MASTER´S THESIS

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Relationships between squat clean, sprint and vertical jump performance.

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Abstracts

Background: Handball players commonly use Olympic weightlifting derivates to train explosive abilities such as sprint and vertical jump skills. Most used by coaches and athletes is the derivates of the clean, such as hang, power and squat clean. The squat clean allows athletes to use higher load, which results in higher rate of force development, peak power output, force-velocity load and requires more muscular strength, which could help athletes jump higher and sprint faster.

Objective: To examine (1) the correlation the relationship between squat clean performance with sprint and vertical jump performance, and (2) how the effect of anthropometrics plays a crucial role in this correlation.

Methods: 22 well trained resistance experienced elite level handball players participated in this study (age: 20.41±2.7 years, height: 1.81±0.37 meters, body mass: 89.73±10.7 kg) were tested for one repetition maximum squat clean (1-RM), thirty-meter sprint and Sargent vertical jump test. Pearson's R and Spearman's Rho were used to compare the relationship between anthropometrics and squat clean 1-RM upon (absolute and relative value) on sprint and vertical jump performance.

Results: Pearson's R and Spearman's Rho statistical analyses show a positive correlation between squat clean 1-RM and Sargent vertical jump test and between relative strength with thirty-meter sprint and Sargent vertical jump test.

Conclusion: This study shows that the squat clean relatively to an athlete's body mass shows moderate to large correlation in the thirty-meter sprint and vertical jump performance. However, it did now show any form of correlation between ten or twenty meter sprint and is therefore a better suited exercise for longer sprint distances and vertical jump performance

Keywords: Squat clean, 1-RM, sprint, vertical jump, performance, anthropometrics, Olympic weightlifting

Forword

Med disse ordene ferdigstiller jeg min masteroppgave og det 5-årige utdanningsløpet ved Nord Universitet, tre år i Bodø og to år i Levanger. Etter fem utfordrende og lærerike år har jeg opparbeidet meg ett kunnskapsnivå innenfor idrett og trening som jeg aldri kommer til å glemme. Med det skal dette kapittelets avsluttes, og et nytt skal begynne. Nå som jeg står i den andre enden av studieløpet, er jeg utrolig stolt og takknemlig. Jeg er stolt over all innsatsen og arbeidet som jeg har lagt ned, for at jeg skal kunne bli den beste fagpersonen som jeg overhode kan bli. Jeg er takknemlig for alt jeg har opplevd, samt alle menneskene jeg har møtt på veien. Disse fem årene kommer til å være med meg så lenger jeg lever og jeg er evig takknemlig for mulighetene jeg har fått og kommer til å få, på grunn av disse årene.

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Contents

1.0 Introduction

Strength and power are two essential components of athletic performance in many sports and are important components in sprint and vertical jump performance. The ability to produce high force and generate power is highly dependent on an athlete's anthropometrics (Teo, et al. 2016, Brazier, et al. 2020). McBride, et al. (1999) compared strength and power characteristics between elite level Olympic Weightlifters, powerlifters and sprinters and showed that Olympic Weightlifters produce higher peak force and peak power compared to powerlifters and sprinters. This supports Henricks. (2014) who suggested that the need for maximal force production and peak force during the concentric contractions relatively to the athlete's body mass may result in improved sprint and vertical jump performance. Other studies have reported findings that high power and force in the vertical direction is strongly correlated to those of sprinting performance (Weyand, et al. 2000, Sleivert and Taingahue 2004). This suggest that exerting high force and power rapidly in the vertical plane such in Olympic Weightlifting derivates could help develop sprint performance (Baker and Nance 1999, Young, et al. 2001).

Among the various strength and power exercises utilized in sports training, the squat clean is a popular compound exercise that has been shown to improve strength, power, and performance in a range of athletic activities such as in competitive handball (Hori, et al. 2008, Comfort, et al. 2013, Ayers, et al. 2016). While it is widely accepted that anthropometric characteristics play a crucial role in athletic performance (Claessens, et al. 1994, Mészáros 2000, Storey and Smith 2012). Are there limited research investigating the relationship between an athlete's squat clean performance relative to their anthropometric characteristics and their performance in other key athletic movements such as the thirty-meter sprint and vertical jump (Hori, et al. 2008). Understanding this relationship could have practical implications for coaches and athletes seeking to optimize their training programs and improve their overall athletic performance.

Competitive handball is an Olympic sport ball game which is determined by individual performance, tactical components and interactions within the team (Wagner, et al. 2014). There are six players and one goalie on the field on each handball team with the objective of the sport to score goals. Handball is a position-based sport and athletes play their positions based on their anthropometrics and athletic performances (Srhoj, et al. 2002). In the sport of handball there are several key factors that determine the performance of handball competitiveness and individual plays. The key skills required to play handball are considered fundamental skills for handball players. These techniques are mainly used to score goals and are a large part of the repertoire of skilled players. The factors are the players' ability to coordinate movements such as running, jumping, pushing, change of direction and team-specific movements such as passing, catching, throwing, checking, and blocking (Wagner, et al. 2014). One of the most important individual skills needed for competitive handball is strength and power (Wagner, et al. 2014). Therefore, Handball players incorporate Olympic weightlifting strength exercises in their program that require high speed, high velocity training. Strength and power are important aspects of a successful handball player. Gorostiaga, et al. (2004) found that elite players with a higher one repetition maximum bench press had a higher power output of the upper extremities (+20%) and a higher average power output in half squat (+16%) compared to amateur players. They found positive correlation between ball velocity and in the 3-step running throw. Several studies found positive correlations between strength and power on ball velocity in team handball throw (Granados, et al. 2007, Marques, et al. 2007, Chelly, et al. 2010, Debanne and Laffaye 2011). This could suggest that muscular strength and power in the lower extremities can benefit handball players in sprinting and jumping performances. Gorostiaga, et al. (2004) suggested that higher values of maximal strength and muscle power would give more advantages to sustain such forceful muscle contractions during team-handball specific movements. Therefore, it would be interesting to investigate how Olympic weightlifting derivates affect sprint and jump performance in handball players.

