

Impact of Nonresponse on Survey Estimates of Physical Fitness & Sleep Quality

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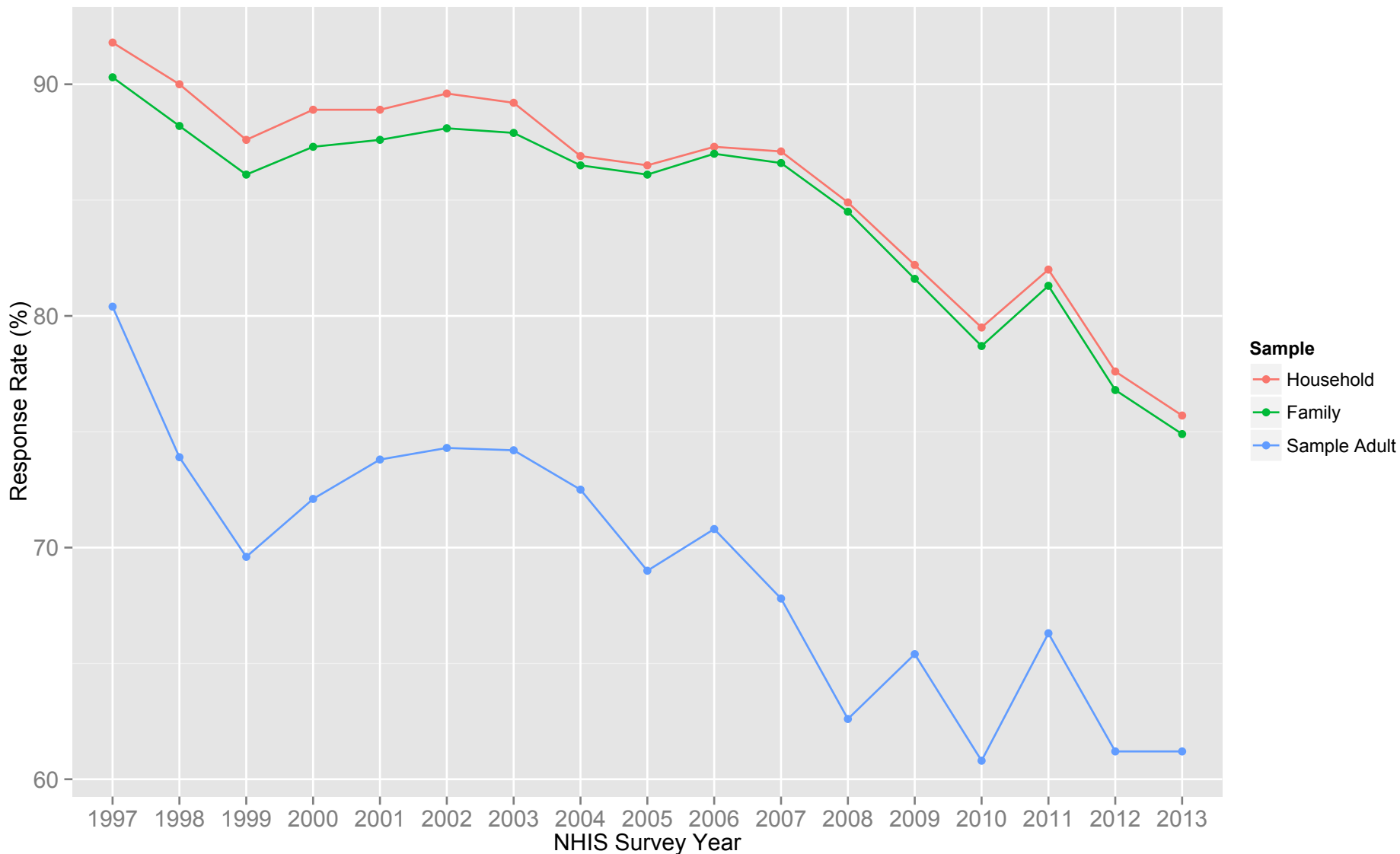
ESRA 2015 Conference

Reykjavik, Iceland

Data Source

- CDC/NCHS, National Health Interview Survey (NHIS)
- In-person household interviews; telephone supplement
- Multistage area probability-based sample
- 35,000 sample adults residing in the USA in 2013

NHIS Response Rates since 1997



Nonignorable Nonresponse

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- Survey nonresponse merely increases the risk of bias in estimates
- Nonresponse does not necessarily result in bias
- Nonresponse may be ignorable if it is random and not associated with core substantive measures
- Focus: extent of association between the core substantive measures and nonresponse propensity

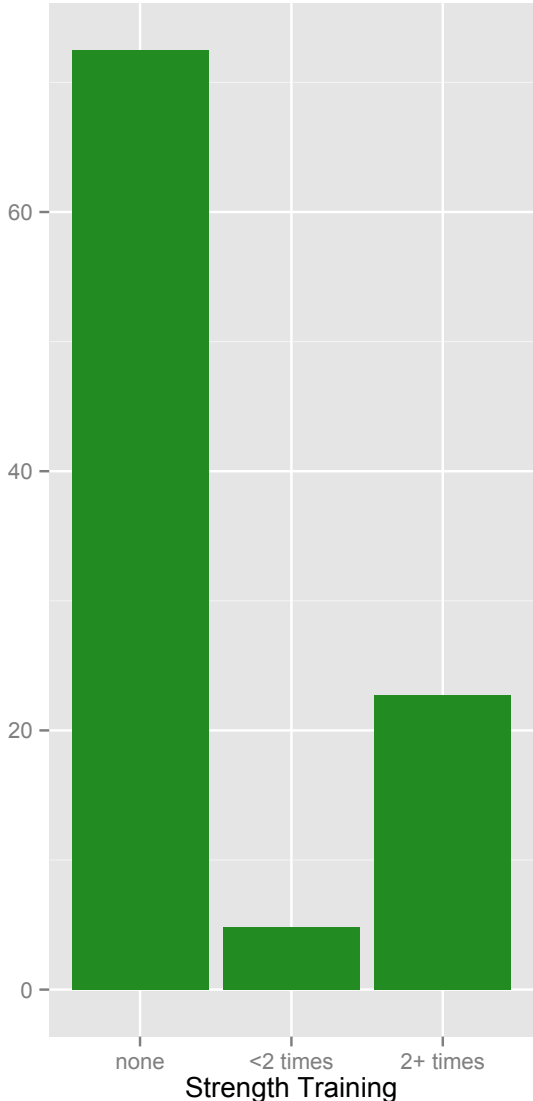
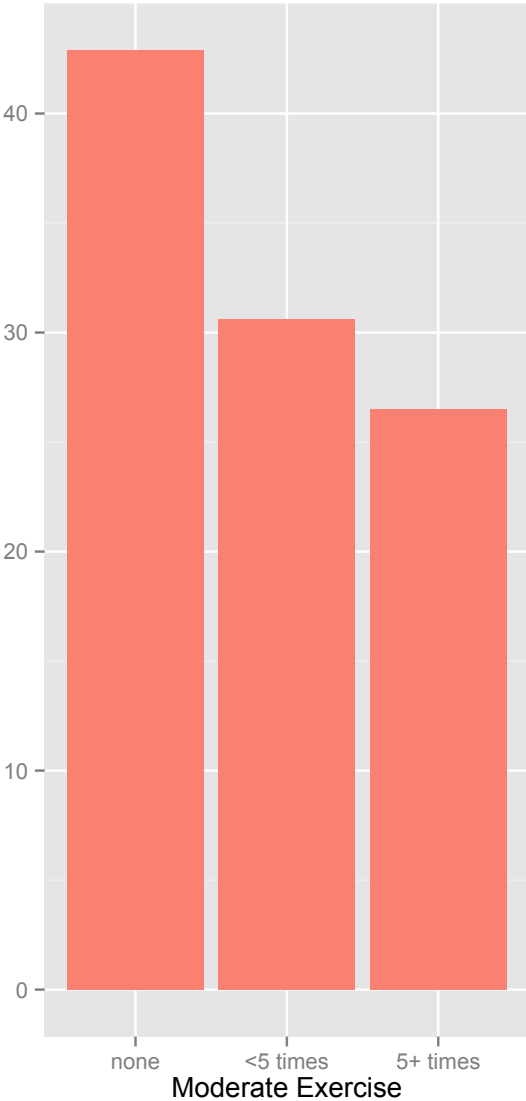
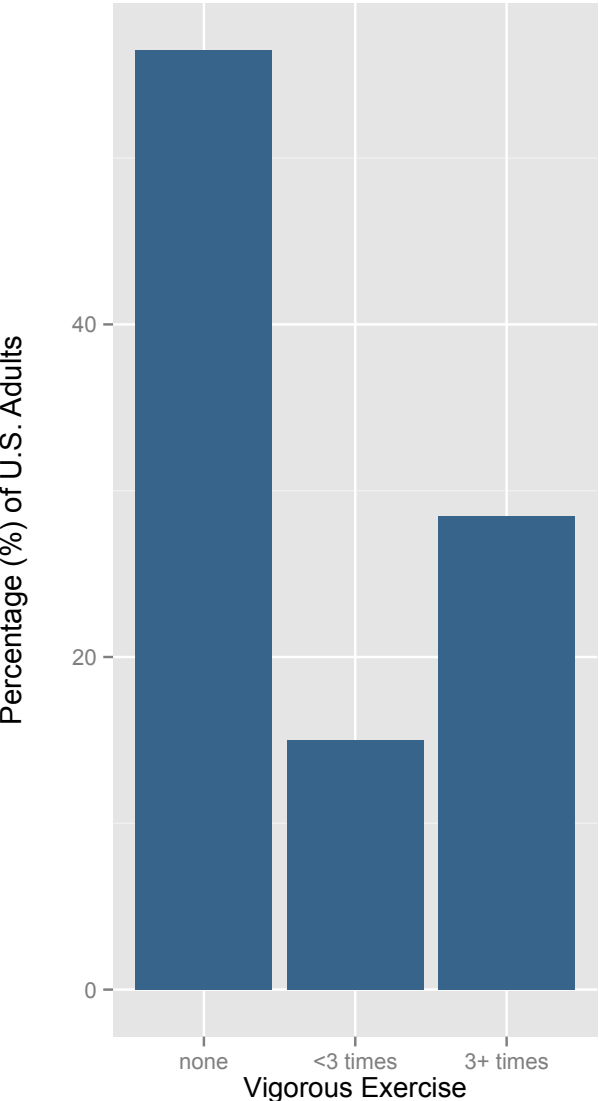
NHIS Paradata

