TV Untethered

Modeling the Impact of Mobile TV Viewing with TreeNet

August 1st, 2013

TreeNet Modeling

Predictive Modeling Through TreeNet

TreeNet is a hybrid between **Neural Networks** and Classification and Regression Trees (**CART**) models used for predictive modeling of consumer behavior and market outcomes.

TreeNet is more **flexible** than more conventional regression techniques. It can accommodate non-linear, missing and miscoded data, and it doesn't assume a "normal" distribution of the underlying data.

It can identify **interaction effects** among different independent variables.

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Predictive Modeling Through TreeNet

TreeNet is a cousin to a **Random Forests** approach, with these key differences:

1) *Random Forests* generate a series of very large, *independent trees* (since the variables included in any given tree are pulled at random, the trees are unrelated to each other)

2) *TreeNet* generates a series of very small, *related trees* – each successive tree builds off of information from prior trees, and the final model prediction is built from adding up all of the individual tree contributions
    a) A typical TreeNet model may utilize from several hundred to several thousand trees for a single problem

More information on TreeNet:
http://www.slideshare.net/salfordsystems/treenet-overview-2012

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Our TreeNet Models for TV Viewing

- The models **explain 96% of the variance** in both total and television set viewing hours logged
- The "Mean Absolute Error" is 1.66 (i.e., the model predicts actual hours logged within +/- 1.66 hours).
  - E.g., if you actually logged 20 hours of viewing, the model would predict your viewership in the 18-22 hour range on average based on your inputs.

	Impact on ***Total*** Viewing Hours	Impact on ***Television Set*** Viewing Hours
R^2	0.96 (both test and learn samples)	0.96 (both test and learn samples)
Mean Absolute Error (MAE)	+/- 1.66 hrs	+/- 1.66 hrs

TreeNet predictive modeling importance scores

All Mobile Is Associated With More Total Viewing; Only Smartphones Relate To More TV Set Viewing

- **The portability of mobile devices provide greater exposure to TV content and can be associated with more *total viewing* hours.**
- **Smartphones are the only mobile device associated more *TV set viewing*.**

	Impact on *Total* Viewing Hours	Impact on *Television Set* Viewing Hours
Smartphone	↑↑↑↑↑	↑↑↑
Tablet	↑↑↑	↓
Computer	↑↑↑↑	↓↓↓

Modeling Mobile Viewing's Impact on Total Viewing Volumes

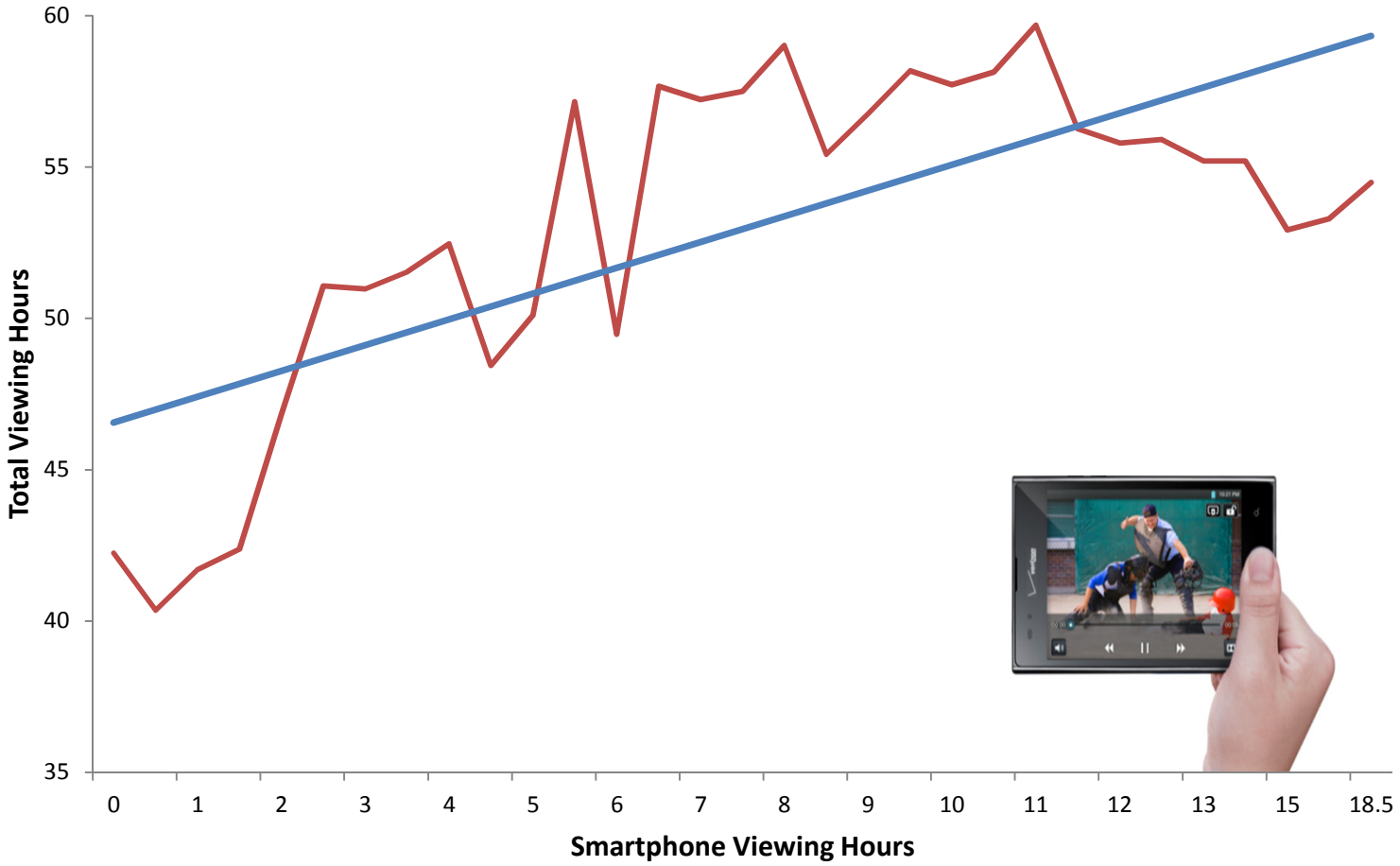
Smartphone TV viewing has the strongest impact on total viewing hours

