# Sq:#d

#### Sgord makes kids more active.

#### Sqord is the only entertainment platform for kids powered by healthy, old-school active play.



Get Moving Players earn Activity Po

Players earn Activity Points for their physical activity whenever they wear a Soord Booster.



Sync Activity Points
Players instantly send their Activity
Points to Sqord by syncing with our
iPhone. Android or desktop app.



Connect and Compete Online In Sqord's online world, players earn rewards, share successes, and participate in challenges.

#### Sqord gets kids moving.

Our data shows that the more kids wear and sync, the more they move. And it doesn't take long... It's not uncommon to see spontaneous jumping jacks erupt on a Player's first day when they see how easy it is to earn Activity Points.

#### New school tech, old school play. When Players sync, they instantly transfer their

Activity Points to Sqord. Then they can log in to...

- · Claim rewards they've earned
- Interact with friends and teammates
   Participate in Group & Individual Challenges
- See their rank on the Soord Leaderboards
- Customize their online PowerMe character
- and much more

#### Anything counts, there are no rules.

It doesn't matter what the activity is. From walking, to swimming, to pogo stick, any physical activity can earn some number of points.

#### Sqord is built for groups.

We've deployed in hundreds of schools and youth groups nationwide. Sqord offers powerful admin tools, easy set up, detailed player data, and direct assistance available any time.

#### Sqord works, because Sqord is fun!

Play used to be about more than what was on a screen. Our mission is to reclaim that by making old school active play fun again for today's connected generation. Help Sqord Take Back Play.

Visit sqord.com today to find out about making your kids more active.



## SQORD in ASD: 2 years of evidence

#### Mouhcine Guettabi

Presentation for 2017 Alaska School Health and Wellness Institute (AKSHWI)

10/31/2017



#### **Outline**

- Overview
  - Part 1: General patterns
  - Part 2: Do students respond to feedback?
  - Part 3: Do incentives work?
- 2 General patterns
- Do students respond to feedback?
- 4 Do incentives work?
- Final thoughts



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# General findings

#### Point accumulation

In this section, I will discuss findings from 23 elementary schools in the Anchorage School District where students between 3rd and 6th grade were provided the device but were not given specific instructions by the research team. This subset of schools had a total of 2,973 students who had signed parental agreements. Of the children that participated 1,462 were boys and 1,511 were girls and the average age was 10.15 years old. The results are from usage data in October 2015.

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Part 1: General patterns
Part 2: Do students respond to feedback?
Part 3: Do incentives work?

#### Feedback Experiment

In the Fall of 2015, we randomized 13 schools into treatment and control schools. We evaluated the effect of feedback type on the physical activity of elementary school children. One type of feedback allowed students access to a website to check their points and compare their activity levels to that of friends while the other type limited the information to leader-board printouts that they received once every two weeks. We find evidence that the type of feedback affects point physical activity.

Part 1: General patterns
Part 2: Do students respond to feedbar
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Part 1: General patterns
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#### Incentive Experiment

Starting October 14th, 2016 students in both control and treatment groups were told by their teachers that they will be setting daily goals at 70,000 daily SQORD points for both boys and girls. These numbers roughly approximate the points that translate to 60 minutes of moderate-vigorous physical activity in a day. They were also told that on a weekly basis, the target would be considered as achieved if they reached the mark on at least 3 out of 6 days. In addition to these instructions, students in the treatment group were promised rewards if they reach the target. We find that incentives resulted in a higher share of students achieving their goals. This effect, however, was not consistent across schools.

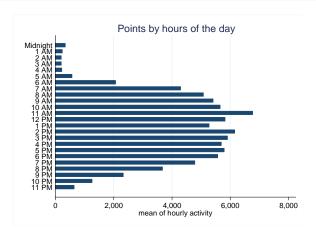


### **General Patterns**

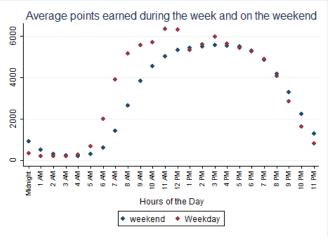
Table 1: Number of users by Month

Month	Unique users	Unique student users	Average Number of days in month with positive points	
September, 2015	2,629	2,424	6.1	
October, 2015	3,434	2,984	17.5	
November, 2015	2,587	2,251	16.6	
December, 2015	1,983	1,723	14.8	
January, 2016	1,706	1498	15.9	
February, 2016	1,526	1,367	14.2	
March, 2016	1,255	1,112	13.4	
April, 2016	1,030	905	14.7	
May, 2016	668	578	11.6	
June. 2016	178	160	7.6	

