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Original Research

Investigation of Inter-Device Reliability Between the Squegg® Smart Dynamometer and the Baseline BIMS Digital Hand Grip Dynamometer

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ABSTRACT

Objective: Accurate measurement of grip strength is crucial for evaluating muscle function and monitoring the rehabilitation process. The aim of this study was to assess the inter-device reliability of grip strength measurements obtained using the Baseline BIMS digital hand dynamometer and the Squegg smart hand dynamometer and to compare intra-rater reliability alongside measurement precision.

Methods: A cross-sectional repeated-measures design was conducted between March and April 2025 with 50 healthy young adults (mean age 19.52 ± 1.02 years; 90% right-hand dominant). The measurement order of the devices was randomized for each participant. Maximum grip strength was measured three times on both the dominant and nondominant hands using each device (Squegg® and Baseline BIMS). A 15-second rest was given between measurements, and a 15-minute rest was given between devices. Inter-device reliability was assessed using the mean of three trials with the Intraclass Correlation Coefficient (ICC). Intra-rater reliability was assessed using the ICC for three trials on each hand for each device. Measurement precision was evaluated using the standard error of measurement (SEM) and the minimal detectable change (MDC).

Results: Overall inter-device agreement was found to be "good" (ICC = 0.857; 95% CI [0.749–0.919]). Intra-rater reliability coefficients ranged from ICC = 0.959–0.962 for Squegg and ICC = 0.976–0.981 for BIMS, indicating "excellent" reliability for both devices. SEM values were 1.3 kg for both devices, with MDC90 values of 3.6–3.7 kg (MDC% = 8.5–9.8) for Squegg and 3.7 kg (MDC% = 8.2–9.7) for Baseline BIMS.

Conclusion: Both inter-device and intra-rater analyses demonstrated that the Squegg and Baseline BIMS devices provided consistent, reliable measurements of grip strength. Owing to its practicality, portability, and digital features, Squegg offers a reliable alternative to Baseline BIMS for clinical settings and remote monitoring applications.

Keywords: Squegg, BIMS, reliability, grip strength

INTRODUCTION

Physical functionality refers to an individual's capacity to perform the physical tasks required in daily life. Therefore, it plays a key role in carrying out both basic and instrumental activities of daily living. Grip strength is not only one of the elements that reflect physical capacity in the assessment of physical functionality, but it also serves as an indicator of both current and future health status [1-3]. As an indicator of general muscle strength and functional status in daily life, grip strength is closely associated with general health status, including cognitive functions [4,5]. Moreover, it has been reported that health-related quality of life is associated with grip strength and that individuals with reduced grip strength face an increased risk of heart attack, stroke, and cognitive problems [6-8].

Maximum grip strength (MGS) is a widely used objective measurement method for determining the severity of upper extremity impairment, assessing hand function following hand surgery and rehabilitation, and evaluating physical functionality in geriatric individuals [9,10]. For grip strength measurements, it is crucial that the equipment used is accurate, precise, and reliable, as this ensures the validity of both the assessment and the clinical interpretation. Grip strength is evaluated by statically squeezing a dynamometer with the fingers, and the results are expressed in units of kilograms, pounds, or Newtons [11]. The dynamometer used for measurement may operate on a hydraulic principle or be equipped with a technological infrastructure that includes a force sensor [12]. The American Society of Hand Therapists (ASHT) recommends the Jamar hydraulic hand dynamometer as the gold standard for measuring grip strength [13]. Normative data from this device are widely used by researchers worldwide to compare patients' or individuals' grip strength [14,15].

