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**Supplemental information**

**Quantifying the impact of physical activity  
on future glucose trends using machine learning**

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## Supplementary Data

**Table S1|** Data features obtained from participant wearables during a 4-arm artificial pancreas study, related to STAR Methods.

<b>Name</b>	<b>Description</b>
<b>CBG</b> Start of Exercise	The glucose value as measured by SMBG at the start of aerobic exercise.
<b>CGM</b> Start of Exercise	The glucose at the start of exercise as measured by CGM. The CGM directly following SMBG calibration is used to avoid calibration artifact.
<b>Average CGM</b> Prior 25 minutes	The average glucose in the 25 minutes preceding exercise. If a calibration point is detected, the average CGM following the most recent calibration point is used.
<b>CGM Trend</b> (25, 20, 15, 10) Minutes Prior to Exercise	The glucose trends in the last 25 min preceding exercise, as calculated by CGM data. The trend is determined using data preceding SMBG calibration points, if SMBG is present at the start of exercise.
<b>Average CGM Trend</b> Prior Hour	The average glucose trend in the hour preceding exercise, calculated by CGM data.
<b>Coefficient of Variation of Glucose</b>	The coefficient of variation of CGM data in the 4 hours directly preceding aerobic exercise.
<b>Insulin On Board</b>	The current active insulin directly preceding the start of exercise. Measured in Units of insulin, as calculated using a linear decay formulation.
<b>IOB Trend</b> (25, 20, 15, 10) Minutes Prior to Exercise	The trend in the IOB of the participant in the 25 minutes directly preceding exercise.
<b>Meal On Board</b>	The current active meal carbohydrate directly preceding the start of exercise. Measured in grams of carbohydrate, as calculated using a linear decay formulation.
<b>Recent Meal</b>	Binary variable indicating if a meal was consumed in the 2 hrs preceding exercise.
<b>HR</b> 10 minutes prior to exercise	The heartrate of the participant directly preceding the start of aerobic exercise.
<b>Average HR</b> prior 25 minutes	The average heartrate of the participant in the 25 min directly preceding exercise.
<b>HR Trend</b> (25, 20, 15, 10) Minutes Prior to Exercise	The trend in the heartrate of the participant in the 25 minutes directly preceding exercise.
<b>MET</b> 10 minutes prior to exercise	The estimated metabolic expenditure of the participant directly preceding the start of exercise. Calculated using the Zakeri algorithm.
<b>MET</b> prior 25 minutes	The average energy expenditure of the participant in the 25 min preceding aerobic exercise
<b>MET Trend</b> (25, 20, 15, 10) Minutes Prior to Exercise	The trend in the energy expenditure of the participant in the 25 min preceding the start of aerobic exercise.
<b>TDIR</b>	Total daily insulin requirement of the participant in Units of insulin
<b>TDIR</b> estimated	Total daily insulin requirement as the average insulin dosed over the preceding study days.
<b>Weight</b>	Weight in Kilograms
<b>Height</b>	Height in centimeters
<b>Age</b>	Age in years

**Table S2|** Data features representing exercise history. For example, on a given day of exercise, this exercise history data would represent the participant’s data collected during other exercise sessions, related to STAR Methods.

<b>Features from prior exercise sessions</b>	
<b><math>\Delta(\text{CGM/CBG})</math> Identical Exercise</b>	The change in glucose measured during a separate in-clinic exercise session.
<b>Average <math>\Delta(\text{CGM/CBG})</math> in-clinic exercise sessions</b>	The average change in glucose measured during all other identical in-clinic exercise sessions recorded by the user.
<b>Average <math>\Delta(\text{CGM/CBG})</math> other exercise sessions</b>	The average change in glucose measured during all other exercise sessions recorded by the user during the entire 4-week study, both in-clinic at home.
<b>HR Identical Exercise</b>	The heartrate measured 10 minute after the start of exercise, recorded during a separate in-clinic exercise session.
<b>Average HR in-clinic exercise sessions</b>	The heartrate measured 10 minutes after the start of exercise, collected during all other identical in-clinic exercise sessions recorded by the user, which is then averaged.
<b>Average HR other exercise sessions</b>	The heartrate measured 10 minutes after the start of exercise, collected during all other exercise sessions recorded by the user during the entire 4-week study, both in-clinic at home, which is then.
<b>MET Identical Exercise</b>	The metabolic expenditure measured 10 minutes after the start of exercise, recorded during an identical in-clinic exercise session.
<b>Average MET in-clinic exercise sessions</b>	The metabolic expenditure measured 10 minutes after the start of exercise, averaged across all other identical in-clinic exercise sessions recorded by the user.
<b>Average MET other exercise sessions</b>	The metabolic expenditure measured 10 minutes after the start of exercise, averaged across all other exercise sessions recorded by the user during the entire 4-week study, both in-clinic at home.

**Figure S1|** Model Training and Validation, related to STAR methods