# **Hourly Activity**



# Weekday and weekend differences



## Gender differences



Table 2: General descriptive statistics

	All	Boys	Girls	T-test?
Gender	0.46 (0-1)			
Age	10.15(6-15)	10.08(6-15)	10.22(6-15)	
Average Daily points	55,843	57,363	54,422	Yes
Average points per day on weekdays	58,241	60,025	56,568	Yes
Average points per day on weekends	48,771	49,456	48,137	No
Quartile 1 (lowest earners)	23,009	22,481	23,478	Yes
Quartile 2	48,416	48,744	48,148	Yes
Quartile 3	68,628	68,673	68,584	No
Quartile 4	91,916	93,831	89,772	Yes
Overall number of students	2,973	1,462	1,511	
Number of students averaging 70,000 points	s 802	416	386	
Share of students averaging 70,000 points	26.97%	28.45%	25.55%	

- We use simple t-tests to determine differences in activity between different categories of interest. We focus on four categories. They are the following:
  - -Differences between boys and girls
  - -Difference between hours of the day
  - -Differences between title 1 and non title 1 schools
  - -Differences across ages

- We find that the unadjusted differences between boys and girls are 2,941 points per day and are statistically significant.
- students earn almost 1700 more points between 11 and 12pm than they do between 8 to 9am.
- students in Title 1 schools earn on average 370 points less per hour than ones students in non-Title 1 schools.
- A 9 year old earns 423.79 points more hourly points than an 11 year old and an 8 year old earns 277.30 more hourly points than a 10 year old.



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- Girls earn about 1.6% fewer points than boys
- Students earn 33% more points between 11 and 12 than between 8 and 9 am.
- Differences between Title 1 and non-Title 1 are about 10% of the hourly average.
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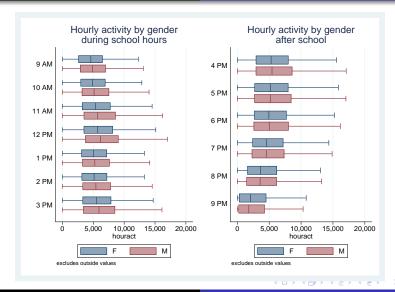
# Fall 2015 Feedback Experiment

- Study practices and eligibility: All elementary schools in the Anchorage School District were invited to participate by speaking to PE teachers. 13 schools volunteered for the study after which students were asked to have a consent form signed by their parents.
- Intervention Design: A 2-group design in which all participants were provided the SQORD and half were randomized to not have access to the website but instead we sent their teachers a leaderboard once every two weeks.

- We will be discussing the effects of website access on point accumulation.
- We had 13 schools participate in our experiment with 7 in the control group (website) and 6 in the treatment (no website).
- The control school had 1032 students participating, while the treatment group had 944.

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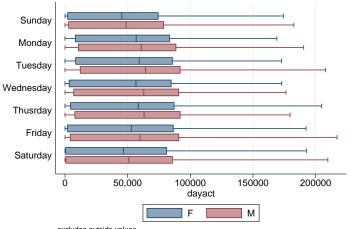
#### **During school**

	Male	Female
Male	0	-475.65***
Female		0

#### After school

	Male	Female
Male	0	-153.94***
Female		0





excludes outside values

#### Are the differences due to exercise?

 The answer seems to be yes because the differences are not due to the number of hours the device recorded positive points.

Day of		
	Number of hours device	
the week	worn	
Friday	13.63	
Monday	13.34	
Saturday	13.32	
Sunday	13.76	
Thursday	13.73	
Tuesday	13.78	
Wednesday	13.64	

# Summary statistics

Summary	statistics
---------	------------

	<b>Treatment</b>	Control
Number of observations	1,094,198	895,530
Number of users	944	1032
Number of schools	6	7
Individual characteristics		
Male	50.30%	50.10%
Age	9.86	10.08
School characteristics		
% African American	4.12%	3.08%
% Native	3.35%	6.49%
% Other	20.96%	26.55%
% white	68.55%	48.50%
% Asian	2.93%	15.38%
% free or reduced lunch	23.17%	32.66%
Title1	0	2