Despite its accuracy and reliability, the Jamar hydraulic hand dynamometer is increasingly seen by clinicians as outdated due to issues such as calibration problems, reading difficulties, insufficient robustness, or insensitivity to very low weights [12]. Researchers have reported that the Jamar, frequently cited as the gold standard in many grip strength studies, may introduce observer-dependent reading errors inherent to analog dial instruments, due to its 2-kg increment dial display and the potential for needle acceleration during measurement, which can result in overestimated values [12,16-18]. As a result, many alternative reliable devices have been developed [18-25]. Additionally, the Jamar company has produced a digital model called Jamar+, which operates using an electronic measurement principle based on a load cell force sensor rather than a hydraulic sensor. Although the grip handle and device design are identical between the two models, the differences lie in their digital vs. analog nature and device weight [26]. A similarly designed, reliable, and cost-effective digital dynamometer frequently used in clinical practice is the Baseline BIMS Digital Dynamometer (BIMS), which is reported to serve as a substitute for the Jamar+. Comparative studies between the Jamar+ and BIMS have shown high agreement, strong criterion validity, and low measurement error, indicating that the results from these two dynamometers can be confidently used interchangeably [27].

Today, advanced technological dynamometers, such as digital dynamometers, are available that display force values with high precision, connect to mobile devices via Bluetooth, perform self-calibration, and easily record, score, and interpret results, in addition to providing real-time measurement displays [23,24]. These dynamometers are also used to support rehabilitation through various games based on measurement results. Thanks to these features, they can be employed in remote treatments, such as tele-rehabilitation interventions. Although the importance of remote rehabilitation tools was emphasized, particularly during and after the COVID-19 pandemic, ensuring the validity and reliability of equipment used in clinical settings remains crucial [23]. Furthermore, the normative data for the Jamar have lost validity due to changes in living conditions and anthropometric characteristics, leading researchers to express concerns about the continued use of these data and to emphasize the need for updating normative values [12,28].

Main Points

- This study evaluated the inter-device and intra-rater reliability of the Squegg smart dynamometer in comparison with the clinically established BIMS device in healthy young adults.
- The results demonstrated good inter-device reliability and high correlations between the two devices, indicating strong consistency in grip strength measurements.
- Intra-rater reliability was excellent for both dominant and nondominant hands across devices.
- The study showed that the Squegg provides comparable measurement consistency to the BIMS, despite differences in design and structure.

To obtain normative data for new devices that could serve as alternatives, it is first necessary to establish that the measurement tool used to collect such data demonstrates adequate reliability and precision [24]. The Squegg® Smart Dynamometer (BioSparrow, Plantation, FL) is a digital and portable dynamometer that connects to mobile devices such as tablets or smartphones, visually presents grip strength data during measurement, and stores the data in a cloud-based system. Shaped like an egg, this device features indentations for the second, third, fourth, and fifth fingers, is silicone-coated, has a long battery life, and is designed to be pocket-friendly and portable, making it a highly advantageous new-generation measurement tool [23,29]. Beyond enabling the monitoring of grip strength and visualizing progress, it actively engages the user in grip training through challenging games [23]. Due to these features, it is preferred by many healthcare professionals for both in-person and/or remote use in clinical settings [23]. However, the prerequisite for using the device in clinical practice, remote applications, or research is to investigate whether it produces reliable and precise results. Data on the reliability of the Squegg are limited [23,29]. Therefore, this study aimed to assess the inter-device reliability between the Squegg smart dynamometer and the BIMS digital dynamometer, which are commonly used in clinical practice as alternatives to the Jamar gold-standard device, while also comparing their intra-rater reliability and measurement precision.

MATERIAL AND METHODS

This observational study was conducted at Gaziantep University between March and April 2025, in compliance with the ethical principles outlined in the Declaration of Helsinki, following approval from the Non-Interventional Clinical Research Ethics Committee of Gaziantep Islamic Science and Technology University (Protocol No: 2025/496). The study was reported in accordance with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines.

Participants

All participants were healthy young adults. Volunteers over the age of 18 who were fluent in Turkish were included in the study. Individuals with cognitive impairments, orthopedic and/or neurological problems affecting upper extremity function, or a history of any upper extremity injury were excluded. Informed consent forms were obtained from all participants, indicating their voluntary participation in the study.

Assessment Tools

Sociodemographic data, including age, gender, dominant hand, and body mass index (BMI), were recorded using a descriptive data form. To measure participants' maximum grip strength, BIMS and Squegg devices were used.

