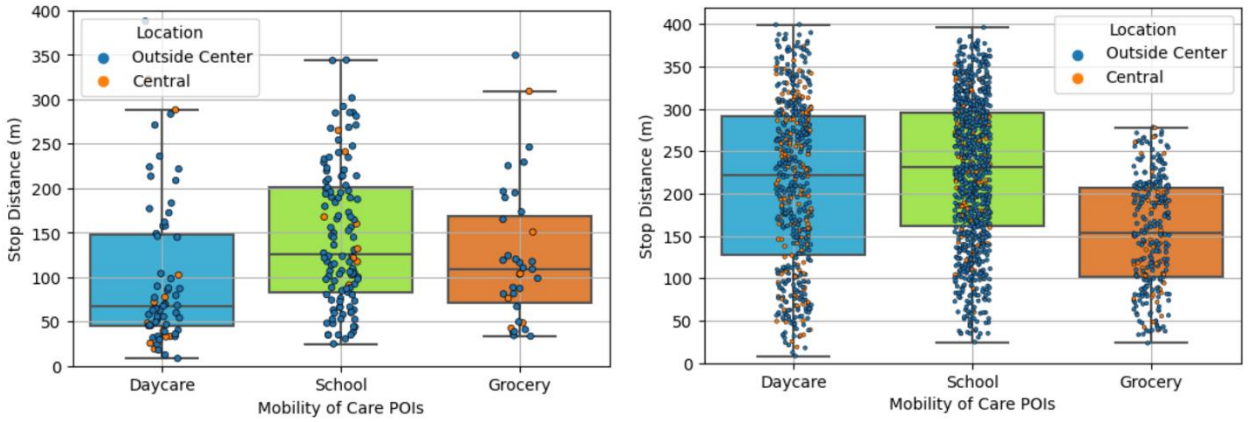
Supplemental Information: Identifying Stops Serving Mobility of Care Places of Interest

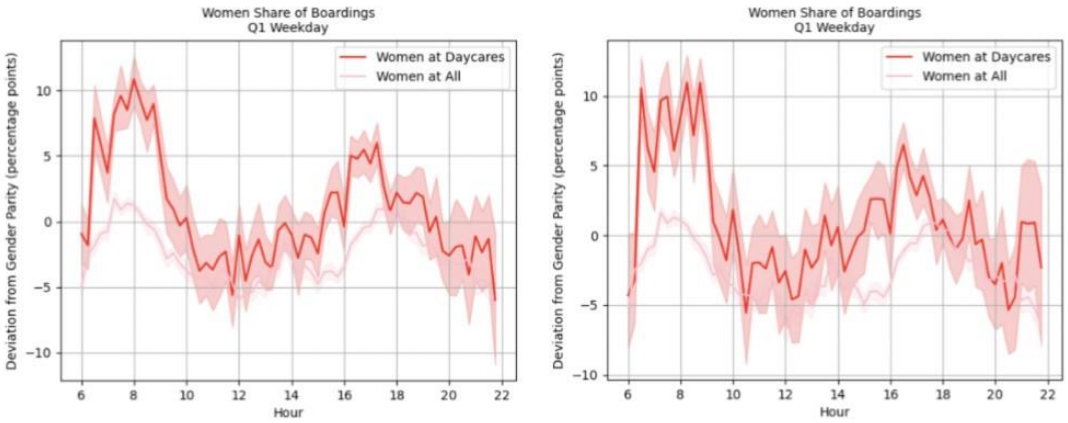
As detailed in Algorithm 1 in the Methods section, we use a 400m radius to evaluate stops and identify the nearest stop to a Mobility of Care POI for every GTFS route pattern. We employ this radius to limit candidate stops and reduce the search space for each mobility of care POI. The WMATA system has approximately 11,000 bus stops, hence an exhaustive search for all the stops for every Mobility of Care POI (or POIs of any other use of interest) would be quite inefficient. The FHWA guidelines suggest that an access/egress walking distance of ¼ - to - ½ mile (400m – 800m) is generally acceptable by transit riders. We use the lower threshold of 400m, considering that the transit riders we're interested in are presumed to accompany children or be carrying grocery bags, as an ***upper limit*** and evaluate only the stops within that radius to find the nearest GTFS-route-pattern stop for every Mobility of Care location. This assumes that the riders know and will only get off at the closest stop for each GTFS route pattern even if multiple stops fall within the 400m radius. For the Mobility of Care POI stops in Washington D.C. identified via this method, we found the average POI to bus stop distance to be **105 meters** (74 meters for daycares, 125m for schools, and 108m for grocery stores). Figure 3 shows the distribution of those stops, with Figure 3(a) illustrating the absolute nearest bus stop to each POI, and 3(b) showing the distribution of the nearest stop per GTFS-route-pattern that fall within that 400 m radius.



(a) Nearest Stop. (b) Nearest GTFS-Pattern Stop.

FIGURE 3: Distribution of nearest bus stop distances to Mobility of Care places of interest.

