Moment of Inertia of a thin circular disc

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The disc has uniform density. The mass of a slice (like a pizza)
of the disc is:

dm = (M/2pi) * dtheta

theta: the angle of the slice in radians
M: the mass of the disc

So to find the moment of inertia:

I = (Integral from 0 to 2pi)R^2 dm = M*R^2

That's incorrect, as the moment of inertia of a circular disc is
M*R^2/2.

So what am I doing wrong?
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