The parameter f^2 used in G*Power in the univariate case of Repeated Measurements differs from that used in SPSS, and because 'partial eta square' = $f^2/(1+f^2)$ the same holds true with respect to 'partial eta square'.

How to translate between the values used in G*Power f^2 and SPSS $f^{2.}$?

In order to be able to distinguish between both effect sizes, we here write the SPSS f^2 as g^2 .

In SPSS it always holds $F = g^2\, df_2 / df_1$, that is, the noncentrality parameter is given as $\lambda = g^2\, df_2$

In G*Power, f^2 is defined as

$$f^2 = \text{(population effect variance)} / \text{(population error variance within conditions)}$$

exactly as in the non-repeated case.

The simplest way to convert between f^2 and g^2 is via the definitions of λ used in G*Power, which are listed in Table 3 in Faul et al (2007).

I will illustrate the **conversion for „between-interaction“**. From Table 3 we get:

$\lambda = f^2\, m/(1-\rho)\, N\, \varepsilon$
$df_2 = (N-k)(m-1)\varepsilon$

with m = number of repetitions, k = number of groups, ε = nonsphericity correction

Now equate the definitions of λ used in G*Power and those used in SPSS (which must be numerically identical)

$$f^2\, m/(1-\text{rho})\, N\, \varepsilon = g^2\, df_2 = g^2\, (N-k)(m-1)\ \varepsilon$$

and solve for g^2 to calculate the SPSS effect size from the G*Power effect size

$$g^2 = f^2 * m/(m-1) * N/(N-k) * 1/(1-\rho)$$

Analogously, solve for f^2 to calculate the G*Power effect size from the one used in SPSS

$$f^2 = g^2 * (N-k)/N * (m-1)/m * (1-\rho)$$

(The terms including N, k, and m are due to the fact that G*Power treats the effect size as a population parameter, whereas SPSS regards it as an estimator of this value. The term including ρ shows that g^2 (i.e. the value used in SPSS) already includes the (mean) correlation between the repetitions, whereas f^2 does not.)

Thus, **if you have a SPSS partial eta square** u^2 and want to transform it to G*Power's partial eta square v^2, you first calc $g^2 = u^2/(1-u^2)$, then convert to f^2 with the above formula for f^2, then convert f^2 to v^2 with $v^2 = f^2 / (1+f^2)$. Note: It makes no difference which value of ρ you assume in the conversion as long as you insert that value in the corresponding field in the main window of G*Power.