Measure	Variables
Contactability	Number of contact attempts that resulted in noncontact
	Sample adult ever not available
Cooperativeness	Number of reasons for initial refusal(s)
	Field rep rating of cooperativeness
	Field rep rating of likelihood to respond to future survey

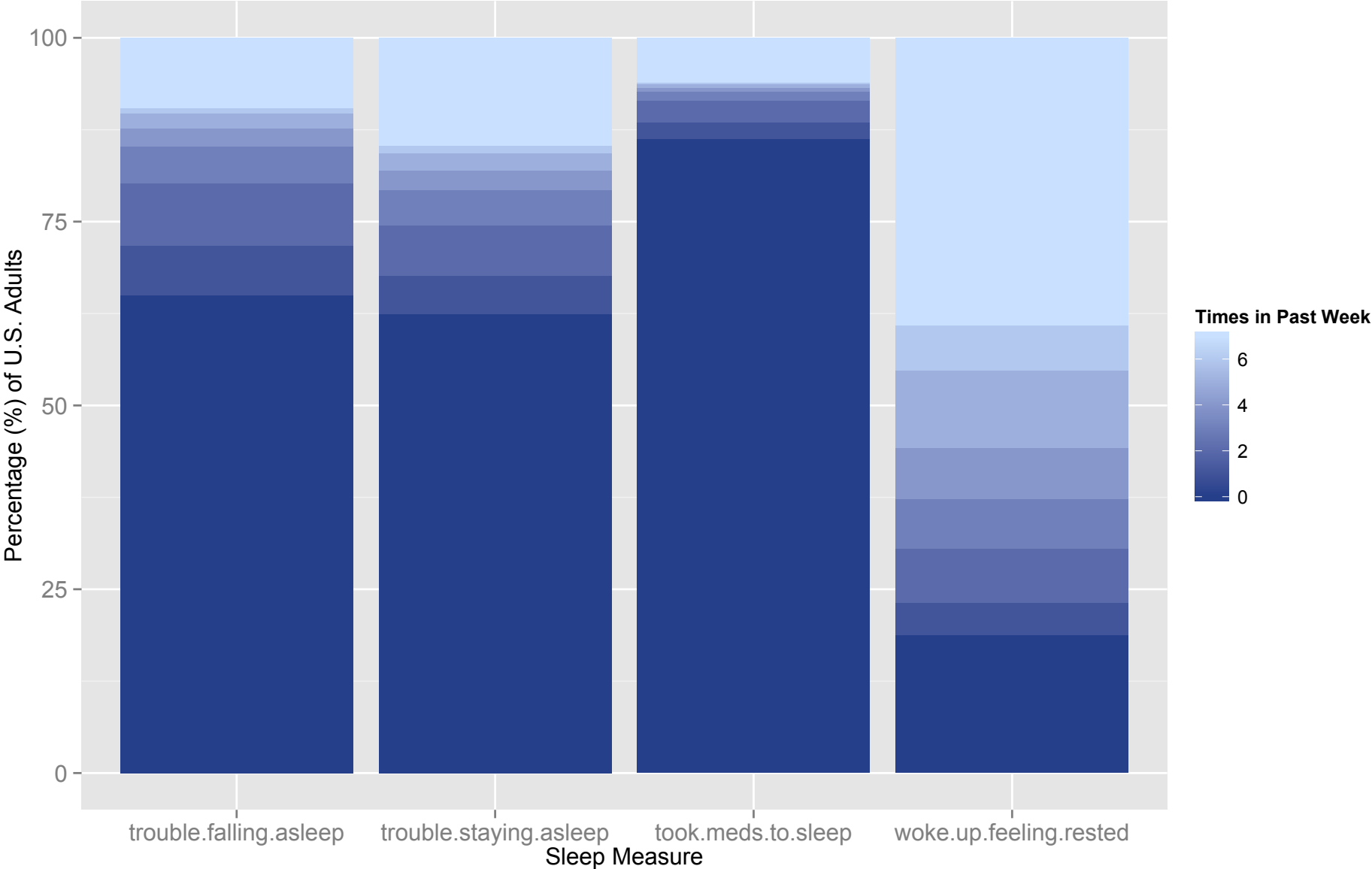
NHIS Substantive Measures

Measure	Variables
Leisure-time Physical Activities	Vigorous workout that cause heavy sweating, or large increases in breathing or heart rate
	Moderate workout that cause light sweating, or slight to moderate increases in breathing or heart rate
	Strength training such as lifting weights or doing calisthenics
Sleep Quality	Average number of hours of sleep
	Trouble falling asleep
	Trouble staying asleep
	Took medications to aid falling or staying asleep
	Woke up feeling rested

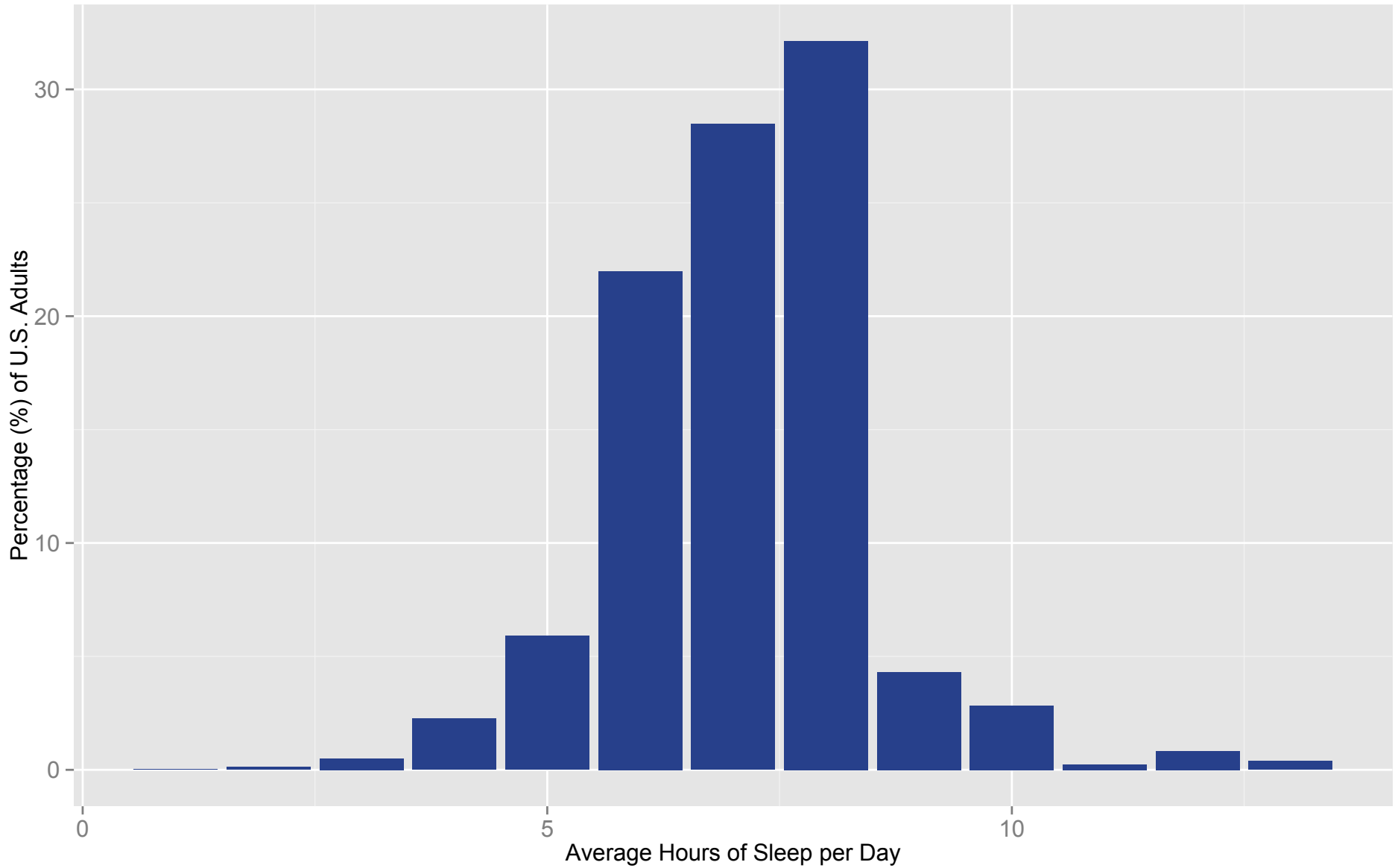
How much do people exercise? (ACSM levels)