# Panel regressions at the hourly level

		TOT	TOT		TOT
VARIABLES	TOT	weekday	weekend	TOT school	afterschool
treatment	-213.99***	-256.71***	-220.15*	-419.64**	-458.38***
	(72.68)	(68.47)	(129.30)	(183.31)	(157.16)
			ividual characte		
Male	277.59***	290.12***	188.86***	509.20***	206.29***
	(30.16)	(32.77)	(46.45)	(58.50)	(78.67)
Age	-68.57***	-66.03***	-101.88***	-183.74***	-153.68***
	(22.64)	(24.20)	(16.89)	(33.34)	(32.18)
		Sc	chool character	istics	
N. of students	-0.82	-0.77	-0.70	-2.58*	-0.33
	(0.65)	(0.62)	(0.63)	(1.51)	(0.90)
% free or reduced					
lunch	-7.33*	-5.70	-5.57	-1.43	1.29
	(4.06)	(3.75)	(6.12)	(9.86)	(7.65)
% African American	11.60	12.05	15.53	-23.51	42.87**
	(11.10)	(9.92)	(15.05)	(27.51)	(19.99)
% Native	-32.73***	-40.95***	-18.72	-96.68***	-28.48
	(10.74)	(10.28)	(16.55)	(25.61)	(18.04)
% Asian	2.22	-1.53	11.19***	10.81**	-1.73
	(2.79)	(3.37)	(3.67)	(5.03)	(6.51)
% Other	8.42	8.35	-19.63	21.66	-47.57
	(14.87)	(12.35)	(22.87)	(37.92)	(30.02)
Week fixed effects	Yes	Yes	Yes	Yes	Yes
Constant	5,045.34***	5,188.90***	5,342.13***	8,551.35***	7,465.51***
	(376.75)	(369.05)	(453.47)	(735.96)	(577.96)
Observations	929,552	674,654	254,898	309,861	248,319
Number of user_id	1,825	1,815	1,725	1,811	1,757
MSE	4174	4195	4066	4042	4090

Robust standard errors in parentheses

<sup>\*\*\*</sup> p<0.01, \*\* p<0.05, \* p<0.1

# Panel regressions at the day level

		тот		
VARIABLES	TOT	weekend	TOT weekday	TOT(goal)
treatment	-1,660.62***	-535.04	-2,192.44***	-0.12
	(518.27)	(443.00)	(629.59)	(0.19)
		Individual ch	aracteristics	
Male	3,056.26***	2,566.29***	3,244.83***	0.28***
	(364.81)	(471.01)	(383.41)	(0.06)
Age	-1,395.86***	-1,841.41***	-1,306.38***	-0.19***
	(268.61)	(240.69)	(325.40)	(0.05)
		School char	acteristics	
enrolled	-8.01**	-2.09	-9.67***	-0.00
	(3.14)	(4.06)	(3.34)	(0.00)
% free or reduced				
lunch	-114.07***	-122.46***	-106.76***	-0.02***
	(21.35)	(42.59)	(24.09)	(0.01)
% African American	329.17***	360.99***	318.77***	0.03*
	(58.31)	(80.35)	(56.49)	(0.02)
% Native	-121.07**	118.38*	-224.88***	-0.00
	(61.77)	(65.42)	(75.74)	(0.01)
% Asian	73.49***	93.42***	62.46**	0.01
	(25.21)	(24.70)	(30.28)	(0.01)
% Other	-32.48	-159.42	-16.06	0.01
	(69.75)	(155.74)	(66.19)	(0.02)
Hours worn	3,952.09***	3,686.00***	4,023.28***	0.30***
	(51.30)	(45.27)	(56.08)	(0.03)
Week fixed effect	Yes	Yes	Yes	Yes
Constant	20,222.66***	21,862.52***	21,110.80***	-2.88***
	(4,146.88)	(4,466.35)	(4,795.10)	(0.92)
Observations	62,664	17,568	45,096	62,664
Number of user_id	1,825	1,725	1,815	1,825
MSE	20671	20964	19927	4.1

- Website access is positively associated with points earned.
   After controlling for demographics, students in the treatment group earn 1600 points less than they would have if they had access to the website.
- Boys earn a little more than 3,000 points than girls on average.
- Students in title 1 schools earn less points than ones in non-title1 schools.
- After accounting for demographics, access to the website does not seem to be related to length of use.



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## A little bit of context

	Treatment	Control
Number of users in October	888	953
Number of Students exceeding 70,000	215	255
Share reaching necessary activity levels	<u>24.2%</u>	<u>26.7%</u>
Average hourly points	3,986	3,937
Average daily points	57,188	56,409
Average number of SQORD points per step	5	5
Average number of steps	11,437	11,281
Number of steps equivalent to 60 minutes for children	12,750	12,750
Step deficit	<u>1,313</u>	<u>1,469</u>

- 70,000 points is roughly equivalent to 60 minutes of physical activity which means the following:
- Differences between treatment and control are about 1.32 minutes per day.
- Differences between between boys and girls are about 2.52 minutes per day.
- Differences between Title 1 and non-Title1 schools are about 11 minutes per day.

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## Fall 2016 Incentive Experiment

#### General description

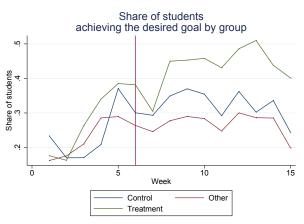
In the Fall of 2016, we implemented a goal achievement and incentive program in Anchorage in which children received a wrist band at the end of each week for reaching 70,000 points on at least 3 out of 6 days in a given week. We had 13 schools participate and 7 of them were randomly assigned to the treatment group. The formal experiment lasted form October 14th to December 20th. We, however, have data for five weeks prior to the begining of the experiment which allows to examine pre-intervention trends. All our analysis is done at the week level which gives (week1-week5) as pre-intervention and (week6-week15) as the intervention period.

