Supplementary Material for:

Hormone Ratios Suffer from Striking Lack of Robustness to Measurement Error

Marco Del Giudice & Steven W. Gangestad

Table S1: Skew of Hormone Levels in Three Empirical Datasets

Dinh et al. (2021)

Hormone	N	Skew
Estradiol	708	3.24
Progesterone	708	8.55
Cortisol	708	1.79
Testosterone	708	1.67
Oxytocin	419	1.67

Stern et al. (2021)

Hormone	N	Skew
Estradiol	1027	2.12
Progesterone	868	5.71

Jones et al. (2018)

Hormone	N	Skew
Estradiol	2180	3.30
Progesterone	2180	2.84
Cortisol	2179	20.22
Testosterone	2180	0.87

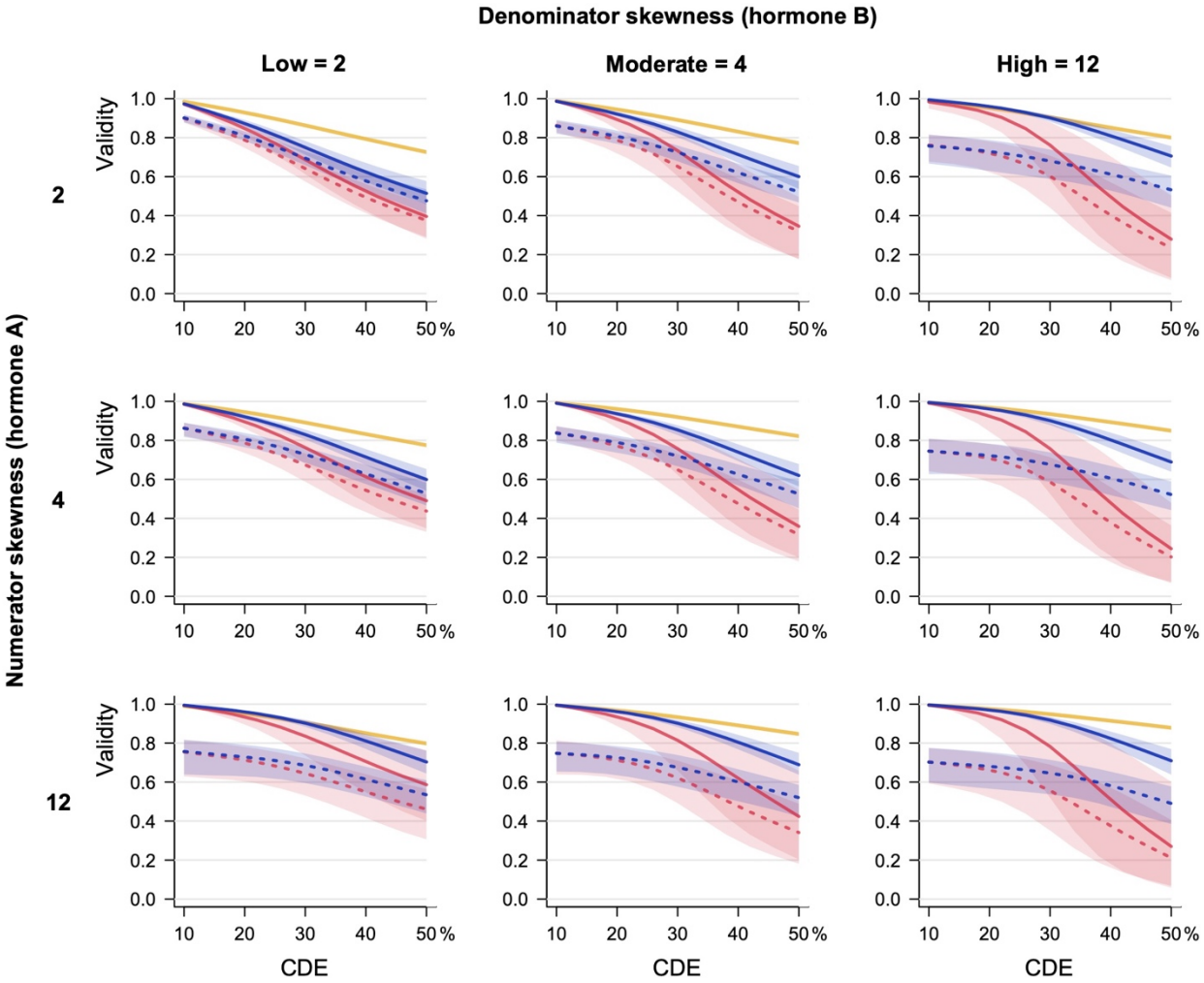

Fig. S1. Simulated validities of raw hormone ratios and log-ratios when the concentration-independent error (CIE) is set at 1% of the median and the levels of the two hormones are positively correlated (about .25 to .45 between measured levels). Validities are shown as a function of concentration-dependent error (CDE), skewness of numerator hormone levels (A), and skewness of the denominator hormone levels (B). Values of A and B were sampled from log-normal distributions. Solid red line: Correlation between measured raw hormone ratios and underlying raw hormone ratios. Solid blue line: Correlation between measured log-ratios and underlying log-ratios. Dashed red line: Correlation between measured raw hormone ratios and underlying log-ratios. Dashed blue line: Correlation between measured log-ratios and underlying raw hormone ratios. When the dashed blue line is higher than the solid red line, the measured log-ratio has greater validity for measuring the underlying raw ratio than does the measured raw ratio itself. Red and blue bands show the 5th and 95th percentiles of the validities across 100 simulated studies (N = 500 each). Solid yellow line: Average correlation of the measured hormone levels of A and B with the underlying raw levels, shown for comparison purposes.