How well do people sleep?



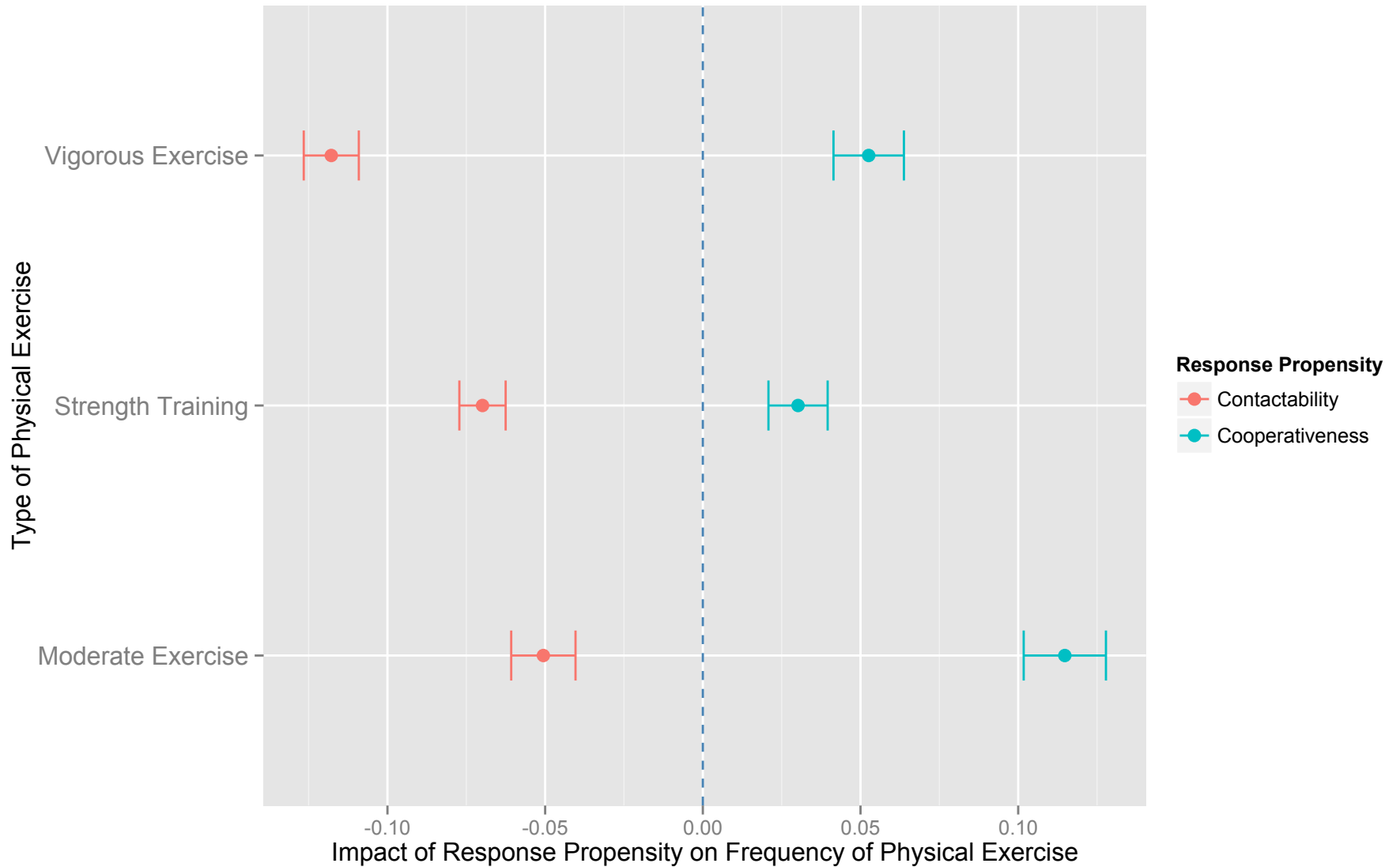
How much do people sleep?