The Baseline BIMS Digital Hand Dynamometer (BIMS) is a digital hand dynamometer utilizing load cell technology, featuring design and physical characteristics similar to those of the Jamar hydraulic and Jamar+ digital hand dynamometers. It has an LCD screen for real-time force display, can measure up to approximately 135 kg, and accommodates five different handle positions to fit various hand sizes. It is widely used in clinical practice and has been reported to provide results reliable enough to be used interchangeably with those of the Jamar+ [19,23]. There are three types – functional, clinical, and luxury – and the "functional type" was used in this study.

The Squegg is an egg-shaped device suitable for home use, featuring four indentations (fitting the 2nd–5th fingers) and coated with slip-resistant silicone material, capable of measuring up to 100 kg [23,30] (Figure 1). Easily controlled via a mobile device through Bluetooth technology, the Squegg measures the force exerted by the participant and displays the values in kilograms or pounds. For statistical analysis, force values were used in kilograms.

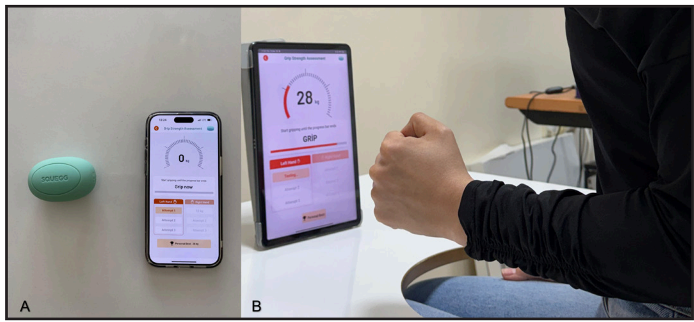

Figure 1. The Squegg™ Smart Dynamometer and Handgrip Trainer used in this study, shown (A) as the device itself and (B) during a grip strength measurement.

Design

A repeated-measures design was employed to control for individual differences among participants. To eliminate the effect of fatigue, the order of the dynamometers used first for measurement was randomized for each participant using a website (random.org) [31]. Before measurements, both dynamometers

were checked to ensure that they were functioning correctly. The BIMS was set to handle position 2, as recommended and in line with general use [19]. All measurements were performed by a therapist with 12 years of experience, following the standard measurement instructions recommended by the ASHT.

The participants were asked to sit in a chair without armrests, leaning back with their arms at their sides, elbows at 90° flexion, forearms in a neutral position, and wrists positioned at 0°–30° flexion and 0°–15° ulnar deviation [32]. After achieving proper positioning, the participants were instructed to squeeze the dynamometer as forcefully as possible. The evaluator provided standardized verbal instructions: "3-2-1!", "Now!", "More! More!", and "Release" [20]. To control for fatigue effects, measurements were conducted alternately on the right and left hands, starting with the dominant side. Approximately 15 seconds were allowed between measurements on each hand, during which the reading on the dynamometer was recorded. Afterward, a 15-minute break was taken before switching to the other dynamometer. The 15-second intervals between trials and the 15-minute break between devices were based on prior studies and were considered sufficient to minimize the risk of fatigue effects [20,23,33].