Olympic Weightlifting is a competitive Olympic sport and is the only strength sport in the Olympic Games. Olympic weightlifting includes two lifts, the snatch and clean and jerk (Storey and Smith 2012). Olympic Weightlifter athletes are arguably the most powerful athletes in the strength performance world. Olympic Weightlifting benefits strength, speed, and power. This contributes to other athletic performances. In addition to athletic enhancement Olympic weightlifting also benefits musculoskeletal and mechanical adaptations, cardiorespiratory abilities, and motor behavior (Chiu and Schilling 2005). The snatch and clean & jerk exercises have been widely used to enhance and increase sport and athletic performance (García-Valverde, et al. 2021, Weldon, et al. 2021) Many athletes use derivates of the snatch and clean and jerk in their strength training program to enhance athletic abilities (Teo, et al. 2016, Hermassi, et al. 2019). When performing the snatch, clean and jerk athletes have reported some of the highest rate of force development and relative peak power output compared to traditional powerlifting exercises such as the squat, bench press and deadlift (Stone, et al. 2006, Storey and Smith 2012). Due to the high rate of force development and high-power output Olympic weightlifting has it could have a positive effect on sprint and vertical jump performance which also require high rate of force development and high-power output (Teo, et al. 2016). The squat clean or the full clean is the first part of the clean & jerk and one of the most popular Olympic Weightlifting derivates for athletes requiring rapid rate of force development. In the clean & jerk lifters are able to lift 18-20% more weight than in the full snatch (Storey and Smith 2012). When performing the squat clean lifters have reported higher peak power output and rate of force development in the first and second pull of the clean than in the snatch and overhead jerk in both male and female lifters (Garhammer 1991, Stone, et al. 2006). Many athletes therefore use these exercises to increase sprint and jump performance.

Body anthropometrics are physical characteristics and measurements of how the human body works (McConville, et al. 1980, Brazier, et al. 2020). Therefore, it will affect Olympic Weightlifting and other competitive sports. There are three key components that describe body anthropometrics and their effect on Olympic Weightlifting as well as other sports (Storey and Smith 2012, Zaccagni, et al. 2019, Brazier, et al. 2020). The three components include mechanical advantages, body composition and weight class. Mechanical advantage such as the length of limbs and the size of joints can affect the mechanical advantage of an athlete in weightlifting. For example, an athlete with shorter limbs may have a greater leverage advantage during a lift than an athlete with longer limbs (Storey and Smith 2012). Additionally, the size of joints can affect the range of motion which can also influence the athlete's technique and performance (Garhammer 1985, Storey and Smith 2012, Vidal Perez, et al. 2021). Body composition such as muscle mass and body fat percentage can also affect an athlete's performance. A higher muscle mass and fat mass may allow for greater force production during a squat clean therefore resulting in higher absolute 1-RM. While a lower body fat percentage may improve the athlete's relative strength (Chiu and Schilling 2005, Storey and Smith 2012, Reale, et al. 2020). The third component is weight class. This is commonly used in Olympic weightlifting and other strength sports and competitions are typically divided into weight classes. An athlete's body anthropometrics can determine which weight class they are best suited for. Athletes with larger body sizes and higher body weights may have advantages in higher weight classes, while athletes with smaller body sizes may have advantages in lower weight classes (Stone, et al. 2006, Storey and Smith 2012).

Several studies have examined the effects of Olympic Weightlifting on sprint, vertical jump, agility drills, countermovement jumps and squat strength performance and found improvements in athletic abilities and performance (Fatouros, et al. 2000, Hoffman, et al. 2004, Hori, et al. 2005, Moore, et al. 2005, Tricoli, et al. 2005, Hori, et al. 2008, Arabatzi, et al. 2010, İnce 2019). However, only one study has looked at the hang power clean 1-RM strengths correlation with body anthropometrics between sprint, change of direction and countermovement jump (Hori, et al. 2008).

The vertical jump is another key factor in many sports. The vertical jump tests physiological adaptations from training. Vertical jump testing is commonly used to measure improvements in vertical jump performance for sports and as a measurement of general lower body strength and power (Hedrick and Anderson 1996). Both sprint and vertical jump are highly recommended for handball and are two important aspects for a successful athlete and athletic performance (Hori, et al. 2008, Wagner, et al. 2014). The two skills are basic needs for every athlete in ball sport and other sports requiring rapid rate of force development, peak power, and power output. In sprinting and vertical jumping a strong lower body is beneficial since the majority of power output and rate of force developments are used by the lower extremities (Behrens and Simonson 2011, Seitz, et al. 2014).

Power and strength are strongly correlated to sprint performance, especially in the starting phases of sprint acceleration (Behrens and Simonson 2011, Henricks 2014, Haugen, et al. 2019). Some studies found positive correlations between different jump tests and sprint acceleration and speed because of the physiological and biomechanical similarities between sprint and vertical jump abilities (Marques, et al. 2011, Nagahara, et al. 2014, Köklü, et al. 2015). The importance of these skills in handball are required to sprint the distance of the handball court numerous times back and forth throughout the duration of the game. Vertical jumping is used to leap above the opponents to be able to score goals. Handball players could therefore benefit from the squat clean towards sprint and vertical jump performance.

Only three articles have compared the relationship between hang and/or power clean on sprint and vertical jump abilities (Baker and Nance 1999, Hori, et al. 2008, Barr, et al. 2014). Baker & Nance (1999) investigated the hang power clean 3-RM on ten- and- forty-meter sprint and found positive correlation between sprint start, ten-meter and forty-meter sprint in 3-RM hang power clean relative to the athlete's body mass. Hori, et al. (2008) investigated whether an athlete who possess higher relative strength 1-RM in hang power clean performed better in a series of sports-related tests than athlete's who possess a lower relative strength 1-RM in hang power clean. The study found that athletes with a higher relative 1-RM in hang power clean ran faster and jumped higher than athletes with lower 1-RMs. Barr, et al. (2014) investigated the effect of strength and power training on sprinting and found strong correlation with higher 1-RM power clean relative to an athlete's body mass in sprint acceleration and sprint speed. All three articles investigated the hang and/or power clean on elite rugby players. The present study is the first one to look at the relationship between the full squat clean exercise on sprint and vertical jump performance in relation to athlete's anthropometrics.

The strength and power exercise investigated in this study was the squat clean, a common weightlifting exercise used by athletes worldwide for increasing the clean and jerk strength. This type of exercise uses the entirety of the lower extremities (Hoffman, et al. 2004, Tricoli, et al. 2005, Suchomel, et al. 2017). The squat clean or the clean is one of the most popular strength exercises in sports as it is performed predominantly as a concentric movement that has similar knee angle of sprint start (Baker and Nance 1999). This type of biomechanical movement is beneficial for sprinting and vertical jumping since the majority of power output and force development are used by the lower body musculature (Hedrick and Anderson 1996, Behrens and Simonson 2011, Seitz, et al. 2014). Its variations are commonly used amongst Olympic Weightlifters, strength and conditioning coaches and athletes within a wide range of sports (Stoessel-Ross 1993, Ebben and Blackard 2001, Durell, et al. 2003, Simenz, et al. 2005, Weldon, et al. 2021). The exercise is popular for its less technical requirements than the full snatch and the overhead jerk and is technical similar to the Romanian Deadlift and the Front Squat. Its variations, hang, power and squat clean are used for enhancing sport and athletic performance (Stoessel-Ross 1993). The clean exercise practices the same triple extension as the snatch and its derivates but with less technicality and is able to overload significantly compared to the full snatch and the overhead jerk. The triple extension in the ankle, knee and hips with the Olympic Weightlifting exercises are similar to those that are needed for sprinting and jumping (Mann and Hagy 1980, Harland and Steele 1997, Bergamini 2011). How this exercise affect sprint and vertical jump performance is still unclear.