Nonresponse Bias

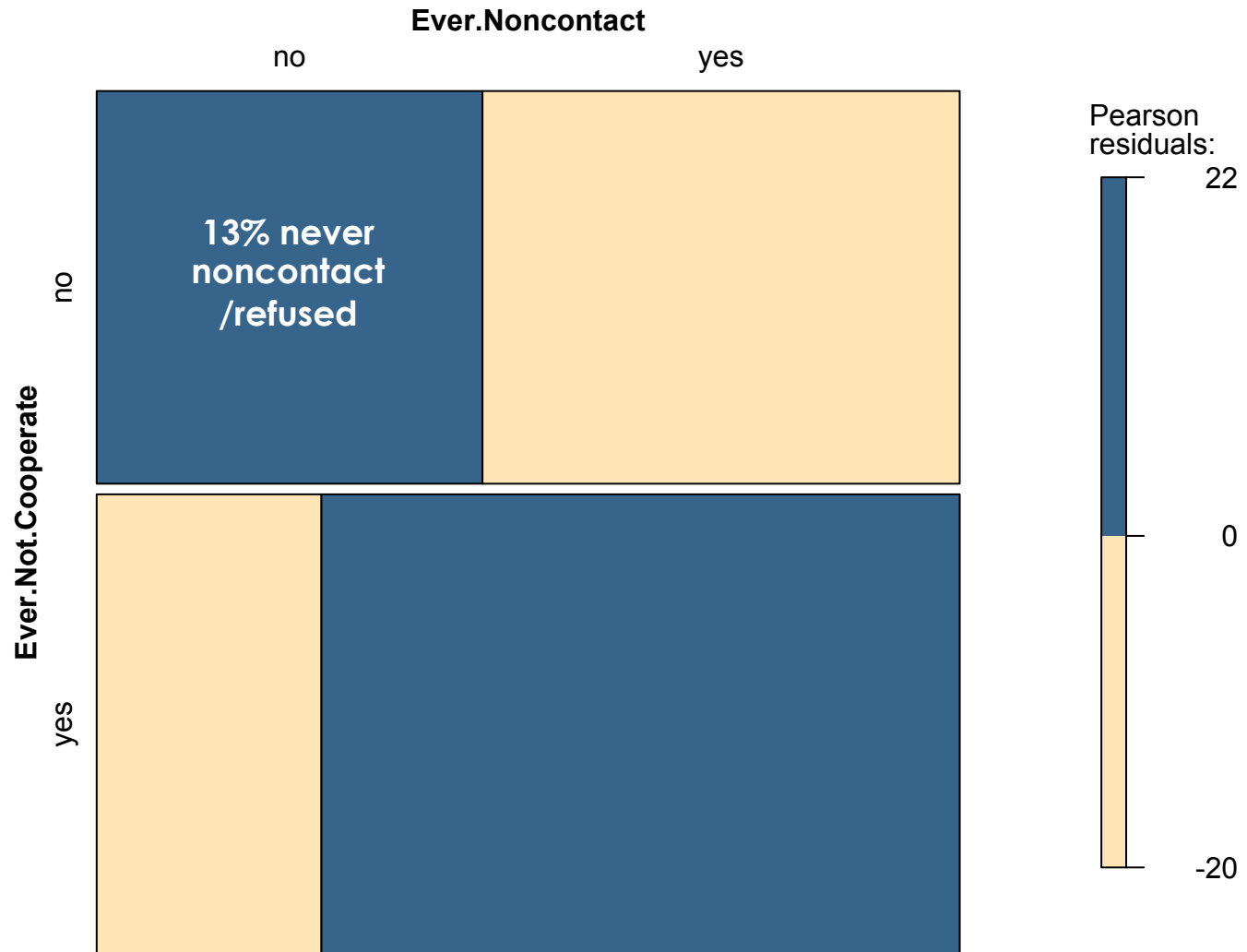
Physical Fitness & Sleep Quality

Oposing Forces of Contactability vs. Cooperativeness

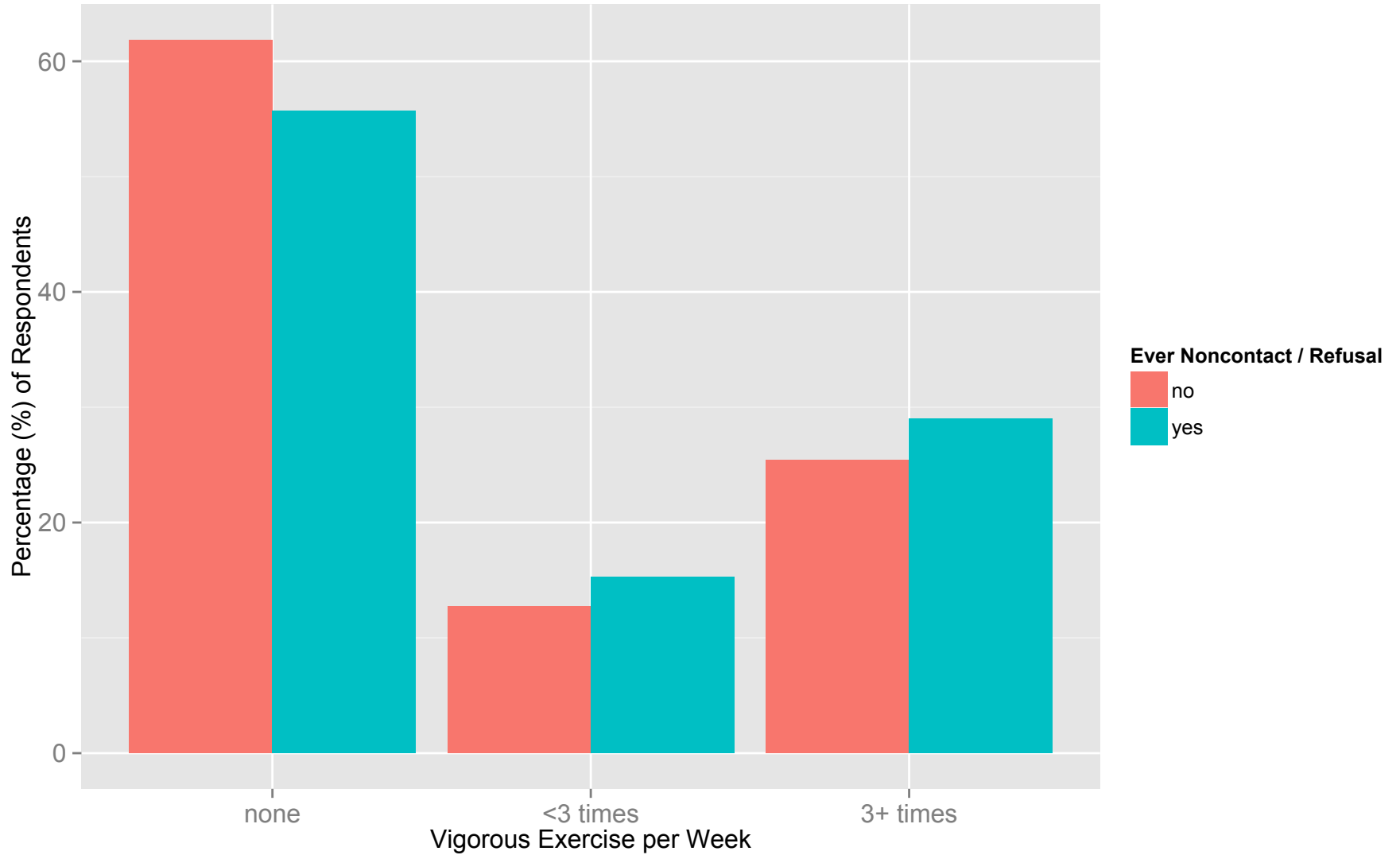


Note: All variables recoded to range 0-1

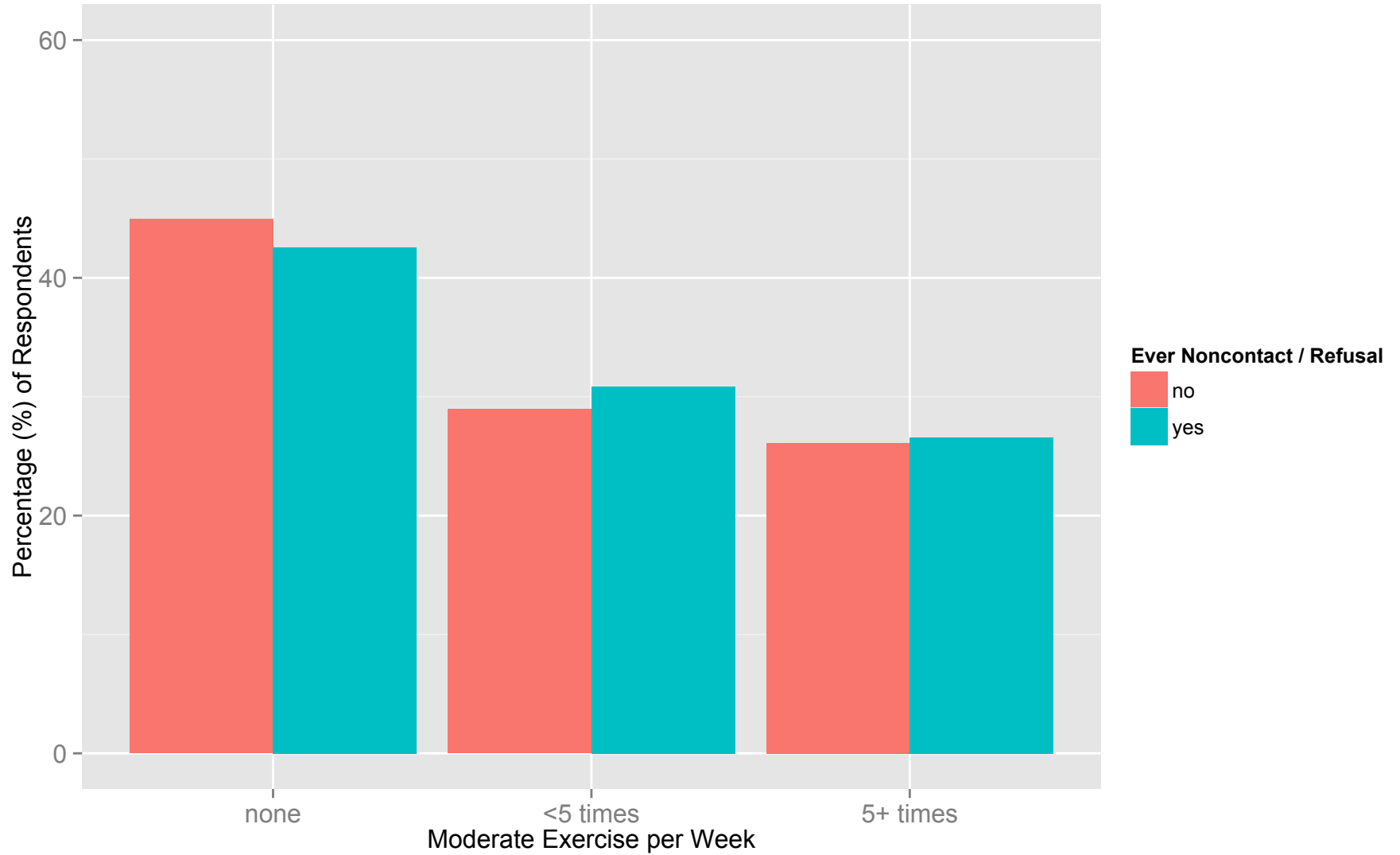
Concordance between Noncontact & Noncooperation