- Tablets also have a positive relationship with total hours watched, but not as strong as smartphone viewing's relationship

	Importance Rating	Relationship with total viewing
Smartphone hours watched	100	More SP viewing -> *more total viewing*
Computer hours watched	97	More computer viewing -> *more*
Level of Education	93	Advanced degrees -> *less* High school grads -> *more*
Tech Adopter Status	89	Leading edge adopters -> *more*
Race/Ethnicity	79	African-Americans -> *more* Asian-Americans -> *less*
Tablet hours watched	70	More tablet viewing -> *more*
Age	70	Older -> *more* Younger -> *less*
New TV show watcher	60	Early adopters -> *more*

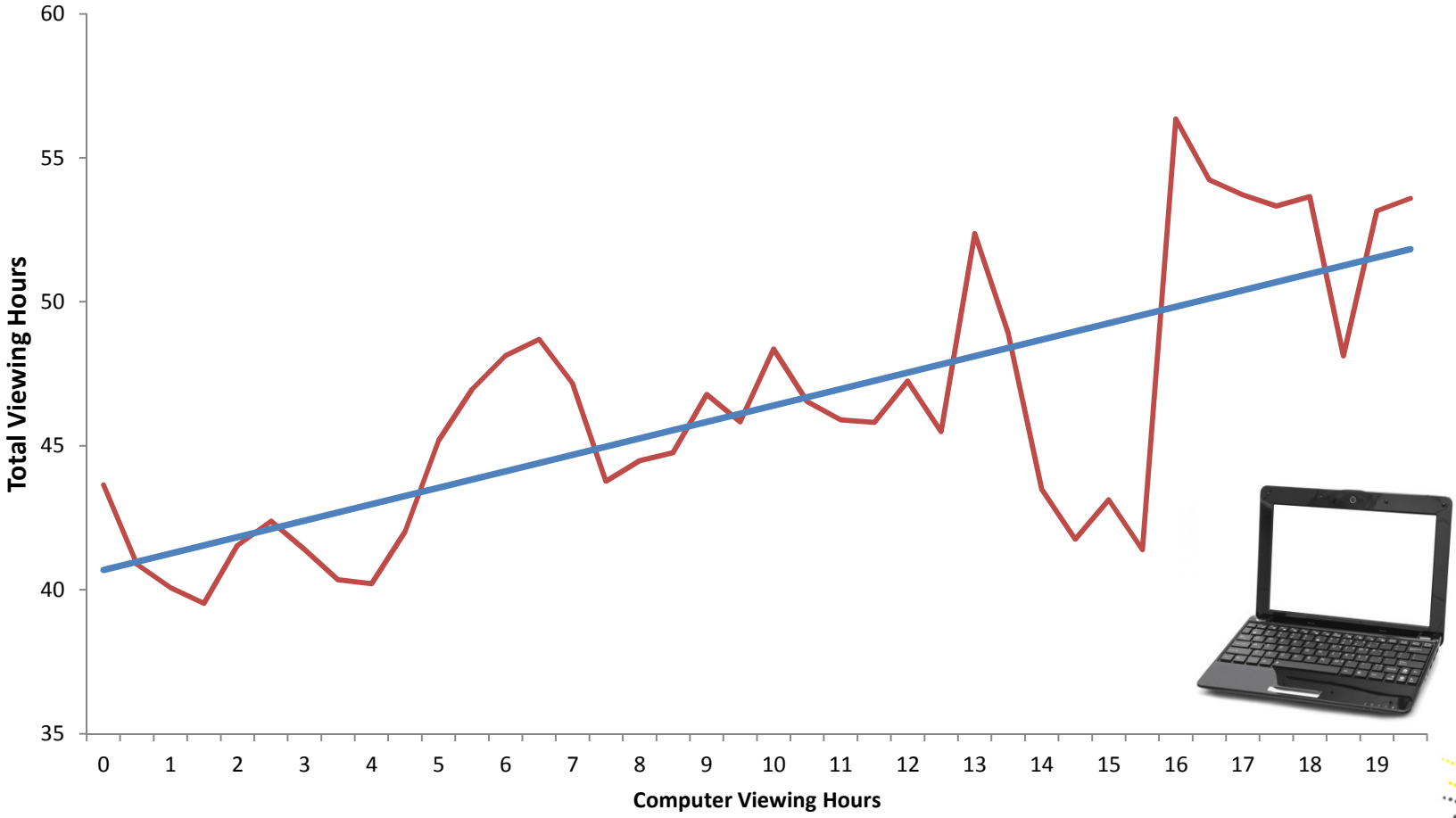
TreeNet predictive modeling importance scores