Statistical Analysis

The data were analyzed using IBM SPSS version 26.0. Factors such as age, gender, and dominant hand were treated as independent variables, while the data collected with the BIMS and Squegg were treated as dependent variables. For each device, the mean of three measurements per hand (three for the dominant hand and three for the nondominant hand) was used in the data analysis. The Kolmogorov-Smirnov test and skewness-kurtosis values were used to assess the normality of data distribution. Mean and standard deviation (SD), minimum (min.) and maximum (max.) values, frequency (n), and percentage (%) were used for the comparison of quantitative data. Paired samples t-tests were used to compare the overall mean MGS and the mean MGS of each hand between the two devices. The correlation between Squegg and BIMS measurements at the overall participant level was examined using the Pearson correlation coefficient. Correlation coefficients below 0.3 were interpreted as "negligible"; between 0.3 and 0.5 as "low"; between 0.5 and 0.7 as "moderate"; between 0.7 and 0.9 as "high"; and above 0.9 as indicating a "very high" level of correlation [34]. For analyzing inter-device and intra-rater reliability, the ICC was calculated. ICC values were interpreted as follows: below 0.5 = "poor"; between 0.5 and 0.75 = "moderate"; between 0.75 and 0.90 = "good"; and above 0.90 = "excellent" reliability [35]. To assess measurement precision, the standard error of measurement (SEM), minimal detectable change (MDC), and MDC_{90} values were calculated using recommended formulas [36]. An MDC% below 30% was considered to indicate "acceptable" precision, while a value below 10% indicated "excellent" precision [37]. Statistical significance was evaluated at the 95% confidence level ($p < 0.05$).

An a priori power analysis was conducted using G*Power version 3.1 to determine the minimum required sample size for calculating reliability [38]. The results indicated that a sample size of 35 participants would be sufficient to achieve 95% power to detect a moderate effect at a significance level of $\alpha = 0.05$ [29].

RESULTS

The results of the Shapiro–Wilk test indicated that the grip strength data obtained from both dynamometers were normally distributed ($p > 0.05$). Additionally, visual assessments using histograms and QQ plots, along with skewness values, supported the use of parametric tests in the analyses (Table 1).

Table 1. Skewness Values for Maximum Grip Strength Measured with Squegg and BIMS

	Skewness	SE
Squegg (Dominant Hand) Mean (1st and 2nd trials)	0.518	0.337
Baseline BIMS (Dominant hand) Mean (1st and 2nd trials)	0.333	0.337
Squegg (Dominant Hand) Mean (3 trials)	0.523	0.337
Baseline BIMS (Dominant hand) Mean (3 trials)	0.404	0.337
Squegg (Nondominant hand) Mean (1st and 2nd trials)	0.535	0.337
Baseline BIMS (Nondominant hand) Mean (1st and 2nd trials)	0.158	0.337
Squegg (Nondominant hand) Mean (3 trials)	0.396	0.337
Baseline BIMS (Nondominant hand) Mean (3 trials)	0.204	0.337

SE: Standard Error

Demographic Characteristic of Participants

The data were collected from 50 adult participants (100 hands) in the study. The number of female and male participants was equal, and the sample consisted of young adults. The mean age of the sample was 19.52 years (SD = 1.02). Ninety percent of the participants were right-hand dominant, a proportion consistent with the literature in terms of accurately representing the general population [39]. The participants' demographic characteristics and mean MGS values (dominant hand (DH), nondominant hand (ND), and total) are presented separately by gender and for the overall sample in Table 2.

For the comparison analyses, both the mean of the three trials and the mean of the first and second trials for each hand were included. Furthermore, the overall mean across all hands (100 hands) were compared. When comparing MGS measurements obtained from the two devices, no statistically significant differences were found in any of the measurement pairs ($p > 0.05$). For the DH, the mean difference between Squegg (M = 35.92, SD = 6.52) and BIMS (M = 35.58, SD = 9.83) when comparing only the first and second trials was 0.34 kg ($t(49) = 0.387$, $p = 0.700$). For the ND, the mean difference between Squegg (M = 33.79, SD = 6.87) and BIMS (M = 33.04, SD = 8.61) was 0.75 kg ($t(49) = 0.928$, p =. 0358). When comparing the mean across all three trials for the DH, the difference between Squegg and BIMS was 0.28 kg ($t(49) = 0.325$, $p = 0.747$) (Table 2). For the ND, the mean difference across all trials was 0.74 kg ($t(49) = 0.963$, $p = 0.340$). Across both hands combined (using the mean of all three trials), the overall difference was determined to be 0.51 kg ($t(49) = 0.654$, $p = 0.516$) (Table 2). In the inter-device reliability analyses, all ICC values were statistically significant at the 95% confidence level, ranging from 0.838 to 0.857. These findings indicate that the overall inter-device reliability was at a "good" level. The highest inter-device reliability was found for the combined DH and ND measurements (ICC = 0.857, 95% CI [0.749–0.919]), while the lowest value was observed for the two-trial mean of the nondominant side (ICC = 0.838, 95% CI [0.714–0.908]). These results particularly demonstrate that mean measurements provide highly consistent and reliable outcomes across devices (Table 3).