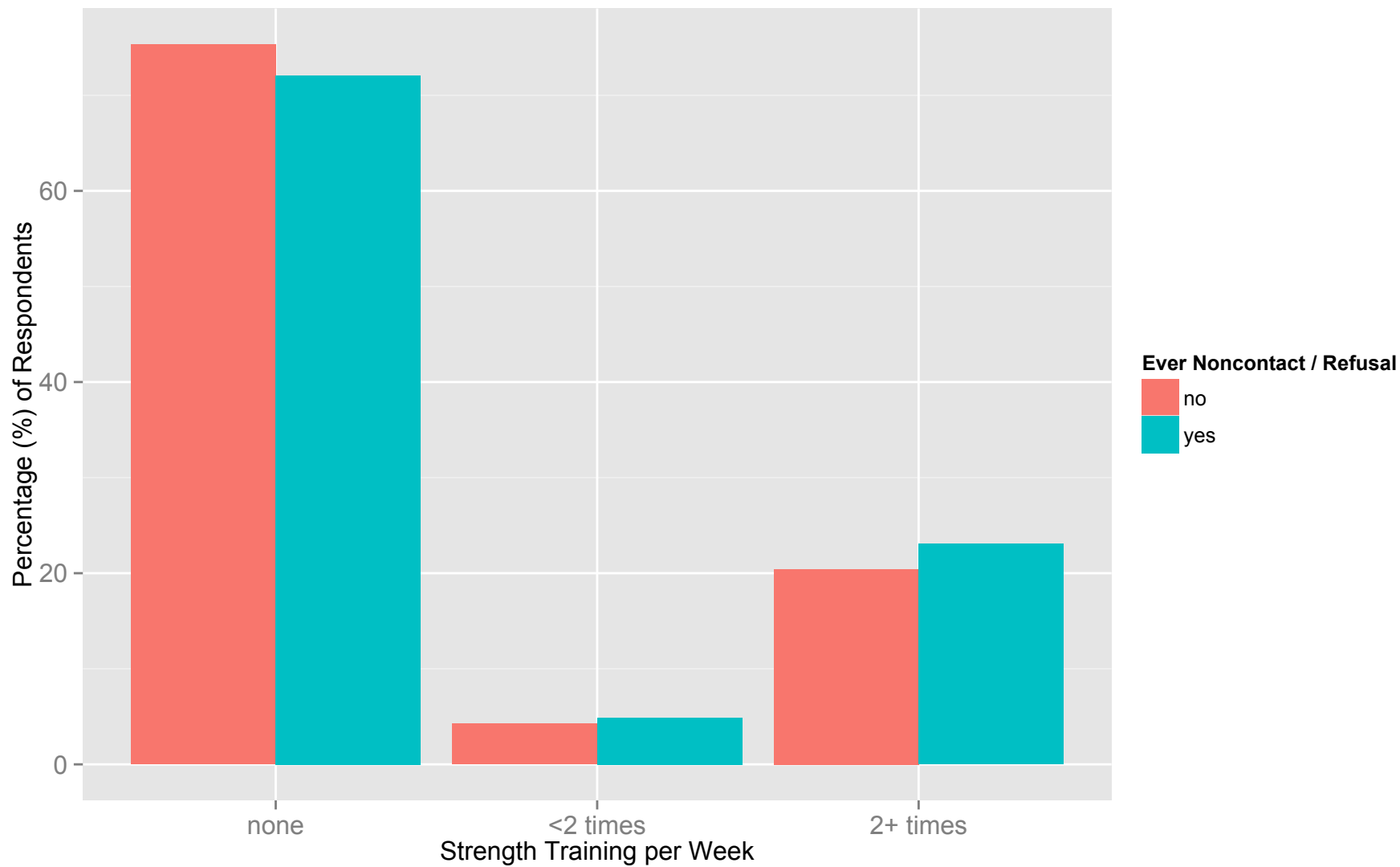
Easy-to-reach respondents report LESS vigorous exercise



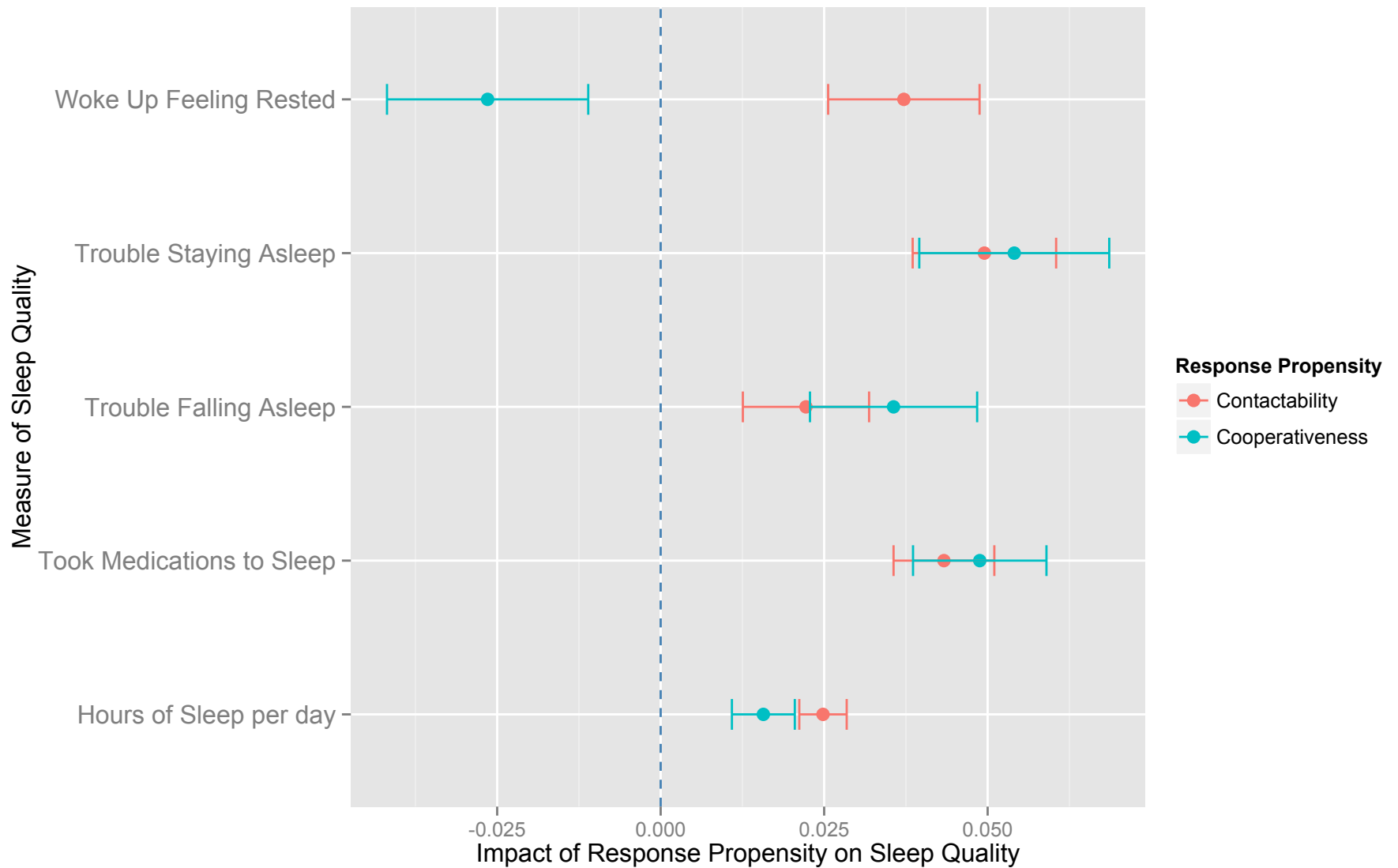
Relatively weak effects on moderate exercise