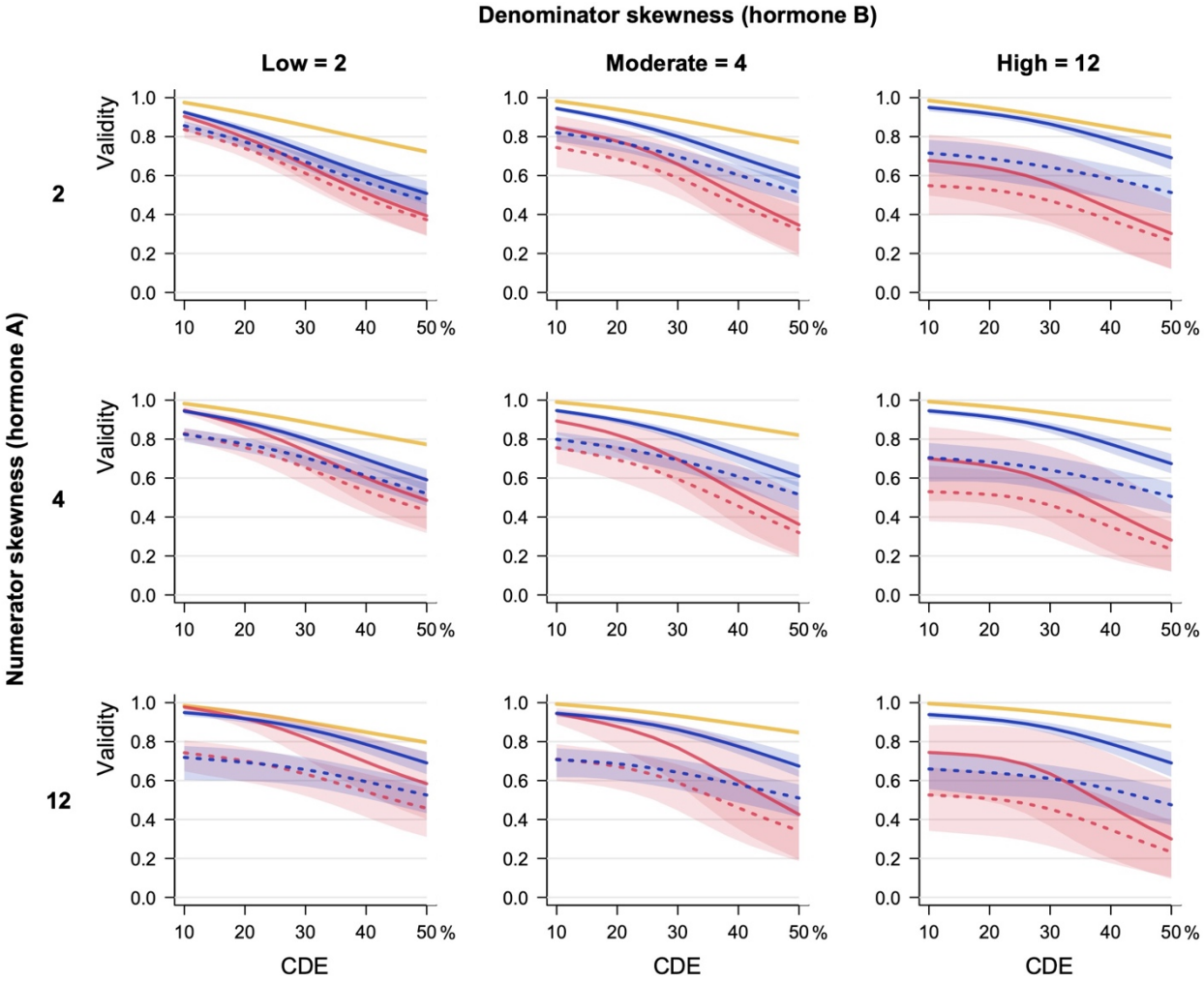

Fig. S2. Simulated validities of raw hormone ratios and log-ratios when the concentration-independent error (CIE) is set at 10% of the median and the levels of the two hormones are positively correlated (about .25 to .45 between measured levels). Validities are shown as a function of concentration-dependent error (CDE), skewness of numerator hormone levels (A), and skewness of the denominator hormone levels (B). Values of A and B were sampled from log-normal distributions. Solid red line: Correlation between measured raw hormone ratios and underlying raw hormone ratios. Solid blue line: Correlation between measured log-ratios and underlying log-ratios. Dashed red line: Correlation between measured raw hormone ratios and underlying log-ratios. Dashed blue line: Correlation between measured log-ratios and underlying raw hormone ratios. When the dashed blue line is higher than the solid red line, the measured log-ratio has greater validity for measuring the underlying raw ratio than does the measured raw ratio itself. Red and blue bands show the 5th and 95th percentiles of the validities across 100 simulated studies (N = 500 each). Solid yellow line: Average correlation of the measured hormone levels of A and B with the underlying raw levels, shown for comparison purposes.