A high level of positive correlation was identified across all measurement pairs ($r = 0.749–0.794$, $p < 0.001$), indicating strong measurement consistency between the devices (Table 4).

Table 2. Demographic Characteristics of Participants and Grip Strength Values Measured with Squegg and BIMS

Group	n (%)		
	Total (n=50)	**Male (n=25)**	**Female (n=25)**
Dominant hand	Right: 45 (90%)	Right: 22 (88%)	Right: 23 (92%)
	Left: 5 (10%)	Left: 3 (12%)	Left: 2 (8%)
Group	**M (min.-max.) + SD**		
	Total (n=50)	**Male (n=25)**	**Female (n=25)**
Age	19.52 (18-22) + 1.02	19.67 (18-21) + 1.03	19.38 (18-22) + .98
BMI	23.03 (17.15-36.23) + 3.66	24.21 (18.41-36.23) + 3.71	21.94 (17.15-30.08) + 3.32
MGS-Mean (Dominant + Nondominant hands)			
Squegg	34.36 (17.5-52.67) + 6.35	38.39 (28.67-52.67) + 5.46	30.63 (17.5-41.5) + 4.65
BIMS	33.84 (14.3-53.52) + 9.03	41.38 (30.18-53.52) + 6.14	26.89 (14.3-36.18) + 4.79
MGS (Dominant hand)			
Squegg	35.35 (19.67-53.33) + 6.37	39.47 (29.67-53.33) + 5.51	31.54 (19.67-41.33) + 4.5
BIMS	35.06 (14.17-58.47) + 9.73	43.06 (32.2-58.47) + 6.94	27.68 (14.17-39.37) + 4.83
MGS (Nondominant hand)			
Squegg	33.37 (15.33-52.0) + 6.57	37.32 (27.67-52.0) + 5.77	29.72 (15.33-41.67) + 5.01
BIMS	32.63 (14.43-50.97) + 8.56	39.7 (28.17-50.97) + 5.79	26.09 (14.43-33.0) + 5.22

Table 3. ICC Values for Inter-Device Reliability Analyses

Measurement	ICC	95% CI
Mean of 2 trials (dominant hand)	0.846	0.728 - 0.912
Mean of 2 trials (nondominant hand)	0.838	0.714 - 0.908
Mean of 3 trials (dominant hand)	0.855	0.745 - 0.917
Mean of 3 trials (nondominant hand)	0.844	0.726 - 0.911
Overall mean (dominant and nondominant)	0.857	0.749 - 0.919

Table 4. Correlation Values Between Squegg and BIMS Dynamometers

Pairs	Correlation	p
Squegg – BIMS Mean (1st and 2nd trials) (Dominant Hand)	0.792	0.000
Squegg – BIMS Mean (1st and 2nd trials) (Nondominant Hand)	0.749	0.000
Squegg - BIMS Mean (3 trials) (Dominant Hand)	0.783	0.000
Squegg - BIMS Mean (3 trials) (Nondominant Hand)	0.773	0.000
Squegg - BIMS Mean (3 trials) (Dominant + Nondominant Hands)	0.794	0.000

Table 5. Intra-rater Reliability and Precision Values for Squegg and BIMS

Equipment and Side	Reliability	Precision	
	ICC (CI_{95})	SEM	MDC_{90} (MDC%)
Squegg - Dominant	0.959 (0.925 - 0.978)	1.3	3.7 (9.8)
Squegg - Nondominant	0.962 (0.931 - 0.979)	1.3	3.6 (8.5)
BIMS - Dominant	0.981 (0.952 - 0.991)	1.3	3.7 (8.2)
BIMS - Nondominant	0.976 (0.952 - 0.987)	1.3	3.7 (9.7)