#### **Specifics**

Starting October 14th, students in both groups were told by their teachers that they will be setting daily goals at 70,000 daily SQORD points for both boys and girls. These numbers roughly approximate the points that translate to 60 minutes of moderate-vigorous physical activity in a day. The students were also told that on a weekly basis, the target would be considered as achieved if they reached the mark on at least 3 out of 6 days. In addition to these instructions, students in the treatment group were promised rewards if they hit the target.

### How did students fare?

Graph 1: Share of students achieving 70,000 on at least 3 out of 6 days



## Aggregate analysis

$$Y_{i,t} = \alpha + \beta(D_i \times \mathsf{Post}_{i,t}) + Z_t + C_i + \epsilon_{i,t}, \tag{1}$$

where  $Y_{i,t}$  is the outcome of interest for school i in week t,  $D_i$  is the indicator variable identifying the treatment schools, and  $Post_t$  is an indicator variable equal to unity for treatment period (week 6 through 15). Any meaningful temporal shocks that are not specific to a single school are captured by time fixed effects  $Z_t$ , while any school-specific, time-invariant disturbances are captured by school fixed effects,  $C_i$ . The error term,  $\epsilon_{i,t}$  is clustered at the school level.

### What do we find?

#### Difference in difference results: Equation 1

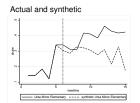
	Relative to everybody else	Just non-study schools	Relative to control groups
$D_i \times Post_t$	0.106*	0.123***	0.0762
	(0.0567)	(0.0574)	(0.0625)
R <sup>2</sup>	.496	.565	.517
N	510	405	195

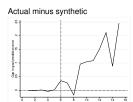
**Note.** \*\*\*, \*\*, \* corresponds to 1%, 5% and 10% significance, respectively. The control groups are shown in the column headers. Standard errors (clustered at the school level) are given in parenthesis below the estimated coefficients. Year and school fixed effects are included in all regressions. The coefficients can be interpreted as the causal effect of the treatment on the share of students achieving 70,000 points on at least 3 out of 6 days.

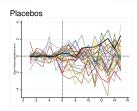
## What about heterogeneity?

#### School level estimates

Estimating an average treatment effect, as we do above, can mask the fact that these treatments are implemented by teachers and are likely sensitive to teacher enthusiasm, classroom competition, and other time varying factors and are likely to have nonuniform effects across schools. Exploring the school variation in this linkage is not only important for a deeper understanding of the treatment but also holds substantive practical ramifications and policy implications. We, therefore, adopt the synthetic control method to approach the question as multiple case-studies.







#### Estimation statistics (Full sample)

	Α	В	С	D	E	F	G		
SCM:pre-intervention fit									
Absolute prediction error/mean ratio	0.19	0.55	0.073	0.029	0.006	0.003	0.05		
SCM inference:permutations test									
Pre-intervention difference (D1)	-0.0452	-0.0352	0.030	0.0089	0.0023	-0.0007	20.0182		
Post-intervention difference (D2)	0.1904	0.167	0.055	0.1494	0.0154	0.105	0.157		
DID= D2  -  D1	0.23	0.20	0.02	0.14	0.01	0.10	0.13		
P-value:DID	0.037	0.037	0.296	0.037	0.296	0.074	0.037		
DID rank	1	1	8	1	8	2	1		

#### Estimation statistics (Relative to control schools)

	Α	В	С	D	E	F	G
Pre-intervention difference (D1)	-0.010	-0.094	0.108	-0.005	0.079	-0.014	0.046
Post-intervention difference (D2)	0.248	0.093	0.064	0.331	0.0207	0.062	0.108
DID= D2  -  D1	0.25	0.18	-0.047	0.33	-0.058	0.077	0.061
P-value:DID	0.142	0.142	0.857	0.142	0.857	0.142	0.142
DID rank	1	1	6	1	6	1	1

- Of the 7 schools in the treatment group, 5 had significant increases in the share of students achieving 70,000 in 3 out of 6 days.
- These effects were large as they ranged from 6 to 33 percent when we restrict the comparison to the control schools and 10 to 23 percent when compared to all schools.
- In 2 of the schools, the rewards made no difference.

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- In 2 of the schools, the rewards made no difference.

- Based on the findings above, it appears that rewards play an important part in motivating children.
- It is, however, important to note that the effectiveness of these rewards vary a great deal from school to school.
- It is difficult to isolate which school features are most responsible for these heterogeities.

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