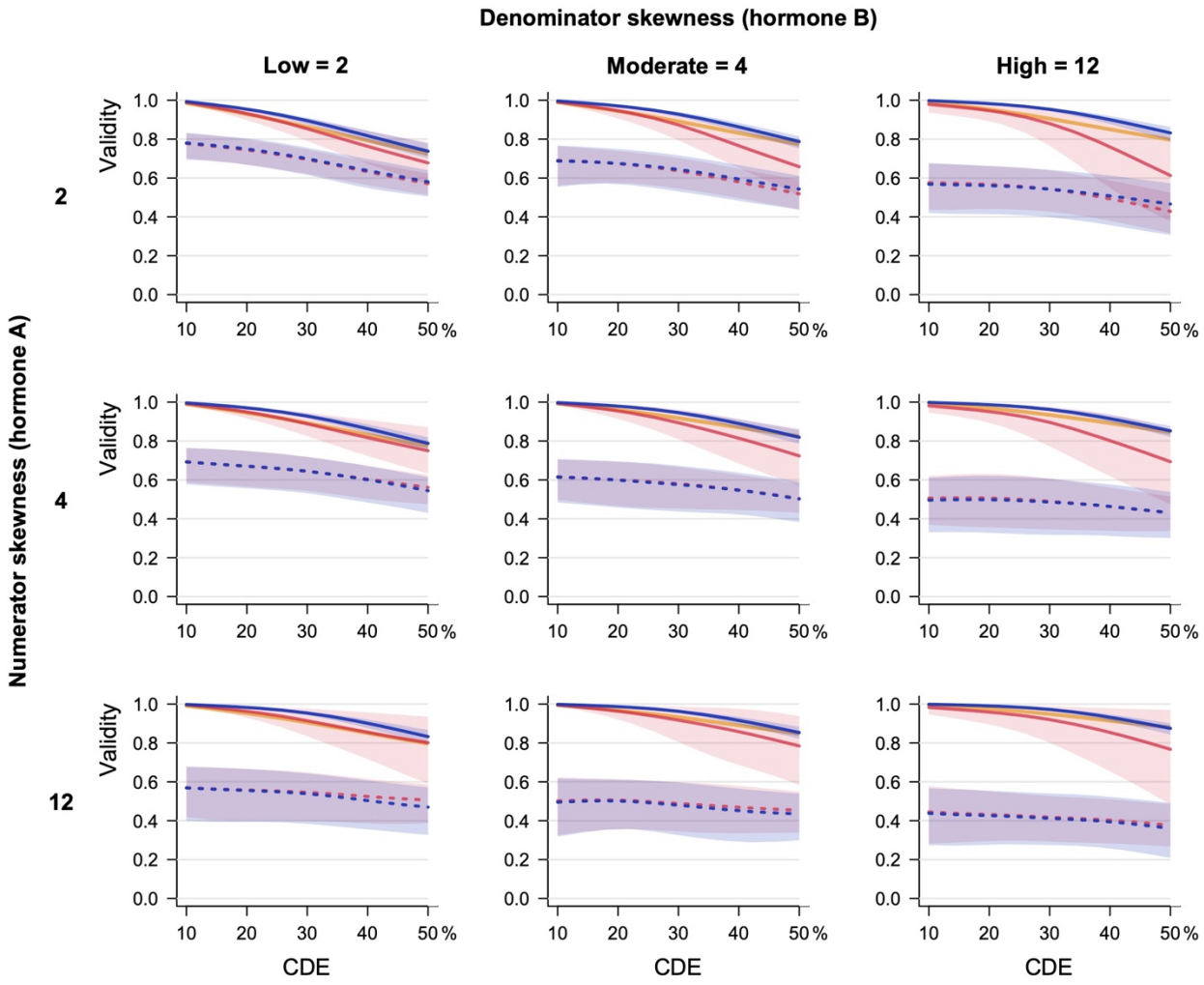

Fig. S3. Simulated validities of raw hormone ratios and log-ratios when the concentration-independent error (CIE) is set at 1% of the median and the levels of the two hormones are negatively correlated (about –.20 to –.40 between measured levels). Validities are shown as a function of concentration-dependent error (CDE), skewness of numerator hormone levels (A), and skewness of the denominator hormone levels (B). Values of A and B were sampled from log-normal distributions. Solid red line: Correlation between measured raw hormone ratios and underlying raw hormone ratios. Solid blue line: Correlation between measured log-ratios and underlying log-ratios. Dashed red line: Correlation between measured raw hormone ratios and underlying log-ratios. Dashed blue line: Correlation between measured log-ratios and underlying raw hormone ratios. When the dashed blue line is higher than the solid red line, the measured log-ratio has greater validity for measuring the underlying raw ratio than does the measured raw ratio itself. Red and blue bands show the 5th and 95th percentiles of the validities across 100 simulated studies (N = 500 each). Solid yellow line: Average correlation of the measured hormone levels of A and B with the underlying raw levels, shown for comparison purposes.