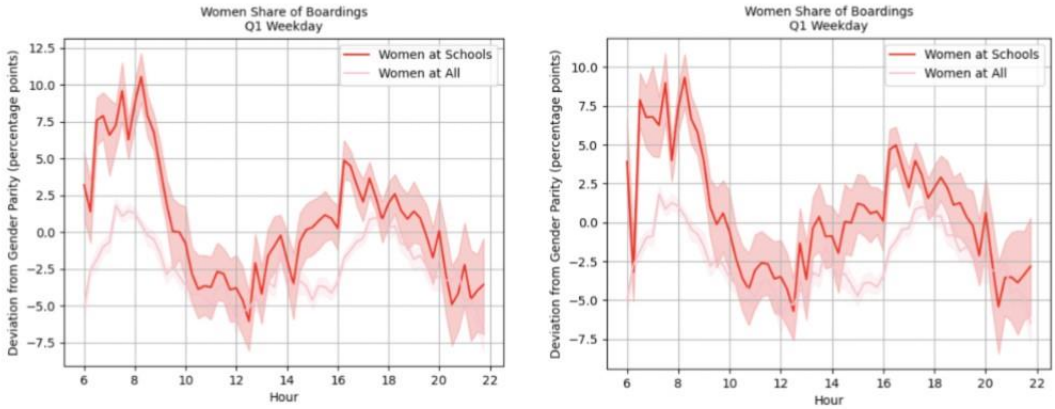
While not all transit users observed trip-chaining near Mobility of Care POI would visit the POI, the higher ratio of women observed in those particular places of interest does indicate a higher probability of women conducting mobility of care work. We performed an additional check to ensure that the results aren't affected by the presence of other competing POIs particularly in the busy, mixed-use city center area by comparing the results to Mobility of Care POIs outside Washington D.C.'s urban core. Evaluating stops that fall outside the central area, we find consistent results as demonstrated in the following figures and tables. The total number of stages shown in Tables 3 and 4 includes all stages for the first quarter of 2019. Grocery stores are the only POIs where there is variability, which is attributable to noise captured at the grocery store stops in the city center area. The peaking of the distribution late afternoon/early evening in locations outside the urban core reflects more of the anticipated visitation behavior to grocery stores. We find that on average, during every 15-minute interval, there is one additional woman that boards at stops near daycare centers compared to men, albeit having fewer women stages on the system's average. We observe this discrepancy across all mobility of care POIs, including an average of 3 additional women boardings per hour at stops near grocery stores outside the urban core.



(a) All daycare stops.

(b) Daycare stops outside city center.

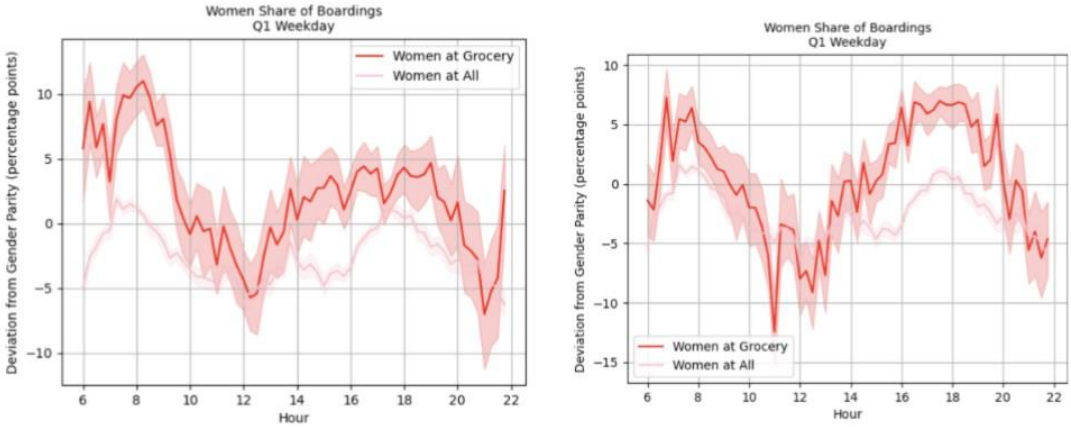
FIGURE 4: Gender ratio deviation from 50% women at Daycare stops.



(a) All school stops.

(b) School stops outside city center.

FIGURE 5: Gender ratio deviation from 50% women at School stops.



(a) All grocery store stops.

(b) Grocery stops outside city center.

FIGURE 6: Gender ratio deviation from 50% women at Grocery stops.