Therefore, the purpose of this study is to investigate the correlation between the relationship of squat clean performance with sprint and vertical jump performance and the effect of anthropometrics upon these relationships in well trained, experienced resistance trained high level handball players. Specifically, this study will investigate whether athletes with certain anthropometric characteristics are better suited to excel in the squat clean, thirty-meter sprint and vertical jump and whether the relationship between these exercises varies based on athlete's body mass and relative strength. The findings of this study could have practical applications for coaches and athletes providing insight into the importance of considering an athlete's anthropometric characteristics when designing training programs to enhance athletic performance. Due to the high rate of force development, high speed and high velocity exercise; squat clean, we hypothesized the following:

Hypothesis (H1): Athlete's with higher absolute strength in squat clean will sprint faster in the thirty-meter distance and jump higher in the Sargent jump test.

Hypothesis (H2): Athlete's with higher relative strength in squat clean compared to body anthropometrics will sprint faster in the thirty-meter distance and jump higher in the Sargent jump test.

2.0 Method

To investigate the correlation of squat clean on sprint and vertical jump skills and the effect of anthropometry (body mass and height) upon this correlation a Pearson's R and Spearman's Rho design was used. Three tests were conducted, one repetition maximum squat clean, thirty-meter sprint with measurements at ten- and twenty-meter distances and Sargent vertical jump test. The full squat clean was the Olympic Weightlifting exercise evaluated for the study and the sprint and vertical jump tests were sport-related skill tests. Correlation between all measurements among all subjects were calculated the strength of relationships.

2.1 Participants

A total of twenty-two first and second division male Norwegian handball players were recruited to participated in this study. Their training experience and health was taken into consideration before asking athletes to participate in the study. Their age, height and weight were measured prior to testing (***table 1***). The present study was conducted during their off-season training period to avoid fatigue and scheduling.

Table 1. *Mean ± SD, body weight, height, age, athlete's relative strength, squat clean 1-RM, 10-20-30 meter sprint and Sargent vertical jump test with minimum and maximum.*

	Mean ± SD	**Minimum**	**Maximum**
Age (Yrs)	20.41 ± 2.7	17	28
Height (Cm)	1.81 ± 0.37	1.78	2.08
Body mass (Kg)	89.73 ± 10.7	65	113
Relative Strength	1,04 ± 0.7	0.78	1.38
Squat Clean 1-RM (Kg)	93.18 ± 17.29	60	115
10-meter sprint (S)	1.80 ± 0.1	1.63	2.06
20-meter sprint (S)	3.11 ± 0.2	2.93	3.52
30-meter sprint (S)	4.33 ± 0.2	4.13	4.96
Sargent vertical test (Cm)	55.09 ± 7.3	42	74

Their medical history was known before testing and none of the subjects had any pain or injuries during the testing period. The participants had at least one year training experience with the barbell clean exercise or its variations (squat, power or hang clean). The study was approved by the Norwegian Center for research Data (NSD) (project nr: 874014) and all the subjects had read the information letter approved by the NSD explaining the procedure and purpose of the study and signed the informed consent document. The Olympic Weightlifting exercise that was tested was the full clean or squat clean one repetition maximum. The sport related exercise was ten, twenty, thirty-meter sprint and Sargent vertical jump test.

2.2 Testing days

The testing was administered over a three-day period with forty-eight hours between the squat clean 1-RM test and thirty-meter sprint and vertical jump test to avoid fatigue.

Table 2. *Days of testing, measurements of athletes, 1-RM test and athletic performance testing.*

Day 1	Measurement of athletes: Height, body mass and age One repetition maximum squat clean
Day 2	No team practices, matches or individual training were conducted during test period.
Day 3	Thirty-meter sprint and Sargent vertical jump test

2.3 Testing

The squat clean test was performed in an indoor strength training facility and was done 48-hours before the sprint and Sargent test. The thirty-meter sprint test and Sargent test were all performed at the same indoor handball court under similar conditions. Both the sprint and vertical jump tests were performed on the same time of the same day. Before the start of each test subjects were given a warm-up protocol with several minutes of aerobic exercises and test-related exercises to warm up the entirety of the body and muscles that were involved during testing. Only the athletes, the team coaches and the researcher were there to observe the tests during test days. No other form of distraction was there to affect the results.

2.3.1 One repetition maximum squat clean

The squat clean exercise was performed with an Eleiko Performance Weightlifting Bar 20kg. The athletes were to raise the barbell from the floor using a shoulder width grip to the front of the shoulders as explosively as possible in one continuous movement receiving the barbell in the bottom position of a front squat with the barbell resting on the athlete’s shoulders to a standing position with the knee’s fully extended with an upright torso (Hori, et al. 2008, Storey and Smith 2012). Warm-up protocol for the 1-RM squat clean attempt is shown in ***table 3*** and ***table 4***.

Table 3. *A basic aerobic warm-up was conducted at the beginning of the test.*

5-10 Minutes	Light to moderate activity cycling, row machine or treadmill walking of athlete's choice
5-10 Minutes	Dynamic stretching of the lower and upper limbs

Table 4. *Squat clean warm-up after the aerobic warm-up. Based on athlete's previous 1-RM squat clean result.*

Empty barbell (20kg)	5 Repetitions
40% of athlete's previous 1-RM	4 Repetitions
60% of athlete's previous 1-RM	3 Repetitions
80% of athlete's previous 1-RM	2 Repetitions
90% of athlete's previous 1-RM	1 Repetition
1-Repetition maximal attempt	3 Attempted repetitions

This type of warm-up involved both heavy and light loads which affect different components of muscle action (Young 1993). After each successful 1-RM attempt the athletes were given four minutes of rest and weight was increased by 2.5-5 kg as long as the athlete's felt like they could increase the weight. If the athletes failed an attempt they were given instructions to try the same weight again. If they succeeded they would increase the total weight by 2.5 kg. During the attempts athletes were to get verbal feedback from their physical coaches about technique and execution until a final one repetition maximum was achieved. Athletes were given three attempts to make a successful 1-RM lift. Whichever weight was successful was used in the analysis for relative and absolute strength.