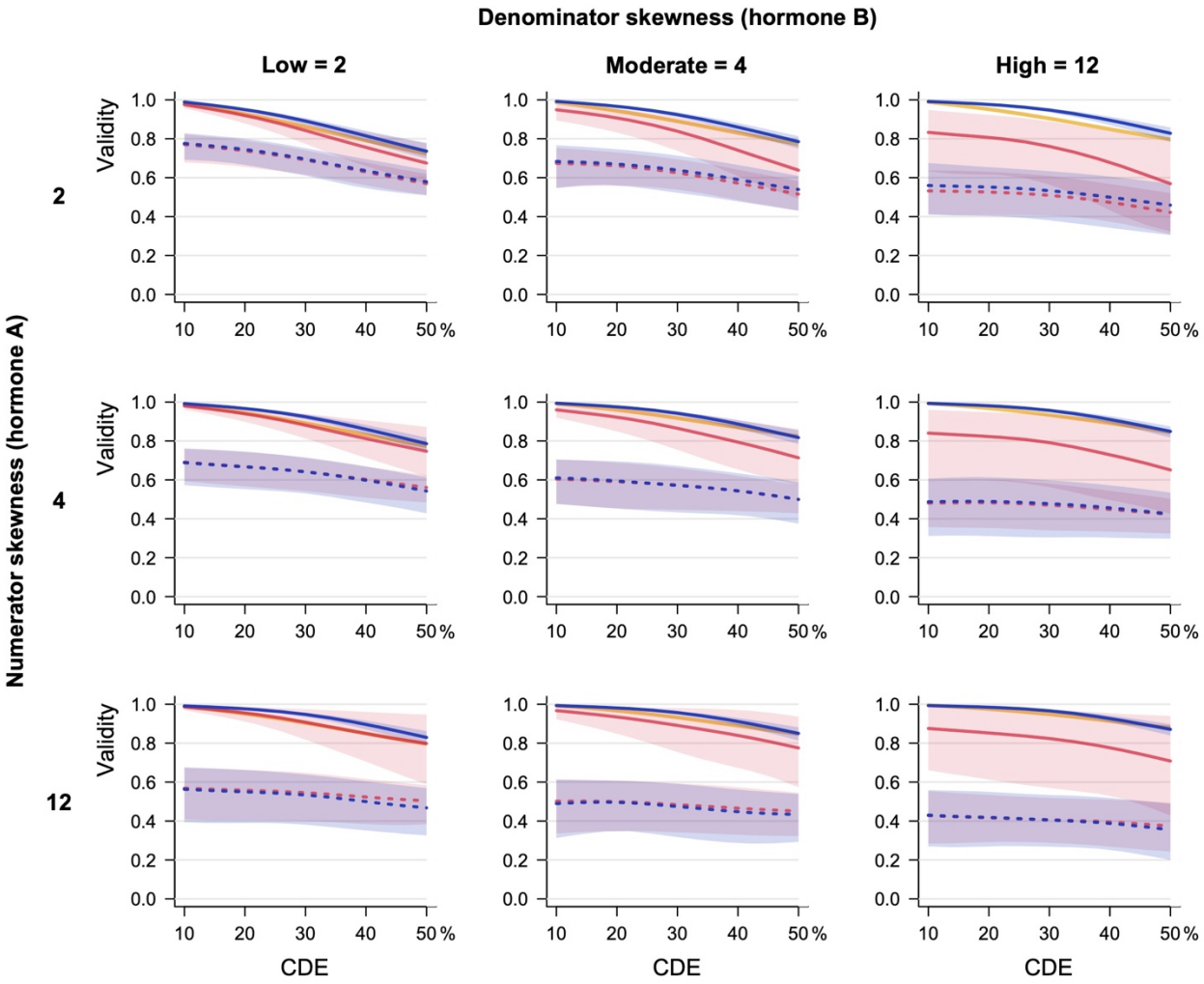

Fig. S4. Simulated validities of raw hormone ratios and log-ratios when the concentration-independent error (CIE) is set at 5% of the median and the levels of the two hormones are negatively correlated (about –.20 to –.40 between measured levels). Validities are shown as a function of concentration-dependent error (CDE), skewness of numerator hormone levels (A), and skewness of the denominator hormone levels (B). Values of A and B were sampled from log-normal distributions. Solid red line: Correlation between measured raw hormone ratios and underlying raw hormone ratios. Solid blue line: Correlation between measured log-ratios and underlying log-ratios. Dashed red line: Correlation between measured raw hormone ratios and underlying log-ratios. Dashed blue line: Correlation between measured log-ratios and underlying raw hormone ratios. When the dashed blue line is higher than the solid red line, the measured log-ratio has greater validity for measuring the underlying raw ratio than does the measured raw ratio itself. Red and blue bands show the 5th and 95th percentiles of the validities across 100 simulated studies (N = 500 each). Solid yellow line: Average correlation of the measured hormone levels of A and B with the underlying raw levels, shown for comparison purposes.