Easy-to-reach respondents report LESS strength training

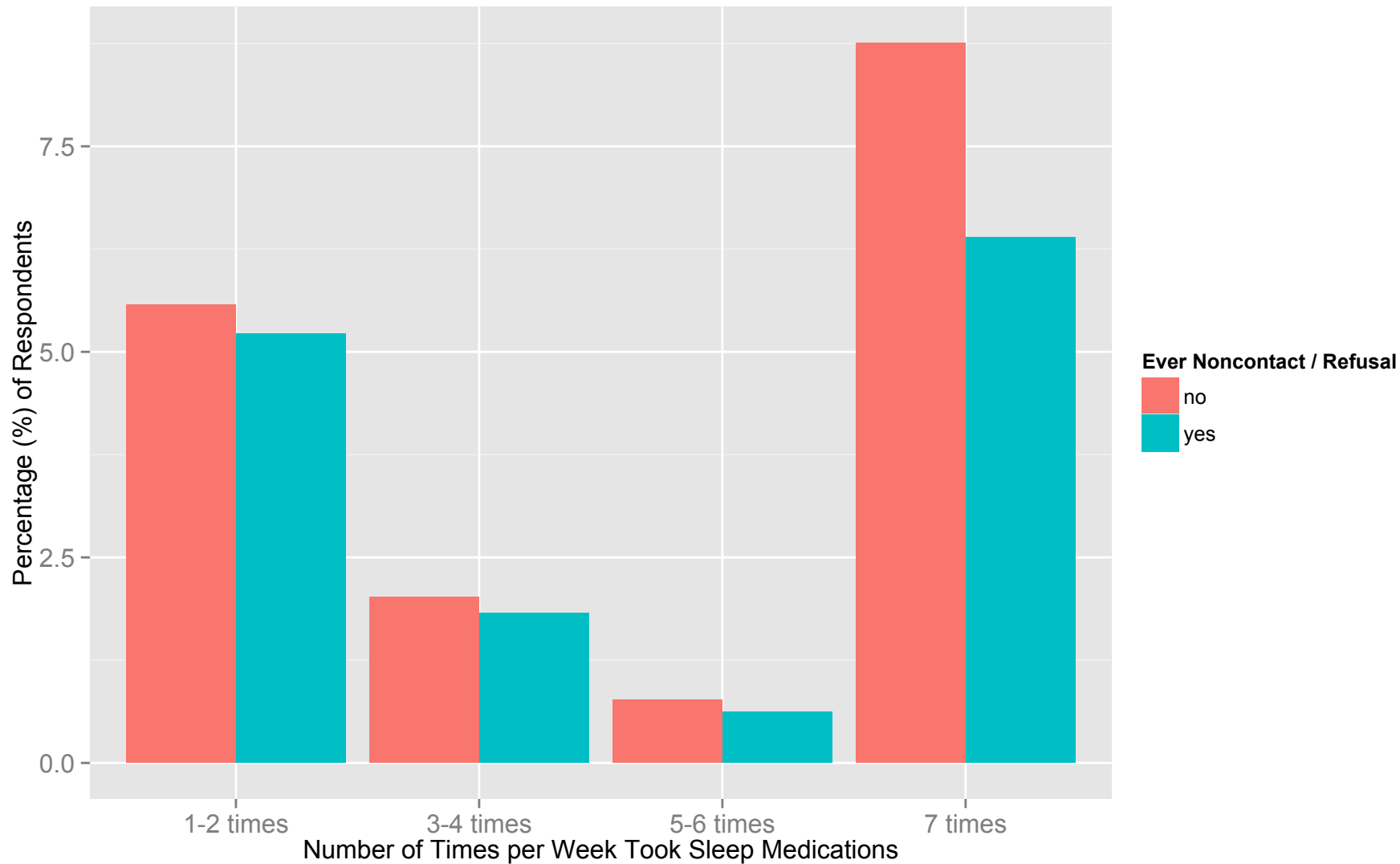


Compounding Forces of Contactability & Cooperativeness

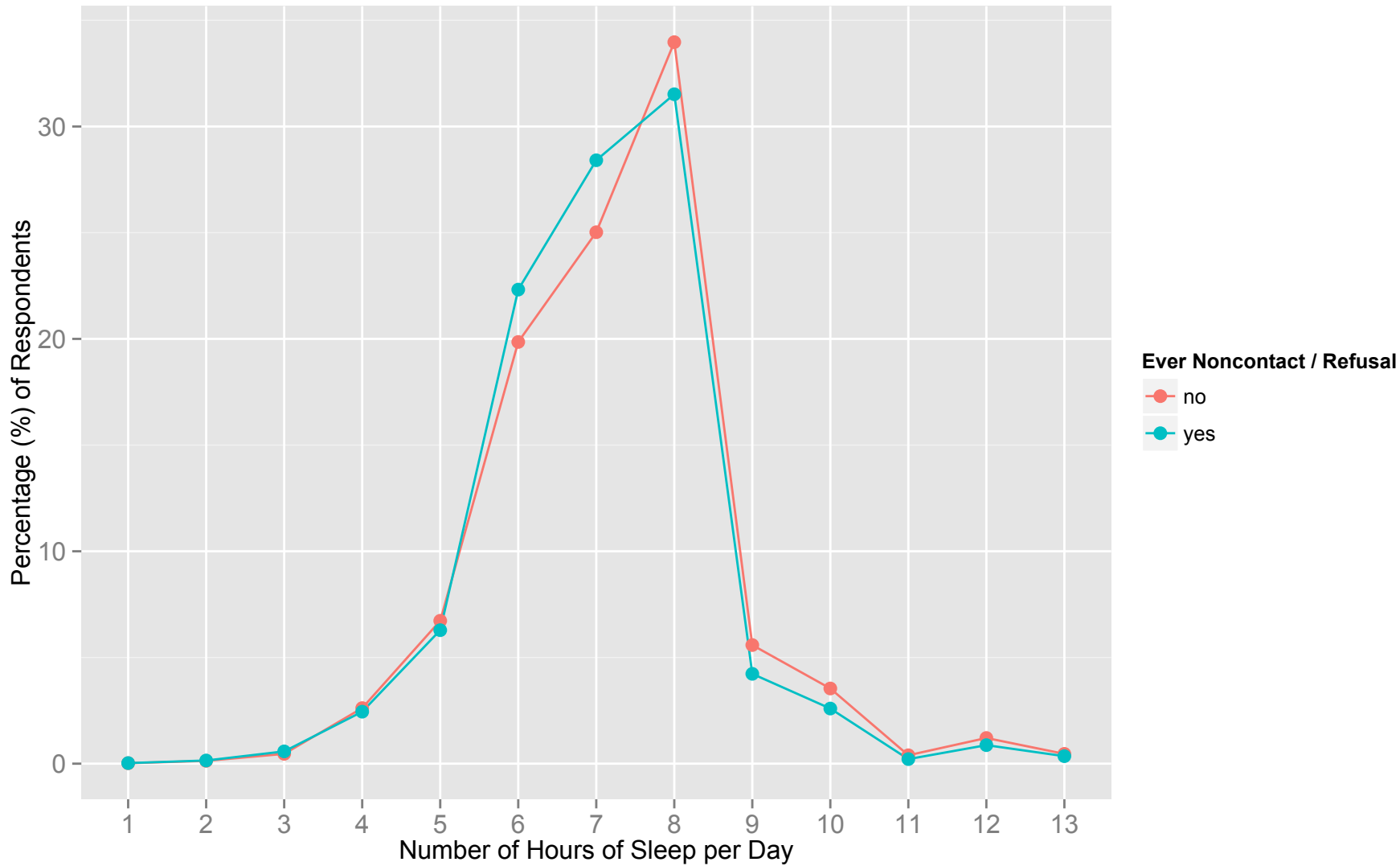


Note: All variables recoded to range 0-1

Easy-to-reach & willing respondents report MORE sleep medications



Easy-to-reach & willing respondents report MORE hours of sleep



Covariates

Controlling for Demographics & Chronic Conditions

To what extent can nonresponse bias be attributed to certain demographic attributes or chronic conditions?

Covariates

- Age, gender, race, household income
- Obesity
- Current Smoker
- Diabetes
- Hypertension
- Hyperlipidemia

Model Coefficients (SE)

	No Covariate	With Covariates
Vigorous Exercise		
Contactability	-0.12 (0.01)***	-0.05 (0.01)***
Cooperativeness	0.05 (0.01)***	0.04 (0.01)***
Moderate Exercise		
Contactability	-0.05 (0.01)***	-0.02 (0.01).
Cooperativeness	0.11 (0.01)***	0.10 (0.01)***
Strength Training		
Contactability	-0.07 (0.01)***	-0.04 (0.01)***
Cooperativeness	0.03 (0.01)**	0.02 (0.01)**

Signif. codes: '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.10
 All variables recoded to range 0-1

Model Coefficients (SE)

	No Covariate	With Covariates
Trouble Falling Asleep		
Contactability	0.02 (0.01)*	0.01 (0.01)
Cooperativeness	0.04 (0.01)**	0.02 (0.01)*
Trouble Staying Asleep		
Contactability	0.05 (0.01)***	0.00 (0.01)
Cooperativeness	0.05 (0.01)***	0.04 (0.01)**
Took Sleep Medications		
Contactability	0.04 (0.01)***	0.01 (0.01)
Cooperativeness	0.05 (0.01)***	0.04 (0.01)***

Signif. codes: '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.10
 All variables recoded to range 0-1

Model Coefficients (SE)