TABLE 3: Statistics For Weekday Stages Near POIs At All Stops

	# Stops	Σ Women Stages	Σ Men Stages	$\overline{\text{Women/hr}}$	$\overline{\text{Men/hr}}$	Δ
Daycares	594	95,857	86,270	10.1	9.1	1
Schools	1,029	140,599	126,692	8.5	7.7	0.82
Grocery	288	92,210	80,823	20.0	17.5	2.5

TABLE 4: Statistics For Weekday Stages Near POIs Outside City Center

	# Stops	Σ Women Stages	Σ Men Stages	$\overline{\text{Women/hr}}$	$\overline{\text{Men/hr}}$	Δ
Daycares	394	61,103	54,972	9.7	8.7	1
Schools	870	119,951	109,328	8.6	7.8	0.8
Grocery	238	81,593	69,414	21.4	18.2	3.2

Additionally, we looked the impact of reducing the maximum distance of nearest stop search from 400m to 200, 100, and 50 meters. Table 5 shows the total number of Mobility of Care POIs GTFS-pattern-stops and the percentage of that fall within each reduced radius. We see that a reasonable number of stops is preserved at each level of radius reduction, with the exception of schools were only 9% of the stops believed to serve the schools can be found within 50 meters. This is attributable to the school yards and open spaces that separate many school buildings (where the centroid of the POI geolocation would be) from the nearest road. Figure 7 illustrates the gender ratio deviation for each POI type at each of those thresholds. We find the results consistent with the previous results that include all stops within 400m with slight increase in variability illustrated by the wider confidence intervals.

TABLE 5: Mobility of Care Stops Within Varying Distances From POIs

	# Stops	Within 200m	Within 100m	Within 50m
Daycares	594	85%	68%	33%
Schools	1,029	75%	34%	9%
Grocery	288	86%	43%	23%

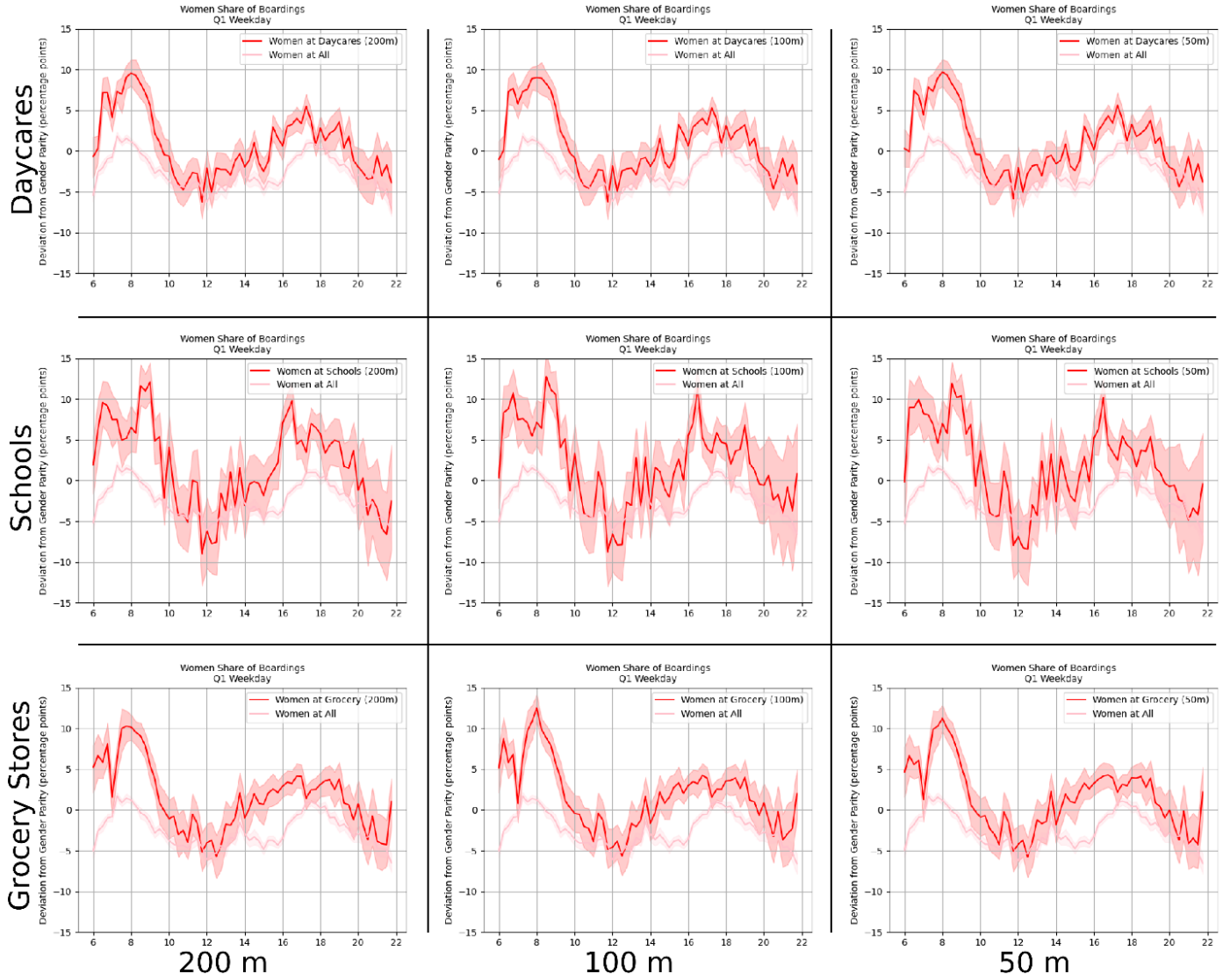


FIGURE 7: Gender ratio deviation from 50% women at Mobility of Care POIs with varying maximum POI-to-stop distances.