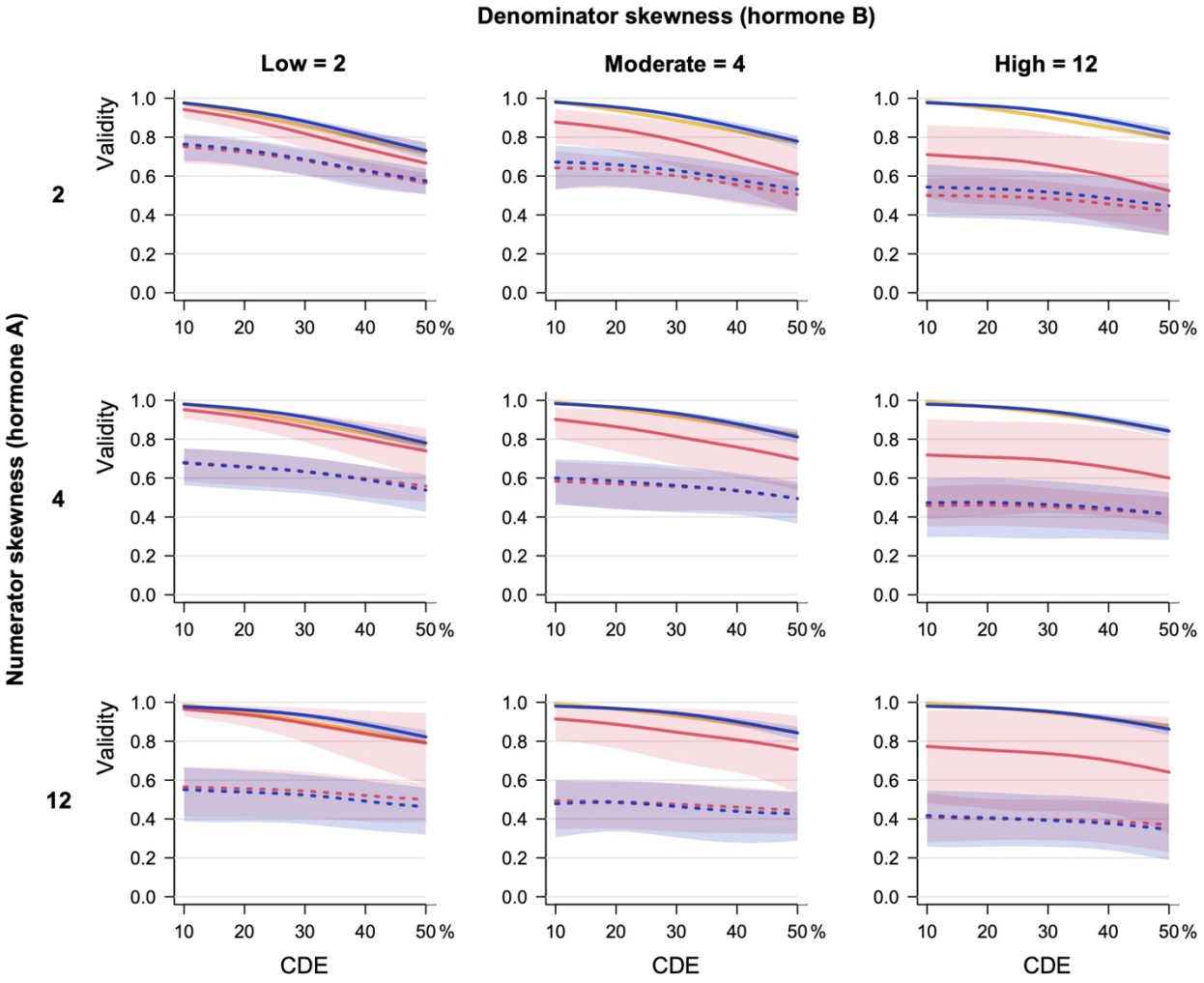

Fig. S5. Simulated validities of raw hormone ratios and log-ratios when the concentration-independent error (CIE) is set at 10% of the median and the levels of the two hormones are negatively correlated (about –.20 to –.40 between measured levels). Validities are shown as a function of concentration-dependent error (CDE), skewness of numerator hormone levels (A), and skewness of the denominator hormone levels (B). Values of A and B were sampled from log-normal distributions. Solid red line: Correlation between measured raw hormone ratios and underlying raw hormone ratios. Solid blue line: Correlation between measured log-ratios and underlying log-ratios. Dashed red line: Correlation between measured raw hormone ratios and underlying log-ratios. Dashed blue line: Correlation between measured log-ratios and underlying raw hormone ratios. When the dashed blue line is higher than the solid red line, the measured log-ratio has greater validity for measuring the underlying raw ratio than does the measured raw ratio itself. Red and blue bands show the 5th and 95th percentiles of the validities across 100 simulated studies (N = 500 each). Solid yellow line: Average correlation of the measured hormone levels of A and B with the underlying raw levels, shown for comparison purposes.