More Smartphone viewing = more total viewing



* All Data is *within* Group 3 for attribute that has greater importance in determining number of total TV hours watched.

More computer viewing = more total viewing



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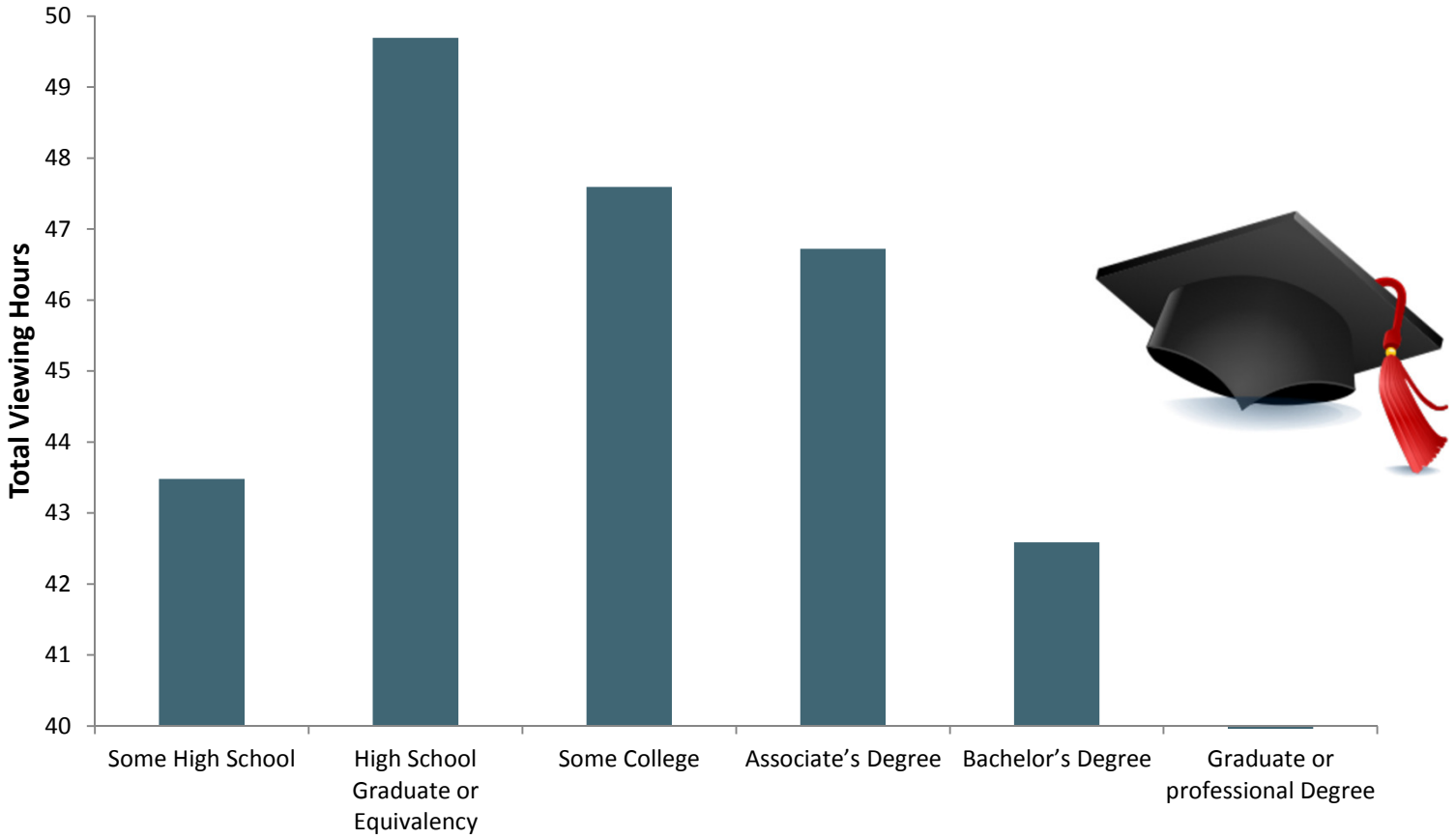
High school grads: highest viewing; Advanced degrees: lowest viewing