	No Covariate	With Covariates
Woke Up Feeling Rested		
Contactability	0.04 (0.01)**	0.02 (0.01)
Cooperativeness	-0.03 (0.02)	-0.01 (0.02)
Average Number of Hours of Sleep		
Contactability	0.025 (0.004)***	0.016 (0.004)***
Cooperativeness	0.016 (0.005)**	0.017 (0.005)***

Signif. codes: '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.10

All variables recoded to range 0-1

Interaction Effects

How Nonresponse Propensity Impact Model Estimates

Predicting Frequency of Leisure-time Strength Training



Predictor	Model Coef (SE)
Contactability	-0.024 (0.02)
Cooperativeness	0.018 (0.027)
Obesity	-0.08 (0.019)***
Diabetes	-0.007 (0.034)
Smoker	-0.016 (0.024)
Hypertension	-0.002 (0.025)
Hyperlipidemia	-0.007 (0.025)
Age	-0.133 (0.039)***
Gender	0.042 (0.018)*
Race	0.027 (0.02)
Household Income	0.14 (0.039)***
Contactability x Obesity	0.014 (0.016)
Contactability x Diabetes	0.013 (0.029)
Contactability x Smoker	-0.005 (0.019)
Contactability x Hypertension	-0.026 (0.021)
Contactability x Hyperlipidemia	0.002 (0.021)
Contactability x Age	0.053 (0.033)
Contactability x Gender	-0.012 (0.015)
Contactability x Race	-0.01 (0.016)
Contactability x Household Income	-0.095 (0.033)**
Cooperativeness x Obesity	0.028 (0.02)
Cooperativeness x Diabetes	-0.02 (0.034)
Cooperativeness x Smoker	-0.021 (0.025)
Cooperativeness x Hypertension	0.019 (0.025)
Cooperativeness x Hyperlipidemia	-0.007 (0.026)
Cooperativeness x Age	-0.012 (0.039)
Cooperativeness x Gender	0.019 (0.019)
Cooperativeness x Race	-0.018 (0.021)
Cooperativeness x Household Income	0.043 (0.04)

Main Effect of Household Income on Strength Training

Signif. codes: '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.10
 All variables recoded to range 0-1

Predicting Frequency of Leisure-time Strength Training



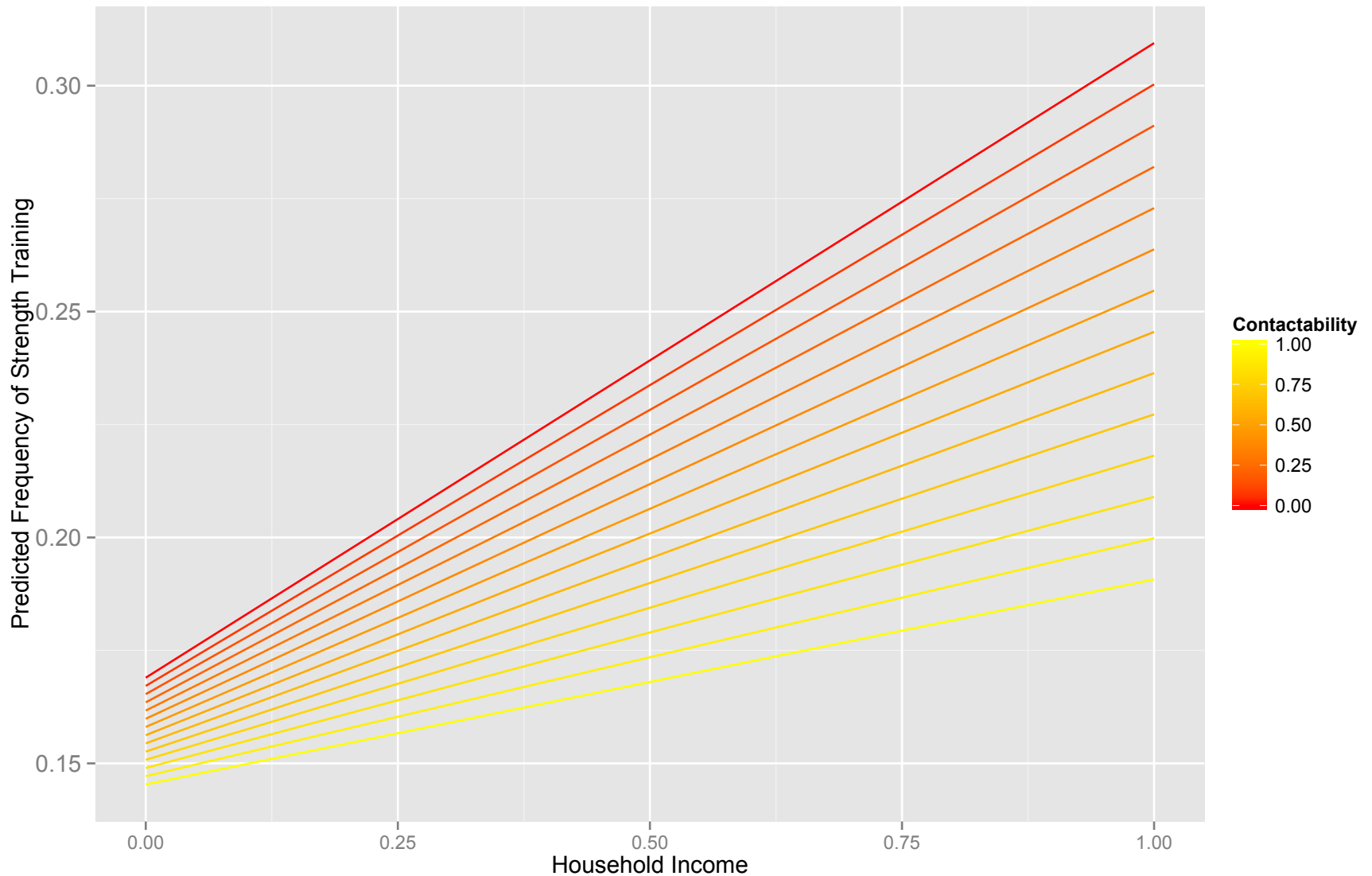
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Main Effect of Household Income on Strength Training

Significant Interaction with Contactability

Signif. codes: '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.10
 All variables recoded to range 0-1

Nonresponse can weaken link between income & strength training



Note: All variables recoded to range 0-1

Predicting Frequency of Trouble Falling Asleep



Predictor	Model Coef (SE)
Contactability	0.003 (0.011)
Cooperativeness	0.023 (0.014)
Feel Sad	0.005 (0.075)
Feel Nervous	-0.114 (0.066)
Feel Restless	0.436 (0.063)***
Feel Hopeless	0.225 (0.100)*
Everything takes Effort	0.292 (0.0600)***
Feel Worthless	-0.074 (0.102)
Contactability x Feel Sad	0.074 (0.059)
Contactability x Feel Nervous	0.216 (0.050)***
Contactability x Feel Restless	-0.217 (0.047)***
Contactability x Feel Hopeless	-0.200 (0.079)*
Contactability x Everything takes Effort	-0.044 (0.046)
Contactability x Feel Worthless	0.055 (0.082)
Cooperativeness x Feel Sad	0.071 (0.081)
Cooperativeness x Feel Nervous	-0.009 (0.069)
Cooperativeness x Feel Restless	0.059 (0.065)
Cooperativeness x Feel Hopeless	0.017 (0.105)
Cooperativeness x Everything takes Effort	-0.199 (0.062)**
Cooperativeness x Feel Worthless	0.026 (0.107)

Main Effects of Negative Emotions on Sleep

Signif. codes: '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.10

All variables recoded to range 0-1

Predicting Frequency of Trouble Falling Asleep



Predictor	Model Coef (SE)
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Main Effects of Negative Emotions on Sleep