2.3.2 Thirty-meter sprint test

The thirty-meter sprint test was measured by using four pairs of timing gates placed at the starting line, ten meters, twenty meters and thirty meters distances with one-meter-high tripods (TCi System, Brower Timing Systems, Draper, USA). The subjects started in a standing position with the toes of the preferable foot five centimeters behind the starting line. Subjects were instructed to start when they felt ready to sprint maximal effort without any starting signal. Each subject was given three attempts however most subjects only used two attempts since sprint times increased in the second attempt. The best time was used for further statistical analysis.

2.3.3 Vertical jump test: Sargent test

The Sargent test is a lower limb strength and power test that requires minimal equipment and tests athletes vertical leap ability (equipment used were adjustable measurement/centimeter-board and chalk or tape). The Sargent test can be used in the field or in laboratories. The purpose of the Sargent test is to measure the persons' standing reach and the height of which he can jump and touch. The Sargent test was performed at the same day as the thirty-meter sprint test, with thirty minutes break between tests. Athletes stood next to the wall keeping both feet on the ground reached one hand as high as possible and mark the height with a centimeter-board connected to a magnetic grip. The athletes then jumped as high as possible from a static position with chalk or tape on his fingers and marks the height of the jump on the centimeter—board. The athletes were given three attempts to jump as high as possible. The highest jump result was used for further analysis. The vertical jump score differentiated between the persons reach and the vertical leap the athletes could reach (van Dalen 1940, Klavora 2000, de Salles, et al. 2012).

Table 5. *Warm-up protocol for the thirty-meter sprint and sergeant vertical jump test.*

5 Minutes	Low to moderate-intensity jogging	
5 Minutes	Walk with high knee-bends, kickbacks, side-step	
3 Minutes	Dynamic Stretching	Stretching of the lower limbs (hip, knee, and ankle flexors)
3 Minutes	Thirty-meter acceleration Runs	Low intensity walks back to start
2 Repetitions	Submaximal vertical jumps	
30-meter sprint and Sargent vertical jump test	Athletes were given 3 maximal effort attempts in each test	

2.3.4 Statistical analysis

To check the form of normality a descriptive analysis was conducted in SPSS. The descriptive analysis test showed that four out of nine data samples were not normality distributed (age, height, twenty and thirty-meter sprint). The Shapiro Wilks test was then used to analyse the age, height, twenty and thirty-meter sprint to check if the data were normally distributed. The Shapiro Wilks test showed that the age, height, twenty and thirty-meter sprint were normally distributed ($p>0.05$). Further analysis was conducted using the athlete's height, body mass, squat clean 1-RM (absolute and relative strength), ten, twenty and thirty-meter sprint and Sargent vertical test. The statistical analysis used for this test was a Pearson's R correlation, and since not all data were normally distributed the Spearman's Rho correlation analysis was also performed. The criterion for statistical significance was set at $P \leq 0.05$ for all analyses.

3.0 Results

All participants completed the testing and the results from all athletes (n=22) are shown in ***table 6***. Results are ranked by their Squat clean 1-RM/ athletes' body mass from highest to lowest. Athlete's relative strength was conducted by the following equation:

Squat clean 1-RM absolute value / Athletes' body mass = Relative strength.

Table 6. *Results from the squat clean 1-RM test, sprint test and vertical jump test. The table is adjusted by the athlete's relative strength, from high-to-low.*

Squat clean 1-RM (absolute value)	10-m sprint	20-m sprint	30-m sprint	Sargent test	Athletes' relative strength
115	1.73	2.98	4.16	54	1.38
110	1.74	3.03	4.19	53	1.3
110	1.71	2.97	4.14	60	1.26
115	1.83	3.12	4.29	57	1.24
110	1.73	3.04	4.19	66	1.20
95	1.72	3.06	4.22	57	1.11
105	1.86	3.07	4.35	48	1.10
95	1.82	3.03	4.28	60	1.09
105	1.80	3.00	4.14	74	1.08
70	1.75	3.06	4.17	49	1.07
85	1.88	3.12	4.20	58	1.06
115	1.97	3.28	4.48	50	1.02
105	2.06	3.41	4.68	60	1.02
100	1.84	3.23	4.55	52	1.02
90	1.72	2.97	4.13	62	1
85	1.66	2.94	4.21	56	0.93
85	1.87	3.22	4.49	58	0.90
80	1.82	3.14	4.39	50	0.87
60	1.74	2.97	4.35	53	0.85
70	1.90	3.24	4.52	46	0.82
65	1.64	3.93	4.25	47	0.81
80	2.04	3.52	4.96	42	0.78

To proceed with the statistical analysis of the data I continued using correlation coefficient analysis by using Pearson's R and Spearman's Rho.

8.3 Pearson's R

Pearson's R correlation coefficient shows large correlation between athlete's body mass and squat clean 1-RM, ten-meter sprint and twenty-meter sprint (***Table 7***, r = 0.57, 0.61, 0.54, p<0.05) and a moderate correlation between thirty-meter sprint (r = .48, p<0.05) and small or trivial in the Sargent test and relative strength (SC 1-Rm/ body mass) (r = 0.12, 0.01) with no significant difference. The squat clean 1-RM (absolute value) shows a small or trivial correlation between ten, twenty and thirty-meter sprint (r =0.15, 0.02, -0.16) with no significant differences results only show moderate correlation between the Sargent test (r = 0.43, p<0.05) and strong correlation between relative strength (SC 1-RM/ body mass) (r = 0.79, p<0.05). Relative strength (SC 1-RM/ body mass) showed a small or trivial correlation in the ten- and twenty-meter sprint (r = -0.26, -.036) with no significant difference, however it showed a strong correlation between thirty-meter sprint (r = 0.55, p>0.05) and moderate correlation in the Sargent test (r 0.42, p<0.05). These findings are somewhat different from other studies (Baker and Nance 1999, Hori, Newton et al. 2008, Barr, Sheppard et al. 2014).

8.4 Spearman's Rho

The athlete's body mass shows similar results as Pearson's R (***Table 8***) as its shows moderate correlation between squat clean 1-RM (absolute value) and thirty-meter sprint (r = 0.44, 0.43, p<0.05) and large correlation between ten-meters print and twenty-meter sprint (r = 0.56, 0.52, p<0.05) but a small or trivial correlation between body mass and Sargent test and relative strength (SC 1-RM/ body mass) (r = 0.12, -0.05) and no significant difference between tests. The squat clean 1-RM (absolute value) shows moderate correlation between the Sargent test (r = 0.58, p>0.05) and large correlation between relative strength (SC 1-RM/ body mass) (r = 0.79, p<0.05) but a small or trivial correlation between ten, twenty and thirty-meter sprint (r = 0,06, 0.06, -0.24) and no significant differences between tests. Athlete's relative strength (SC 1-RM/ body mass) showed a large correlation between thirty-meter sprint (r = 0.56, p<0.05) and a moderate correlation between Sargent test (r = 0.44, p<0.05) but a small or trivial correlation between ten-and-twenty-meter sprint (r = -0.25, -0.22) with no significant differences. Findings are similar to those of the Pearson's R correlation coefficient meaning one of the two correlation analysis tests could have been completed.