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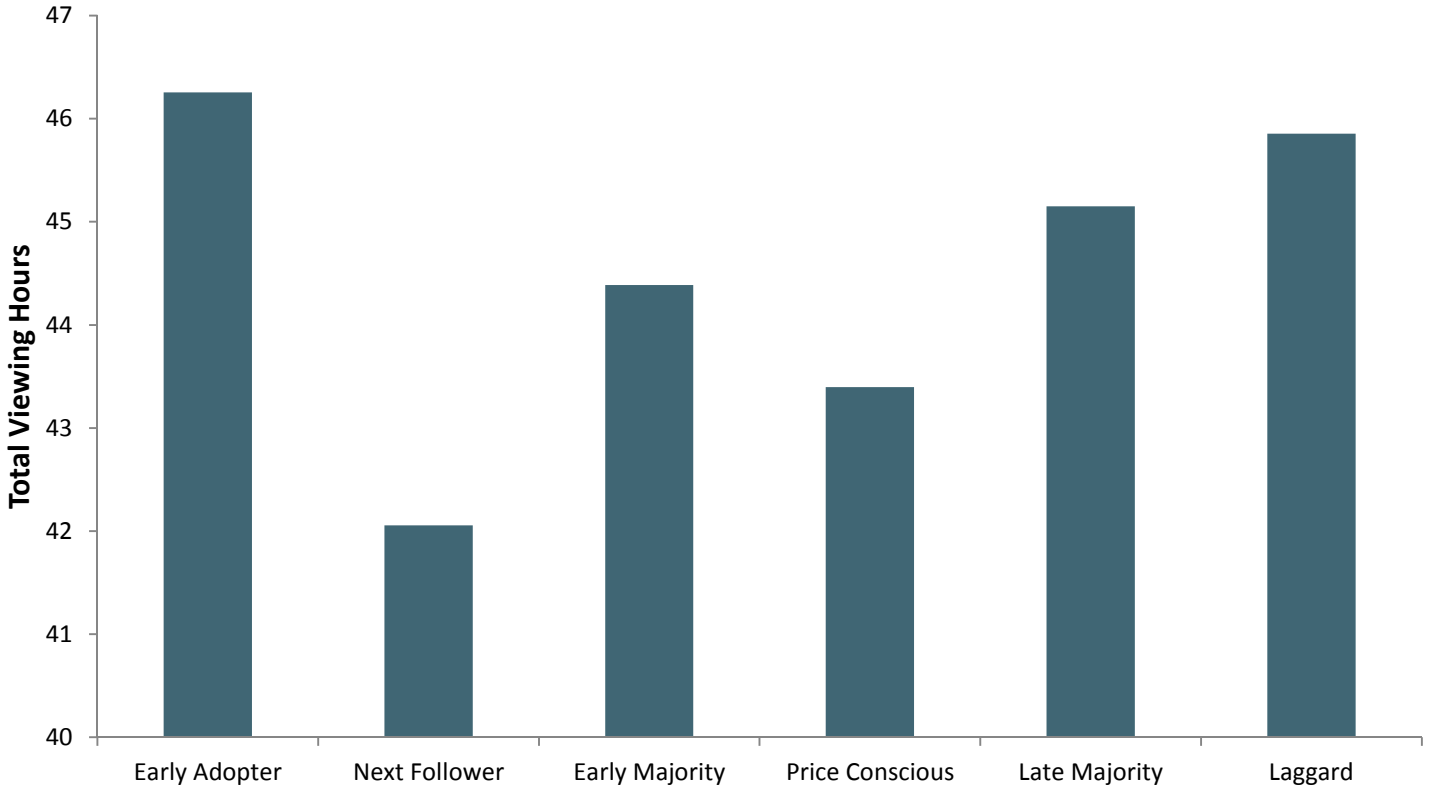
Early Tech Adopters: highest viewing
"Next followers": lowest viewing