Intra-rater reliability (ICC, 95%CI) and precision (SEM, MDC, and MDC%) values are presented in Table 5. The reliability coefficients for measurements on the dominant and nondominant hands ranged from 0.959 to 0.981. Both devices demonstrated reliability coefficients within the excellent range, with BIMS showing slightly higher reliability coefficients compared to Squegg. The SEM and MDC values, reflecting device precision (except for Squegg on the non-dominant side), were identical for both devices, while the MDC% values ranged between 8.2 and 9.8. These MDC% values indicated that both devices exhibited excellent precision (Table 5) [40].

DISCUSSION

The primary aim of this study was to examine the inter-device reliability between the Squegg smart dynamometer, a new-generation device, and the BIMS, a widely used and reliable clinical instrument. Additional objectives included a comparative analysis of the intra-rater reliability and measurement precision of the two devices. Inter-device reliability was found to be at a reasonable level, with measurement correlations being high. Both devices demonstrated excellent intra-rater reliability and precision.

The skewness analyses revealed that the data distribution was generally close to normal, supporting the statistical validity and analytical reliability of the measurements. Furthermore, the demographic distribution and grip strength values showed that male participants had higher measurements on both devices, aligning with the existing literature, which indicates that grip strength is related to physiological gender differences [41].

The inter-device reliability analyses consistently produced good ICC values across all conditions (2- or 3-trial mean values), with ICCs ranging from 0.838 to 0.857. The highest reliability was found for the mean of both hands combined (ICC = 0.857, 95% CI [0.749–0.919]). The study's findings revealed that the results measured by Squegg and BIMS were closely aligned and provided comparably reliable measurements. Our results are consistent with the findings reported by Mutalib et al. [12], who demonstrated strong inter-instrument reliability between GripAble and Jamar PLUS+ dynamometers, with an ICC of 0.906 (95% CI: 0.87–0.94). They also observed that the GripAble consistently produced lower grip strength values—on average, approximately 69% of the Jamar PLUS+ readings—and that the degree of difference increased with greater grip strength. This suggests that while correlations may be high, direct equivalence between devices may not be assumed [12]. Additionally, Lee et al. [16] noted that although digital dynamometers may yield different results compared to the commonly used Jamar-hydraulic, their strong correlations allow these differences to be compensated. Similarly, our study found no statistically significant differences in the inter-device comparisons ($p > 0.05$), and strong, positive, and significant correlations were observed across all measurement pairs ($r = 0.749–0.794$, $p < 0.001$). These findings suggest that Squegg has a measurement capacity close to that of traditional clinical dynamometers, aligning with the results reported by Stamate et al. [23]. Although those researchers used a hydraulic-type dynamometer, the level of correlation they reported ($r = 0.85$, $p < 0.001$) is similar to the result of the study. Our findings support the notion that Squegg and BIMS assess grip strength in a closely aligned manner, but also emphasize that device-specific norms and thresholds should be considered in clinical practice.

The literature has reported that comparative measurements of hand grip strength using digital and analog dynamometers yield similar results [12,23,42]. In our study, the highest correlation ($r = 0.794$) between Squegg and BIMS was observed for the mean values across both hands, suggesting that using mean values may help minimize inter-device differences. This finding also supports the conclusion by Ergen et al. [24] that the mean of three trials provides more reliable results than two trials or a single measurement. Although the closeness of the measured values between devices is noteworthy, it cannot be concluded that they are interchangeable. It should be noted that although normative values from the literature can be applied to BIMS due to its design similarity to the Jamar, they cannot be used for Squegg. However, it is important to acknowledge that the Squegg device currently lacks validated normative datasets. This limitation restricts the ability to interpret individual scores in a broader clinical context, especially when attempting to determine deviations from age- or sex-specific norms. Therefore, while our findings suggest that Squegg is a promising alternative for assessing grip strength, its use in clinical decision-making should be approached with caution until normative reference values are established through large-scale studies involving diverse populations. Future research should prioritize the development and validation of such normative datasets to enhance the clinical applicability and generalizability of digital dynamometers, such as Squegg.