		Height	Body mass	SC 1-RM	10m-sprint	20m-sprint	30m-sprint	Sargent test	Relative strength
Height	Pearson Correlation	1	0,208	-0,156	-0,044	0,072	0,07	0,117	-0,318
	Sig. (2-tailed)		0,352	0,487	0,847	0,75	0,758	0,604	0,149
Body mass	Pearson Correlation	0,208	1	,579**	,612**	,543**	,482**	0,123	-0,014
	Sig. (2-tailed)	0,352		0,005	0,002	0,009	0,023	0,586	0,952
SC 1-RM	Pearson Correlation	-0,156	,579**	1	0,156	0,026	-0,168	,433*	,796**
	Sig. (2-tailed)	0,487	0,005		0,489	0,907	0,456	0,044	0
10m-sprint	Pearson Correlation	-0,044	0,612**	0,156	1	,929**	,851**	-0,237	-0,269
	Sig. (2-tailed)	0,847	0,002	0,489		0	0	0,288	0,226
20m-sprint	Pearson Correlation	0,072	,543**	0,026	,929**	1	,920**	-0,365	-0,362
	Sig. (2-tailed)	0,75	0,009	0,907	0		0	0,095	0,098
30m-sprint	Pearson Correlation	0,07	,482*	-0,168	,851**	,920**	1	-0,507	-0,559**
	Sig. (2-tailed)	0,758	0,023	0,456	0	0		0,16	0,007
Sargent test	Pearson Correlation	0,117	0,123	,433*	-0,237	-0,365	-0,507	1	,423*
	Sig. (2-tailed)	0,604	0,586	0,044	0,288	0,095	0,016		0,05
Relative Strength	Pearson Correlation	-0,318	-0,014	,796**	-0,269	-0,362	-0,559	,423*	1
	Sig. (2-tailed)	0,149	0,952	0	0,226	0,098	0,007*	0,05	

Table 7. *Results from Pearson's R correlation coefficient*

**Correlation is significant at the 0.01 level. *Correlation is significant at the 0.05 level.

Table 8. *Results from Spearman's correlation coefficient.*

		Height	Body mass	SC 1-RM	10m-sprint	20m-sprint	30m-sprint	Sargent test	Relative strength
Height	Correlation Coefficient	1	0,233	-0,212	-0,128	0,041	0,029	0,214	-0,283
	Sig. (2-tailed)		0,296	0,344	0,569	0,858	0,897	0,339	0,201
Body mass	Correlation Coefficient	0,233	1	0,441	,565**	,520*	,430*	0,123	-0,052
	Sig. (2-tailed)	0,296		0,04	0,006	0,013	0,046	0,586	0,818
SC 1-RM	Correlation Coefficient	-0,212	,441*	1	0,069	0,062	-0,243	0,417	,794**
	Sig. (2-tailed)	0,344	0,04		0,76	0,783	0,275	0,054	0.01
10m-sprint	Correlation Coefficient	-0,128	,565**	0,069	1	,900**	,769**	-0,261	-0,255
	Sig. (2-tailed)	0,569	0,006	0,76		0.01	0.01	0,24	0,252
20m-sprint	Correlation Coefficient	0,041	,520*	0,062	,900**	1	,757**	-0,299	-0,222
	Sig. (2-tailed)	0,858	0,013	0,783	0.01		0.01	0,176	0,321
30m-sprint	Correlation Coefficient	0,029	,430*	-0,243	,769**	,757**	1	-0,502	-0,56
	Sig. (2-tailed)	0,897	0,046	0,275	0.01	0.01		0,017	0,007
Sargent test	Correlation Coefficient	0,214	0,123	0,417	-0,261	-0,299	-0,502	1	,477*
	Sig. (2-tailed)	0,339	0,586	0,054	0,24	0,176	0,017		0,037
Relative Strength	Correlation Coefficient	-0,283	-0,052	,794**	-0,255	-0,222	-0,56	,447*	1
	Sig. (2-tailed)	0,201	0,818	0.01	0,252	0,321	0,007	0,037	

**Correlation is significant at the 0.01 level. *Correlation is significant at the 0.05 level.

4.0 Discussion

The main objective of this study was to examine if higher squat clean 1-RM (relative and absolute value) in relation to anthropometrics (body mass) resulted in better sprint and vertical jump performance. Findings from the correlation coefficient analysis shows that body mass strongly correlates with sprint (all distances) and squat clean 1-RM (absolute value). Squat clean 1-RM (absolute value) only correlates with Sargent vertical jump test. Findings in relative strength correlates strongly to the Sargent test and thirty-meter sprint. It seems that athletes who possesses a higher relative strength performed better in the Sargent test and thirty-meter sprint.

These findings support some of those reported previously. However, this study found no significant correlation between relative strength or ten-meter or twenty-meter sprint. When comparing a vertical exercise to a horizontal skill as sprinting and vertical skill as jumping it is important to clarify that there will be a degree of positive correlation between findings. It is likely due to the triple extension and the similarities between rate and pattern of hips, knee and ankle that occur during Olympic weightlifting movements and sport specific tasks (Suchomel, et al. 2017). The squat clean, unlike the hang and power clean allows for greater weight being used and therefore producing higher force-velocity power output, rate of force development, higher peak force and requires more muscle mass (Garhammer 1980, Garhammer 1991). This could mean that higher body mass (fat mass and muscle mass) in athletes with higher absolute strength resulted in poorer sprint time than the athletes with less body mass and higher relative strength. It should be noted that handball is a position-based sport and athletes play their position based on their anthropometrics (Srhoj, et al. 2002). Certain players will have a higher degree of body mass, absolute strength and relative strength depending on their on-court positioning.

4.1 Body mass vs. thirty-meter sprint and Sargent vertical jump test

When assessing body mass measurements, it is important to clarify that the athletes muscle mass and body fat were not measured and therefore could not be accounted for in the study. Athletes with higher body fat percentage are usually heavier and potentially runs slower and jumps lower (Brechue, et al. 2010). In addition to this Newton's second law f=Ma defies heavier athletes' probability to lifting more weight (Susskind 2020). Heavier athletes should therefore lift heavier in the squat clean. This could result in athletes with more body mass could lift more in the squat clean but have lower relative strength and therefore not show a positive correlation between tests. However, the body mass and squat clean 1-RM (absolute and relative value) analysis shows that body mass had the highest correlation in the ten, twenty and thirty-meter sprint with no correlation between relative strength and Sargent test. Pavlovic, et al. (2022) found no significant differences in body mass or body height in sixty-meter sprinting. This could mean that sprinting is predominantly determined by athlete's strength-to-body mass ratio and not their absolute strength levels as only relative strength was the only measurement that showed positive correlation within sprint distances (thirty-meter only). The results from the Sargent test could show that athletes with heavier body mass jumped lower and athletes with lighter body mass jumped higher, as expected. Since wing players are often smaller and lighter than pivots and back court players they could potentially have a higher relative strength in the squat clean compared to other positions in handball (Srhoj, et al. 2002).

