Calcular $I = \displaystyle\int_0^\pi \sin^2\left(1 + \dfrac{\theta}{2}\right)\, d\theta$.

$$I = \int_0^\pi \cos^2\left(\frac{\pi}{2} - 1 - \frac{\theta}{2}\right)\, d\theta = \int_0^\pi \frac{\cos(\pi - 2 - \theta) + 1}{2}\, d\theta$$

Seja $u = \pi - 2 - \theta$, $du = -d\theta$.

$$I = \int_{-2}^{\pi-2} \frac{1 + \cos u}{2}\, du = \frac{u}{2}\Big|_{-2}^{\pi-2} + \frac{\sin(u)}{2}\Big|_{-2}^{\pi-2} = \frac{\pi - 2}{2} + 1 + \frac{\sin(\pi - 2)}{2} + \frac{\sin 2}{2} = \boxed{\frac{\pi}{2} + \sin 2}$$

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Sugestões, comunicar erros: "a.vandre.g@gmail.com".

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