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How Many Different Barbies? How Many Different Girls? How Many Different Girls in Mathematics?

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It's not often that a child's toy becomes a cover story but that's exactly what Barbie did on February 8, 2016 (see "A Barbie for Every Body," *Time*). The cover story reported how Mattel, the toy giant, finally decided that the 57-year old icon just might need to become somewhat representative of the body shapes of human women (see "What would a Real Life Barbie Look Like," *BBC News Magazine*).

The news that Barbie would be available in four "body types"—curvy, tall, petite, and "original"—was not only a *Time* cover story but also a topic of discussion of nearly every media outlet: radio and television news and talk shows, conventional and avant-garde news papers, and literally dozens of magazines, from *Cosmopolitan* to *WIRED*. And, of course, Barbie and her new body types were all the buzz on social media for days.

Never in her 57-year history has Barbie received so much favorable press. But not all of the press in the recent weeks has been favorable, even the news of the different body types came with some of the ongoing critiques. Some of which can even be found in scholarly journals (see "Does Barbie Make Girls Want to Be Thin? The Effect of Experimental Exposure to Images of Dolls on the Body Image of 5- to 8-Year-Old Girls," *Developmental Psychology*). Unfavorable critique, in general, is what Barbie has most often experienced. Remember the fortunate unfavorable critique over twenty years ago when Teen Talk Barbie spoke the words, "Math class is tough" (see "Mattel Says It Erred; Teen Talk Barbie Turns Silent on Math," *New York Times*).

Nonetheless, Barbie over the years has provided me with a simple and straightforward social justice mathematics lesson, one that can work for nearly any age group. It's the scaling up lesson (see "How Big is Barbie?" *MPJ*). Depending on the age group, after doing the mathematics one can decide how far to take the social justice issues by asking different questions: Who created the icon? Who does the icon serve? How does the icon reify "a woman's place"? How does the icon limit "beauty"? How does the icon limit girls' and women's possibilities? For older students, one can turn to issues such as eating disorders (see "The Scary Reality of a Real-Life Barbie Doll," *Huffpost College*) or to conversations about body images in the media generally, for both girls and boys.

The introduction of new body types is not the first time that Mattel has attempted to reinvent a 1959 toy for twenty-first century girls (and boys). In 2015, Mattel expanded Barbie's look with the addition of "23 dolls with new skin tones, hair color, and most notably a flat foot" (see "Barbie 2016 Fashionistas Fact Sheet," Mattel). And over the years, even in her early years, Barbie has had an impressive resume, racking up over

150 careers, including that of a presidential candidate back in 1992.

So, if Barbie was available in any combination of the 4 body types, 7 skin tones, 22 eye colors, 24 hairstyles and textures, and, let's say, 150 careers, a simple permutation (4 x 7 x 22 x 24 x 150) would provide 2,217,600 different Barbies (see The Math Forum @ Drexel). Obviously, Mattel has no plans to manufacture over 2.2 million different Barbies; it would be a marketing and sales disaster.

Nevertheless, let's push into the over 2.2 million Barbies. In the permutation of just five characteristics or, might we say, identity markers, the possibility of difference grew exponentially into the millions. What if we were to consider other identities markers beyond body types, "race," and profession, such as ethnicity, language, class, national origin, religion, sexual orientation, dis/ableness, and so on. I think you get the point. Our 2.2 million different Barbies would quickly expand beyond the nearly 640 million school-aged (6–17) girls in the world.

That's a lot of school-aged girls! So, when we say "Furthering Girls' Math Identity," which girls are we talking about? Can we group all girls into a single category? Or might there be some sub-categories that make sense? Some sub-sub-categories? How might we be diligent in understanding the need, at times, to strategically group all girls into a single category while simultaneously acknowledging the grave dangers in doing so? How might we acknowledge that there's not just one Barbie but rather over 640 million? We must be cautious. We must recognize that girls, like all humans, experience life (and mathematics) at intersections of a multiplicity of identity markers.

In the end, to further girls' math identity, we need to build understandings of how White, English speaking, middle-class girls (might) experience math differently than Black girls, than Latinas, than working-class girls, and so on. We need to learn how we might integrate what we've learned about mathematics teaching and learning and other identities markers (e.g., race, ethnicity, language, class, etc.) in our discussions and understandings about furthering girls' math identity? Although more than 50 years late, we can learn something from the permutations of Barbie. Over 640 million school-aged girls is a lot of *different* girls!

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