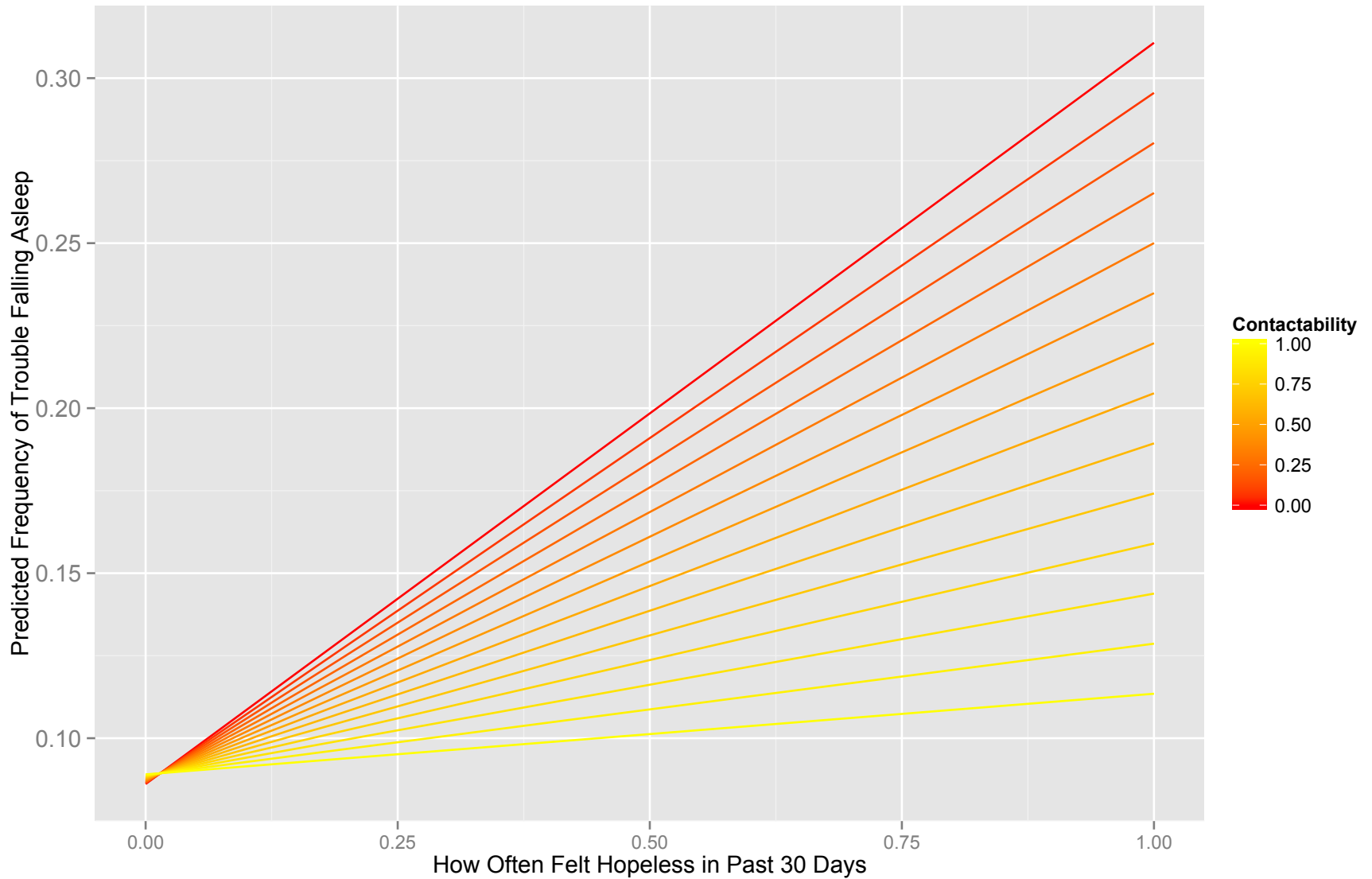
Significant Interactions with Contactability

Significant Interaction with Cooperativeness

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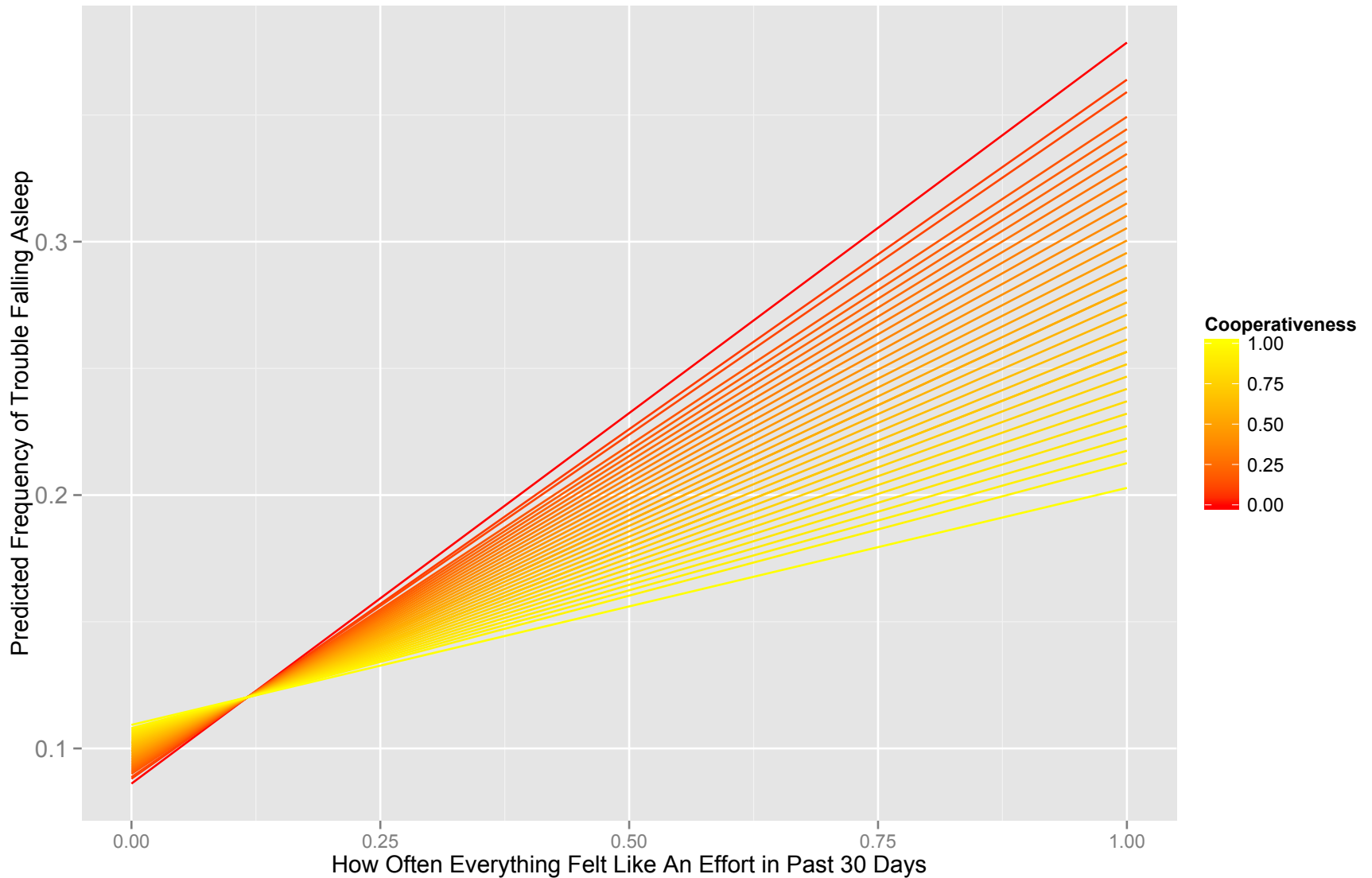
All variables recoded to range 0-1

Nonresponse can weaken impact of hopelessness on sleep



Note: All variables recoded to range 0-1

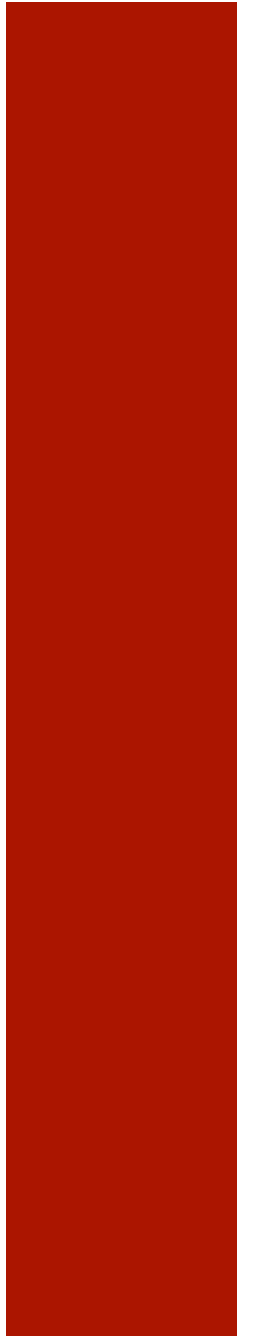
Nonresponse can weaken impact of proven predictors on sleep



Note: All variables recoded to range 0-1

Summary

Key Findings



Summary

- Respondents who were easy to reach reported less vigorous exercise and strength training
- Respondents who were more cooperative reported more trouble with sleep
- Impact of contactability is partially mediated by demographics & chronic conditions
- Substantive model effects could be undermined by nonresponse bias



The End

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