4.2 Squat clean 1-RM vs. thirty-meter sprint and Sargent vertical jump test

Our study found that the Pearson's R and Spearman's Rho correlation coefficient Squat clean 1-RM (absolute value) is not correlated with ten, twenty or thirty-meter sprint. But findings show a moderate correlation in the Sargent vertical jump test. The similarities between a squat clean and a vertical jump are biomechanical familiar (Comfort, et al. 2013, García-Valverde, et al. 2022). The squat clean requires athletes to produce full concentric contraction from the bottom of the catch position till the knees and hips are fully extended, while a vertical jump only requires a 'small' dip in the knee and hip joints. McBride, et al (1999) found that Olympic Weightlifters performed better than powerlifters in countermovement jumps and jump squats, meaning Olympic weightlifters are better at producing vertical force than powerlifters. This could help handball players in choosing strength-based exercises for enhancing athletic abilities. Baker, et al. (1999) found no significant differences in 3-RM hang power clean (absolute value) and ten-meter and forty-meter sprint distances, these findings are similar to those of this study. Athletes with higher absolute strength could have had higher body masses (more fat mass and muscle mass), which results in worse sprint times. Handball players such as pivots and back-courts have in general more body mass than wing players (Srhoj, et al. 2002) and could therefore result in higher absolute strength than wing players.

4.3 Relative strength vs. Thirty-meter sprint and Sargent vertical jump test

When looking at the results from this study, the findings are somewhat interesting. Hori, et al (2008) found that athletes with higher 1-RM in hang power clean relatively to the athlete's body mass had better performance in twenty-meter sprint and jump performance than those of lower relative values however our study found a small or trivial effect in ten- and twenty-meter sprint relatively to the athlete's body mass but a large-to-moderate effect in the thirty-meter sprint and Sargent vertical jump test. When interpretating the results it seems like the squat clean is better suited for longer distances than shorter distances. Sports that require sprints further than thirty-meter at a time could therefore benefit more from a full squat clean exercise than a hang power clean. Meaning competitive handball players whose position are wings could benefit from the squat clean. Baker, et al. (1999) found significant differences in 3-RM Hang power clean relatively to athlete's body mass in ten-and forty-meter sprint and suggested that athletes which are strong per kilogram of body mass should theoretically perform well in ten-meter sprints. Baker, et al (1999) also suggested that the forty-meter sprint results could be manipulated as athletes found a better technique for running longer distances. The participants in this study could have manipulated the sprint distances by partial flying start or being further away from the starting line without the researcher noticing.

There could be several explanations for why the squat clean only correlated with thirty-meter sprint. One possible explanation is that the thirty-meter sprint requires better speed endurance and ability to maintain high velocity over longer distances than ten and twenty-meter sprint, which requires more acceleration (Brechue, et al. 2010). It could seem that wing players in handball are the players that sprints the longest and therefore the participants in this study which plays this role have better speed endurance and the ability to endure high velocity longer than pivots and back-court players. Another explanation is that sprinting performance at difference distances relies more on physiological and anthropometric factors such as body mass, stride length, stride frequency, running technique, running economy and different aerobic and anaerobic energy systems (Brandon 1995, Danion, et al. 2003, Saunders, et al. 2004, Barnes and Kilding 2015, Zaccagni, et al. 2019). The squat clean requires athletes to lift faster compared to the hang and/ or power clean which could affect certain physiological components. The energy systems that's used the most during the squat clean and thirty-meter sprint are the anaerobic energy system (Wadley and Le Rossignol 1998, Hedrick and Wada 2008). Hence athletes use the same energy systems in the squat clean and the thirty-meter sprint it could be a possible explanation for its correlation. After discussing all the factor above, it is crucial to mention that certain limitations of the study could have affected the result. These will be discussed in the next chapter.

5.0 Study limitations

When assessing the results, it is important to look at the method-related inconsistencies that need to be taken into consideration. Firstly six out of the twenty-to athletes did not have the full mobility required for the full squat clean resulting in lower absolute and relative strength 1-RM. These subjects had problems getting below 90 degrees in the catch position and it could therefore be specified that they performed a power clean (Garhammer 1984). This could affect the accuracy of the results. Age gap is another consideration. The youngest athlete participating was seventeen and the oldest twenty-eight. The older athletes could be more technical and experienced in the squat clean and therefore resulting in higher 1-RM strength and could potentially have greater strength (absolute and relative value) in the lower extremities resulting in better performance in sprint and vertical jump tests compared to the younger athletes. The Sargent vertical jump test is an indoor field test and tests the strength of the lower body. The test is easy to do and requires little equipment. However, Bui, et al. (2014) compared the results of three different vertical jump tests (Contact mat, optical system and Sargent jump test) and found that the Sargent vertical jump test overestimates the height by five centimeters on average. Bui, et al. (2014) concluded that the Sargent test validity decreases as the increase in jumps get higher. They noted that this could be attributed for the coordination required to move next to the wall and touch it while being at the height of the jump. Some participants may jump farther away from the wall, while others may touch the wall on the way up. It seems as the Sargent test is better suited for athletes with lower jump height, as the accuracy is reduced as the height increases (Bui, et al. 2015). This could damage the Sargent test results of the study.

When assessing athlete’s anthropometrics, only body mass and height was taken into consideration. Athletes body fat percentage and muscle mass could be potential limitations as these affect sprint and vertical jump performance. Higher body fat alongside height and more muscle mass could result in bigger and slower athlete’s that negatively impact sprint times and vertical jump tests. Therefore, further research should investigate body mass, height, fat percentage and muscle mass on squat clean upon sprint and vertical jump performance.

Handball requires athletes with certain anthropometrics to play with different positioning. Back court, wings, pivots, and goalkeepers all require different skill set. Wing players are the only handball players that involves rapid long-distance sprints (<thirty-meter). Srhoj, et al. (2002)

found that wing players are lighter than back court, pivots and goalkeepers as this could result in higher relative strength. Since this study only recruited twenty-to athletes' there were not enough participants to divide into positioning group and could thus not divide positioning groups upon anthropometrics, strength characteristics, sprint and vertical jump performances. Therefore, its reasonable to assume that when these limitations were taken into consideration the results could have been different.

