after injury and was instrumental in the development of diagnostics for electromyography, nerve conduction velocity and muscular strength. After the Olympics experience, he developed a wide range of strength, range of motion, occupational and cognitive technologies used to objectively measure the whole person. Ray has worked with and educated professionals in the workers compensation, disability and athletic performance industry throughout six countries over the past fifteen years.