# TECHNICAL COMMENTARY

# Dermatoglyphics

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## Introduction

Dermatoglyphics, also referred to as epidermal ridges are the distinct patterns and lines on the hands and fingers. These ridges appear on the hands between weeks 6 and 15 during foetal development and remain largely unchanged after this period. A triradius occurs where three ridge systems meet at a point, and occurs four times on the palm, at the base of each of the four digits (a, b, c, and d)[1]. Dermatoglyphic indices include: fingertip patterns; finger ridge counts, which are the number of ridges between the center of the fingertip patterns and their corresponding triradius; palmar ridge counts, which are the number of ridges on the palm connecting two triradii; fluctuating asymmetries, which are the differences in ridge counts or pattern types between parallel structures on the left and right hands; and the ATD angle, which is the angle formed by lines drawn from the most remote triradius near the base of the palm, to triradii a and d, located close to the index and little fingers respectively.

Patients with schizophrenia have shown alterations in the patterns and counts of their dermatoglyphics, which may be indicative of disruption in utero, showing that an insult, whether genetic, environmental or both, may have occurred during early–mid gestation.

## Method

We have included only systematic reviews (systematic literature search, detailed methodology with inclusion/exclusion criteria) published in full text, in English, from the year 2000 that report results separately for people with a diagnosis of schizophrenia, schizoaffective disorder, schizophreniform disorder or first episode schizophrenia. Reviews were identified by searching the databases MEDLINE, EMBASE, CINAHL, Current Contents, PsycINFO and the Cochrane library. Hand searching reference lists of identified reviews was also conducted. When multiple copies of reviews were found, only the most recent version was included. Reviews with pooled data are given priority for inclusion.

Review reporting assessment was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist that describes a preferred way to present a meta-analysis[2]. Reviews were assigned a low, medium or high possibility of reporting bias* depending on how many items were checked. For instance, a low possibility of bias would be assigned to reviews checking over 66% of items, a medium possibility between 33 and 66% and a high possibility would be given to reviews checking less than 33%. Reviews rated as having less than 50% of items checked have been excluded from the library. The PRISMA flow diagram is a suggested way of providing information about studies included and excluded with reasons for exclusion. Where no flow diagram has been presented by individual reviews, but identified studies have been described in the text, reviews have been checked for this item. Note that early reviews may have been guided by less stringent reporting checklists than the PRISMA, and that some reviews may have been limited by journal guidelines.

Evidence was graded using the Grading of Recommendations Assessment, Development and Evaluation Working Group (GRADE) approach where high quality evidence such as that gained from randomised controlled trials (RCT) may be downgraded to moderate or low if review and study quality is limited, if there is inconsistency in results, indirect comparisons, imprecise or sparse data and high probability of reporting bias. It may also be downgraded if risks associated with the intervention are high. Conversely, low quality evidence such as that gained from observational studies may be upgraded if effect sizes are large, there is a dose dependent response or if results are reasonably consistent, precise and direct with low associated risks (see end of table for an explanation of these terms)[3]. The resulting table represents an objective summary of the available evidence, although the conclusions



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are solely the opinion of staff of NeuRA (Neuroscience Research Australia).

## Results

We found two systematic reviews that met our inclusion criteria[1, 4].

- Moderate to high quality evidence finds a medium-sized effect of reduced total ridge count and a-b palmar ridge count in people with schizophrenia compared to controls, with no differences in ATD angle, fingertip pattern asymmetry or ridge count asymmetry.