6.0 Conclusion

This study aimed to look at the relation between anthropometric and squat clean 1-RM on sprint and vertical jump performance. Based upon the findings of the present study it is concluded that handball players with a higher relative strength in the squat clean will likely have better performance in thirty-meter sprint and Sargent vertical jump test than handball players with lower relative strength. Collectively this tells us that handball players can positively benefit from the squat clean exercise as it correlates positively with further sprint distances and vertical jumps. Handball players who seek to increase their rate of force development, power output and peak power can and should use the squat clean as a main compound lift to decrease sprint times in distances further than thirty meters and to jump vertically higher. It is reasonable to conclude in light of the present study that athletes and coaches should focus on getting stronger per kilogram body mass as this seems more beneficial for overall athletic performances.

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8.0 Attachment content

8.1 Attachment 1. Information about the study with participants signing.

8.2 Attachment 2. Recipe and acceptance from NSD

8.1 Attachment 1

Vil du delta i forskningsprosjektet

" Relationship between squat clean, sprint and vertical jump performance"

Hei! Har du lyst å være med i et forskningsprosjekt? Vi ønsker å finne ut om en høyere 1RM i frivending resulterer i bedre sprint og vertikalt hopp prestasjon i forhold til en utøvers kroppsmasse.

(illustrasjon av formålet)

Formål

I dette prosjektet vil vi finne ut om en høyere 1 repetisjon maksimum frivending i forhold til en utøvers kroppsmasse gir bedre resultat på 30 meter sprint og vertikal spenst hopp.

Vi har lyst å snakke med håndballspillere med teknisk kjennskap til frivending. Vi håper du vil være med!

Dette prosjektet er et mastergrad-prosjekt fra Nord Universitet, avdeling Levanger.

Hvem leder forskningsprosjektet?

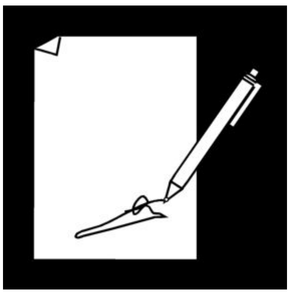
Forskeren/ studenten heter John-Olav Heggen.

Prosjektets veileder heter Roland van den Tillaar.

Hvorfor får du spørsmål om å delta?

Vi spør deg om å være med, fordi du er håndballspiller, over 16 år, har tekniske kjennskaper til frivending, 1.2 x kroppsvekt i knebøy, 0.8 x kroppsvekt i benkpress og 1.5 x kroppsvekt i markløft.

Hvis du har lyst å være med i forskningsprosjektet, må du skrive under på siste ark i dette brevet, og da vil vi ta kontakt med deg.



Hvis du ikke har lyst å være med, tar vi ikke kontakt med deg.

Hva betyr det for deg å delta?
Hvis du har lyst å delta i forskningsprosjektet, vil det foregå 1 styrke test, 1 sprint test og 1 spensttest fordelt på 2 dager (48-timer mellom styrketest og sprint og spensttest)

Styrke testen vil foregå i ett lukket treningssenter

Sprint test og spensttest vil foregå i en offentlig håndballhall.

Testprotokoll:

Testprotokoll frivending, sprint og vertikalt hopp

Generell oppvarming/ gjelder alle tre testene

5-10 minutt lett aktivitet (eks: sykling, lett gange og ro-maskin)

5-10 minutt dynamisk tøying (eks: lår sving- fram og tilbake, ut og inn spark, uttøying av ankelledd)

Spesifikk oppvarming *(Basert på prosent av 1RM)*

Oppvarming frivending

- Stang/ 20kg x 5 repetisjoner
- 40% x 3 repetisjoner
- 60% x 2 repetisjoner
- 80% x 2 repetisjoner
- 90% x 1 repetisjoner
- MAKS TEST – Utøverne får 3 forsøk på å forbedre sin innsats, ved 2-3 mislykket forsøk eller til utøveren er fornøyd vil siste godkjente forsøk bli skrevet som maksimal vekt.

Spesifikk oppvarming *(for 30-meter sprint og vertikalt hopp/ sargent jump test)*

- 5 minutt lav til medium intensitet jogg

- 5 minutt gange med høye kneløft, bak spark, side steg
- 3 minutt dynamisk tøying av under kropp (hofte, kne og ankel-ledd)
- 3 stigningsløp på 50 meter med rolig gange tilbake
- 30-meter sprint test og hopp test - Utøverne får 3 forsøk på å forbedre sin innsats, ved 2-3 forsøk der tiden på sprinten eller hoppet i cm ikke er forbedret vil siste godkjente forsøk bli skrevet som resultat.

John-Olav Heggen vil være med under testene. Alle testene tar rundt 10-40 minutter.

Vil vi også samle inn (*Høyde, vekt, alder og kjønn*).

Det er frivillig å delta

Det er frivillig å delta i prosjektet. Det betyr at du kan velge selv om du har lyst å være med eller ikke. Ingen andre kan velge dette for deg. Det er bare du som kan samtykke. Samtykke betyr at du sier at du synes noe er greit.

Hvis du vil delta, kan du når som helst trekke samtykket tilbake uten å oppgi noen grunn. Det betyr at det er lov å ombestemme seg, og det er helt i orden. All informasjon om deg vil da bli slettet.

Det vil ikke ha noen negative konsekvenser for deg hvis du ikke vil delta eller om du først sier «ja» og så «nei». Ingen vil bli sur eller lei seg, og det vil ikke ha noe å si for jobben din.

Ditt personvern – hvordan vi oppbevarer og bruker dine opplysninger

Vi vil bare bruke informasjonen om deg til å finne ut hvordan frivending resulterer i bedre sprint og spenst prestasjon.

Vi vil ikke dele din informasjon med andre. Det er bare studenten, John-Olav Heggen som har tilgang til informasjonen.

Vi passer på at ingen kan få tak i informasjonen som vi samler inn om deg.

Vi lagrer all informasjon på en sikker datamaskin.

Vi passer på at ingen kan kjenne deg igjen når vi skriver forskningsartikler. Vi vil for eksempel finne opp et annet navn når vi skriver om deg.

Vi følger loven om personvern.

Hva skjer med opplysningene dine når vi avslutter forskningsprosjektet?

Vi er ferdig med forskningsprosjektet 16. Mai 2023.

Da vil vi passe på at all informasjon om deg er slettet.

Dine rettigheter

Hvis det kommer frem opplysninger om deg i det som vi skriver, eller har i dokumentene våre, har du rett til å få se hvilken informasjon om deg som vi samler inn. Du kan også be om at informasjonen slettes slik at den ikke finnes lenger. Det som det er noen opplysninger som er feil kan du si ifra og be forskeren rette dem. Du kan også spørre om å få en kopi av å få informasjonen av oss. Du kan også klage til Datatilsynet dersom du synes at vi har behandlet opplysningene om deg på en uforsiktig måte eller på en måte som ikke er riktig.