It is particularly noteworthy that both devices demonstrated "excellent" intra-rater reliability across dominant and nondominant hands, and that the reliability level of the newly introduced Squegg was remarkably close to that of the widely used BIMS. Supporting this, Amin et al. [42] evaluated the test–retest reliability of Squegg in a large sample of healthy adults ($n = 594$) and reported excellent ICC values for both sides (0.911 and 0.928). Although a hydraulic-type Jamar was used as the comparator in that study, and the exact retest interval was not clearly specified, the consistently high reliability indices reinforce our intra-session findings and highlight Squegg's potential for longitudinal clinical assessment. These results further strengthen the case for Squegg's clinical utility in both cross-sectional and follow-up contexts. Another study also reported that Squegg's intra-rater reliability exceeded 0.99 [29]. In terms of measurement precision, the SEM and MDC values of both devices were very similar, indicating excellent precision. BIMS displayed slightly better precision in measurements on both hands, though the difference was minimal. Our findings were nearly identical to the precision of the Jamar+, one of the most frequently used clinical dynamometers, which has an excellent precision level (MDC% = 9.61) [43]. However, it is important to note that the SEM and MDC values calculated in our study are based on intra-rater reliability data obtained from

repeated measurements with the same device within a single session. Therefore, these values only provide insight into the short-term measurement precision and consistency of the device. Such single-session assessments do not fully reveal the device's capacity to maintain consistent measurements over time, i.e., its long-term test–retest reliability [37]. Similarly, the device's sensitivity – its ability to detect clinically meaningful changes – cannot be fully assessed through intra-rater or within-device analyses alone. To determine whether the device offers valid measurements for clinical follow-up and whether it maintains time-dependent reliability, future studies employing test–retest designs with repeated measurements on different days are needed [44]. Overall, the findings of our study support the use of Squegg as a reliable and technologically advanced alternative for clinical applications.

Limitations

One of the strengths of this study is that the inter-device comparison was performed separately for both the dominant and nondominant hands, and that the overall mean of all measurements was also analyzed. However, the inclusion of only healthy individuals within a narrow age range limits the generalizability of the findings to broader age groups or clinical populations. Additionally, although BIMS shares the same design as the Jamar dynamometer, the absence of the Jamar in this study may be considered a limitation in terms of providing a universal reference for inter-device comparison. Nonetheless, previous studies have demonstrated the validity of comparisons involving alternative devices [17]. Another limitation is the design differences between the two dynamometers, which may introduce variability in grip strength measurements. Furthermore, this study assessed only intra-rater reliability within a single session; test–retest reliability was not examined. Therefore, the temporal stability of the measurements remains unclear and should be explored in future research.

CONCLUSION

The Squegg smart dynamometer demonstrates promising reliability and holds potential as a viable alternative to traditional hand dynamometers in clinical settings. Its lightweight design, portability, and Bluetooth-based digital features offer distinct advantages for remote monitoring and home-based rehabilitation. However, caution is warranted when interpreting results, as the Squegg lacks validated normative datasets, and applying reference values derived from other devices may not be appropriate due to design and calibration differences. Therefore, its integration into standard clinical practice should be approached carefully until such normative values are established. Future studies should prioritize the validation of Squegg across broader populations and clinical cohorts, as well as the assessment of its longitudinal test–retest reliability and responsiveness over time, to better support its long-term clinical utility.

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Conflict of interest: The authors declare that there are no conflicts of interest related to this study.

Informed Consent: All participants were informed about the purpose and procedures of the study, and written informed consent was obtained from each individual before data collection.

Ethical Approval: Ethical approval for this study was obtained from the Non-Interventional Clinical Research Ethics Committee of Gaziantep Islamic Science and Technology University (Protocol No: 2025/496). All procedures were conducted in accordance with the principles of the Declaration of Helsinki.

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