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*Bramon E, Walshe M, McDonald C, Martin B, Toulopoulou T, Wickham H, Van Os J, Fearon P, Sham PC, Fananas L, Murray RM*

## Dermatoglyphics and Schizophrenia: A meta-analysis and investigation of the impact of obstetric complications upon a-b ridge count

**Schizophrenia Research 2005; 75: 399-404**

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| | |
|---|---|
| **Comparison** | **A-b palmar ridge count in people with schizophrenia vs. controls.** |
| **Summary of evidence** | **Moderate to high quality evidence (large sample, inconsistent, precise, direct) finds a medium-sized effect of reduced a-b palmar ridge count in people with schizophrenia.** |
| **a-b palmar ridge count** | |
| *A medium-sized effect of reduced a-b palmar ridge count in people with schizophrenia;*<br>9 studies, N = 2,405, *d* = 0.39, 95%CI 0.05 to 0.73, *p* = 0.03 | |
| **Consistency in results‡** | Inconsistent, authors report significant heterogeneity in results. |
| **Precision in results§** | Precise |
| **Directness of results‖** | Direct |

*Golembo-Smith S, Walder DJ, Daly MP, Mittal VA, Kline E, Reeves G, Schiffman J*

## The presentation of dermatoglyphic abnormalities in schizophrenia: A meta-analytic review

**Schizophrenia Research 2012; 142(1-3):1-11**

View review abstract online

| | |
|---|---|
| **Comparison** | **Dermatoglyphic abnormalities in people with schizophrenia vs. controls.** |
| **Summary of evidence** | **Moderate to high quality evidence (large samples, inconsistent, mostly precise, direct) finds total finger ridge count and total A-B** |

| | |
|---|---|
| | **palmar ridge count is reduced in people with schizophrenia with no differences in ATD angle, fingertip pattern or ridge count asymmetry.** |
| **Total finger ridge count (TFRC), total a–b palmar ridge count (TABRC), ATD angle, fingertip pattern asymmetry between hands (three-pattern; whorl, loop, or arch), fluctuating finger ridge count asymmetry between hands (FAFRC), and fluctuating a–b palmar ridge count asymmetry between hands (FABRC)** | |
| *Significant, small effect showing reduced TFRC and TABRC in people with schizophrenia;*<br><br>TFRC: 18 studies, N = 3316, *g* = -0.20, 95%CI -0.27 to -0.13, *p* < 0.05; Q = 56.9, *p* < 0.001<br><br>TABRC: 18 studies, N = 3435, *g* = -0.31, 95%CI -0.38 to -0.24, *p* < 0.01; Q = 151.00, *p* < 0.001<br><br>*No differences in fingertip patterns, ATD angle or fingertip asymmetry;*<br><br>ATD angle: 10 studies, N = 1506, *g* = -0.10, 95%CI -0.20 to -0.01, *p* > 0.05; Q = 44.49, *p* < 0.001<br><br>Fingertip pattern asymmetry: 4 studies, N = 476, *g* = 0.25, 95%CI -0.08 to 0.59, *p* > 0.05; Q = 11.75, *p* < 0.05<br><br>FAFRC: 3 studies, N = 531, *g* = 0.31, 95%CI -0.50 to 1.12, *p* > 0.05; Q = 54.17, *p* < 0.001<br><br>FABRC: 3 studies, N = 539, *g* = 0.75, 95%CI -0.65 to 2.13, *p* > 0.05; Q = 146.89, *p* < 0.001 | |
| **Consistency in results** | Inconsistent |
| **Precision in results** | Precise, apart from FAFRC and FABRC |
| **Directness of results** | Direct |

## Explanation of acronyms

CI = Confidence Interval, *d* = Cohen's *d* and *g* = Hedges' *g* = standardized mean differences (see below for interpretation of effect sizes), ES = effect size, N = number of participants, *p* = probability of obtaining that result (*p* < 0.05 generally regarded as significant), Q = measure of heterogeneity



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## Explanation of technical terms

* Bias has the potential to affect reviews of both RCT and observational studies. Forms of bias include; reporting bias – selective reporting of results, publication bias - trials that are not formally published tend to show less effect than published trials, further if there are statistically significant differences between groups in a trial, these trial results tend to get published before those of trials without significant differences; language bias – only including English language reports; funding bias - source of funding for the primary research with selective reporting of results within primary studies; outcome variable selection bias; database bias - including reports from some databases and not others; citation bias - preferential citation of authors. Trials can also be subject to bias when evaluators are not blind to treatment condition and selection bias of participants if trial samples are small[5].