Hva gir oss rett til å behandle personopplysninger om deg?

Vi behandler informasjon om deg bare hvis du sier at det er greit og du skriver under på samtykkeskjemaet.

Hvor kan jeg finne ut mer?

Hvis du har spørsmål om studien, kan du ta kontakt med:

- Nord Universitet avdeling Levanger ved John-Olav Heggen, tlf: +47 90805974 eller e-post: johnoheg@hotmail.no. Veileder: Roland van den Tillaar
- Personvernombudet ved Nord universitet er Toril Irene Kringen som kan kontaktes på personvernombud@nord.no

Nord Universitet har bedt Personverntjenester se om prosjektet følger loven om personvern. Personverntjenester har gjort dette, og mener at vi følger loven.

Hvis du lurer på hvorfor Personverntjenester mener dette, kan du ta kontakt med:

- Personverntjenester på epost (personverntjenester@sikt.no) eller på telefon: 53 21 15 00.

Med vennlig hilsen John-Olav Heggen og Roland van den Tillaar

Deltakeren må signere for å samtykke og for å kunne delta i prosjektet.

Signatur her:

8.2 Attachement 2

Vurdering av behandling av personopplysninger

Skriv ut

24.10.2022

Referansenummer

874014

Vurderingstype

Standard

Dato

24.10.2022

Prosjekttittel

Mastergrad 2022/ 2023

Behandlingsansvarlig institusjon

Nord Universitet / Fakultet for lærerutdanning og kunst- og kulturfag / Kroppsøving, idrett og friluftsliv

Prosjektansvarlig

Roland van den Tillaar

Student

John-Olav Heggen

Prosjektperiode

01.09.2022 - 16.05.2023

Kategorier personopplysninger

- Alminnelige
- Særlige

Lovlig grunnlag

- Samtykke (Personvernforordningen art. 6 nr. 1 bokstav a)

- Uttrykkelig samtykke (Personvernforordningen art. 9 nr. 2 bokstav a)

Behandlingen av personopplysningene er lovlig så fremt den gjennomføres som oppgitt i meldeskjemaet. Det lovlige grunnlaget gjelder til 16.05.2023.

Meldeskjema

Kommentar

OM VURDERINGEN

Personverntjenester har en avtale med institusjonen du forsker eller studerer ved. Denne avtalen innebærer at vi skal gi deg råd slik at behandlingen av personopplysninger i prosjektet ditt er lovlig etter personvernregelverket. Personverntjenester har nå vurdert den planlagte behandlingen av personopplysninger. Vår vurdering er at behandlingen er lovlig, hvis den gjennomføres slik den er beskrevet i meldeskjemaet med dialog og vedlegg.

VIKTIG INFORMASJON TIL DEG

Du må lagre, sende og sikre dataene i tråd med retningslinjene til din institusjon. Dette betyr at du må bruke leverandører for spørreskjema, skylagring, video samtale o.l. som institusjonen din har avtale med. Vi gir generelle råd rundt dette, men det er institusjonens egne retningslinjer for informasjonssikkerhet som gjelder.

TYPE OPPLYSNINGER OG VARIGHET

Prosjektet vil behandle alminnelige personopplysninger, særlige kategorier av personopplysninger om helse frem til 16.05.2023.

LOVLIG GRUNNLAG

Prosjektet vil innhente samtykke fra de registrerte til behandlingen av personopplysninger. Vår vurdering er at prosjektet legger opp til et samtykke i samsvar med kravene i art. 4 nr. 11 og 7, ved at det er en frivillig, spesifikk, informert og utvetydig bekreftelse, som kan dokumenteres, og som den registrerte kan trekke tilbake. For alminnelige personopplysninger vil lovlig grunnlag for behandlingen være den registrertes samtykke, jf. personvernforordningen art. 6 nr. 1 a. Behandlingen av særlige kategorier av personopplysninger er basert på uttrykkelig samtykke fra den registrerte, jf. personvernforordningen art. 6 nr. 1 a og art. 9 nr. 2 a.

PERSONVERNPRINSIPPER

Personverntjenester vurderer at den planlagte behandlingen av personopplysninger vil følge prinsippene i personvernforordningen: - om lovlighet, rettferdighet og åpenhet (art. 5.1 a), ved at de registrerte får tilfredsstillende informasjon om og samtykker til behandlingen - formålsbegrensning (art. 5.1 b), ved at personopplysninger samles inn for spesifikke, uttrykkelig angitte og berettigede formål, og ikke viderebehandles til nye uforenlige formål - dataminimering (art. 5.1 c), ved at det kun behandles opplysninger som er adekvate, relevante og nødvendige for formålet med prosjektet - lagringsbegrensning (art. 5.1 e), ved at personopplysningene ikke lagres lengre enn nødvendig for å oppfylle formålet.

DE REGISTRERTES RETTIGHETER

Vi vurderer at informasjonen om behandlingen som de registrerte vil motta oppfyller lovens krav til form og innhold, jf. art. 12.1 og art. 13. Så lenge de registrerte kan identifiseres i datamaterialet vil de ha følgende rettigheter: innsyn (art. 15), retting (art. 16), sletting (art. 17), begrensning (art. 18) og dataportabilitet (art. 20). Vi minner om at hvis en registrert tar kontakt om sine rettigheter, har behandlingsansvarlig institusjon plikt til å svare innen en måned.

FØLG DIN INSTITUSJONS RETNINGSLINJER

Personverntjenester legger til grunn at behandlingen oppfyller kravene i personvernforordningen om riktighet (art. 5.1 d), integritet og konfidensialitet (art. 5.1. f) og sikkerhet (art. 32). For å forsikre dere om at kravene oppfylles, må prosjektansvarlig følge interne retningslinjer/rådføre dere med behandlingsansvarlig institusjon.

MELD VESENTLIGE ENDRINGER

Dersom det skjer vesentlige endringer i behandlingen av personopplysninger, kan det være nødvendig å melde dette til oss ved å oppdatere meldeskjemaet. Før du melder inn en endring, oppfordrer vi deg til å lese om hvilken type endringer det er nødvendig å melde:

https://www.nsd.no/personverntjenester/fylle-ut-meldeskjema-for-personopplysninger/melde-endringer-i-meldeskjema Du må vente på svar fra oss før endringen gjennomføres.

OPPFØLGING AV PROSJEKTET

Vi vil følge opp ved planlagt avslutning for å avklare om behandlingen av personopplysningene er avsluttet.

Kontaktperson hos oss: Janniche Linde

Lykke til med prosjektet!