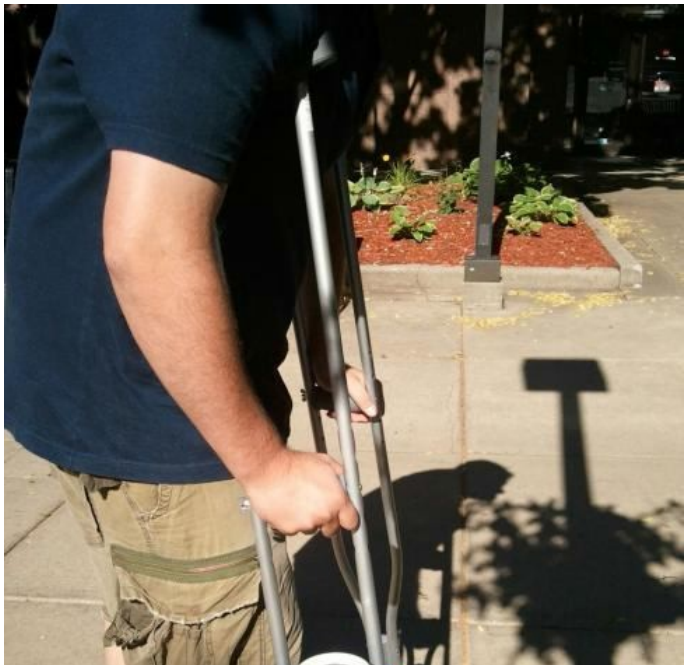
Element H: Prototype testing and data collection plan

Testing the Prototype

Our design specifications were:

1. Minimize spillage: no spills if liquid is ½ inch or greater below top of cup 3
2. Inexpensive, selling price $9.00 - $14.00 (based on current models that do less that run from $9.00 - $15.00) 3
3. Must fit on standard crutch 3
4. Will hold mugs with diameters of no less than 3 inches and no great than 4 inches 2
5. Will hold mugs with heights of no less than 4 inches and no great than 6 inches 2
6. Sturdy: won't break if dropped from height of 3 ft or while being attached to crutch
7. Light weight- weighs 2 lbs or less 2
8. Suitable for holding other non-food items (keys, coins, Rx bottles)1
9. Top rack dishwasher safe, BPA-Free Plastic 1

The red numbers indicate the importance of the specifications, with 3 being of most importance. Our prototype did meet specifications #2 - 5, 7, 8, based on our knowledge of similar products and the rough sketches we created. So that meant we had 2 specifications to address. We did not want to drop our prototype to test # 6, since the material was rather brittle and we did not want to break it. Accidentally the crutch did fall down twice when it was leaning against the wall, and the prototype did not break, but we didn't want to risk a catastrophic failure by intentionaly exposing it to stresses from being dropped. The material we choose will determine if we meet specification #9, so we could not test that. Our testing was designed to determine how well we met criteria 1, which is one of the most important.



Test #1

Our team wrote procedures for two different tests. The first test will keep all factors constant except we will vary the angle of the crutch from 45° to 135° from the horizon. We will then determine the amount of liquid that spills from the cup as these positions are met. Link to the test prcedure is below.

Test #1 angle blank _redacted.pdf

Test #2

Our second test involved varying the amount of weight at the bottom of the cup holder from 50 grams – 250 grams in an effort to determine which weight is most effective in reducing the amount of "swinging" as the crutch is being used to aid walking. As we were attaching the holder to the crutch, we realized that the beverage moved around quite a bit while the crutch was being used. We felt we needed to address this issue by testing different amounts of weights attached to the bottom of the cup. Link to the test procedure is below.

Test #2 varying weights blank_redacted.pdf

Test #3

During the testing phase we added a third test. Based on our analysis of the first test results, we wanted to further refine our findings. This test involved having a constant weight attached to the bottom of the cup. We had no variables, but duplicated the same test 3 times, with a constant weight of 100 grams. We wanted to get an average spill rate under 1 oz. Link to the test procedure is below.

Test #3 constant weight blank (1) redacted.pdf