† Different effect measures are reported by different reviews.

Weighted mean difference scores refer to mean differences between treatment and comparison groups after treatment (or occasionally pre to post treatment) and in a randomised trial there is an assumption that both groups are comparable on this measure prior to treatment. Standardised mean differences are divided by the pooled standard deviation (or the standard deviation of one group when groups are homogenous) which allows results from different scales to be combined and compared. Each study's mean difference is then given a weighting depending on the size of the sample and the variability in the data. 0.2 represents a small effect, 0.5 a medium effect, and 0.8 and over represents a large treatment effect[5].

Reliability and validity refers to how accurate the instrument is. Sensitivity is the proportion of actual positives that are correctly identified - 100% sensitivity = predict all people who are at high risk as developing psychosis and specificity is the proportion of negatives that are correctly identified - 100% specificity = not predicting anyone as being at high risk if they are truly not.

Odds ratio (OR) or relative risk ratio (RR) refers to the probability of a reduction (< 1) or an increase (> 1) in a particular outcome in the treatment group relative to the comparison group. For example, a RR of 0.75 translates to a reduction in risk of an outcome of 25% relative to those not receiving the treatment. Conversely, an RR of 1.25 translates to an increased risk of 25% relative to those not receiving treatment or not having been exposed to a certain risk factor. An RR of 1.00 means there is no difference between groups. The RR effect is statistically significant if the CI completely sits on either side of 1.00 and the *p* value is < 0.05. A medium effect is considered if RR > 2 or < 0.5 and a large effect if RR > 5 or < 0.2[6]. ln OR stands for logarithmic OR where a ln OR = 0 shows no difference between groups and the ln OR is statistically significant if the CI completely sits on either side of zero.

Correlation coefficients (eg, r) indicate the strength of association or relationship between variables. They are an indication of prediction, but do not confirm causality due to possible and often unforseen confounding variables. An r of 0.10 represents a weak association, 0.25 a medium association and 0.40 and over represents a strong association. Unstandardised (*b*) regression coefficients indicate the average change in the dependent variable associated with a 1 unit change in the dependent variable, statistically controlling for the other independent variables. Standardised regression coefficients represent the change



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being in units of standard deviations to allow comparison across different scales.

‡ Inconsistency refers to differing estimates of treatment effect across trials (i.e. heterogeneity or variability in results) that is not explained by subgroup analyses and therefore reduces confidence in the effect estimate. $I^2$ is the percentage of the variability in effect estimates that is due to heterogeneity rather than sampling error (chance) - 0% to 40%: heterogeneity might not be important, 30% to 60%: may represent moderate heterogeneity, 50% to 90%: may represent substantial heterogeneity and 75% to 100%: considerable heterogeneity. $I^2$ can be calculated from Q (chi-square) for the test of heterogeneity with the following formula;

$$I^2 = \left(\frac{Q - df}{Q}\right) \times 100\%$$

§ Imprecision refers to wide confidence intervals indicating a lack of confidence in the effect estimate. Based on GRADE recommendations, a result for continuous data (standardised mean differences, not weighted mean differences) is considered imprecise if the upper or lower confidence limit crosses an effect size of 0.5 in either direction, and for binary and correlation data, an effect size of 0.25. GRADE also recommends downgrading the evidence when sample size is smaller than 300 (for binary data) and 400 (for continuous data), although for some topics, this criteria should be relaxed[7].

‖ Indirectness of comparison occurs when a comparison of intervention A versus B is not available but A was compared with C and B was compared with C that allows indirect comparisons of the magnitude of effect of A versus B. Indirectness of population, comparator and or outcome can also occur when the available evidence regarding a particular population, intervention, comparator, or outcome is not available so is inferred from available evidence. These inferred treatment effect sizes are of lower quality than those gained from head-to-head comparisons of A and B.



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## References

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