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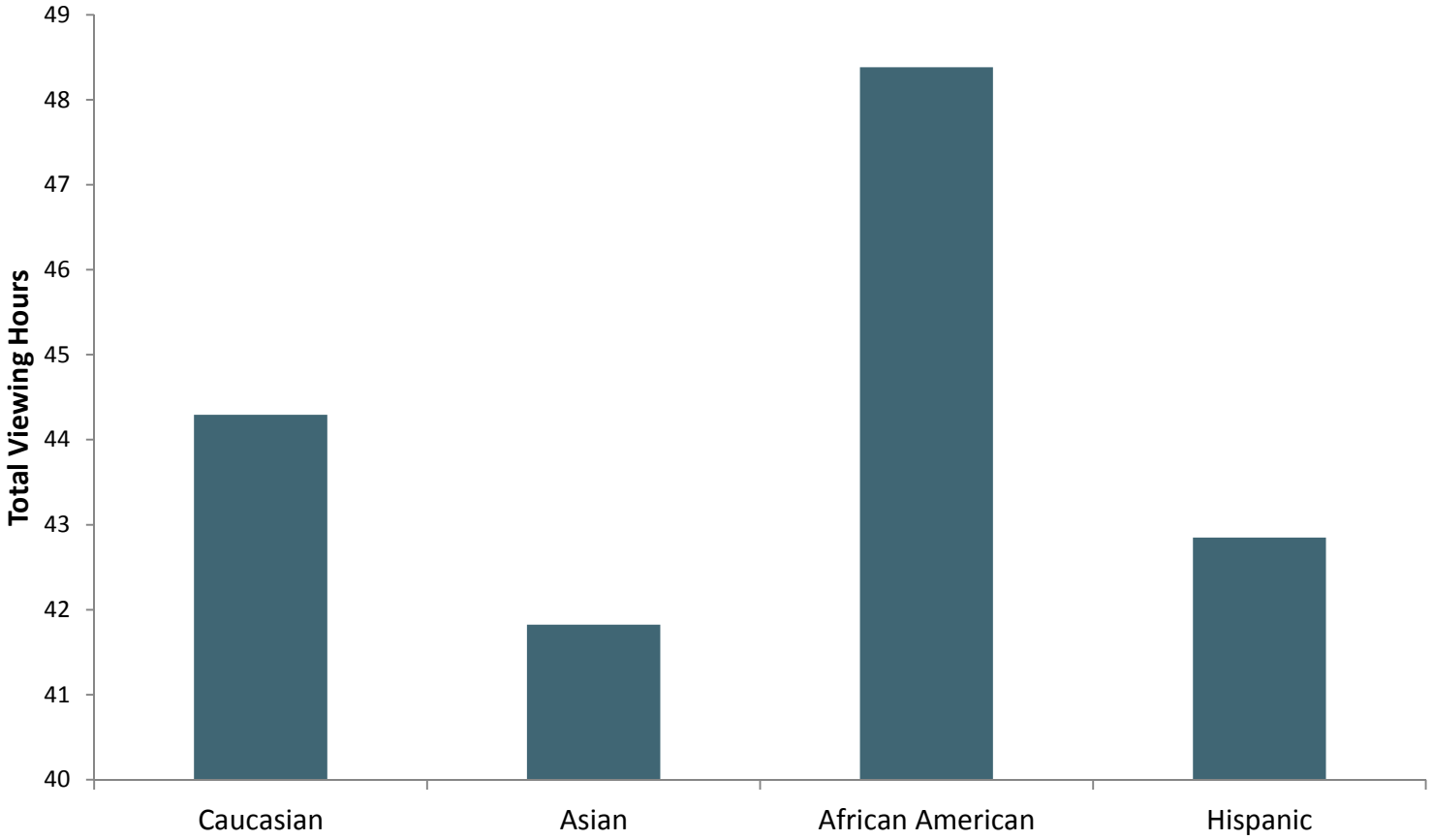
African American: more TV viewing hours; Asian Americans: fewer TV viewing hours



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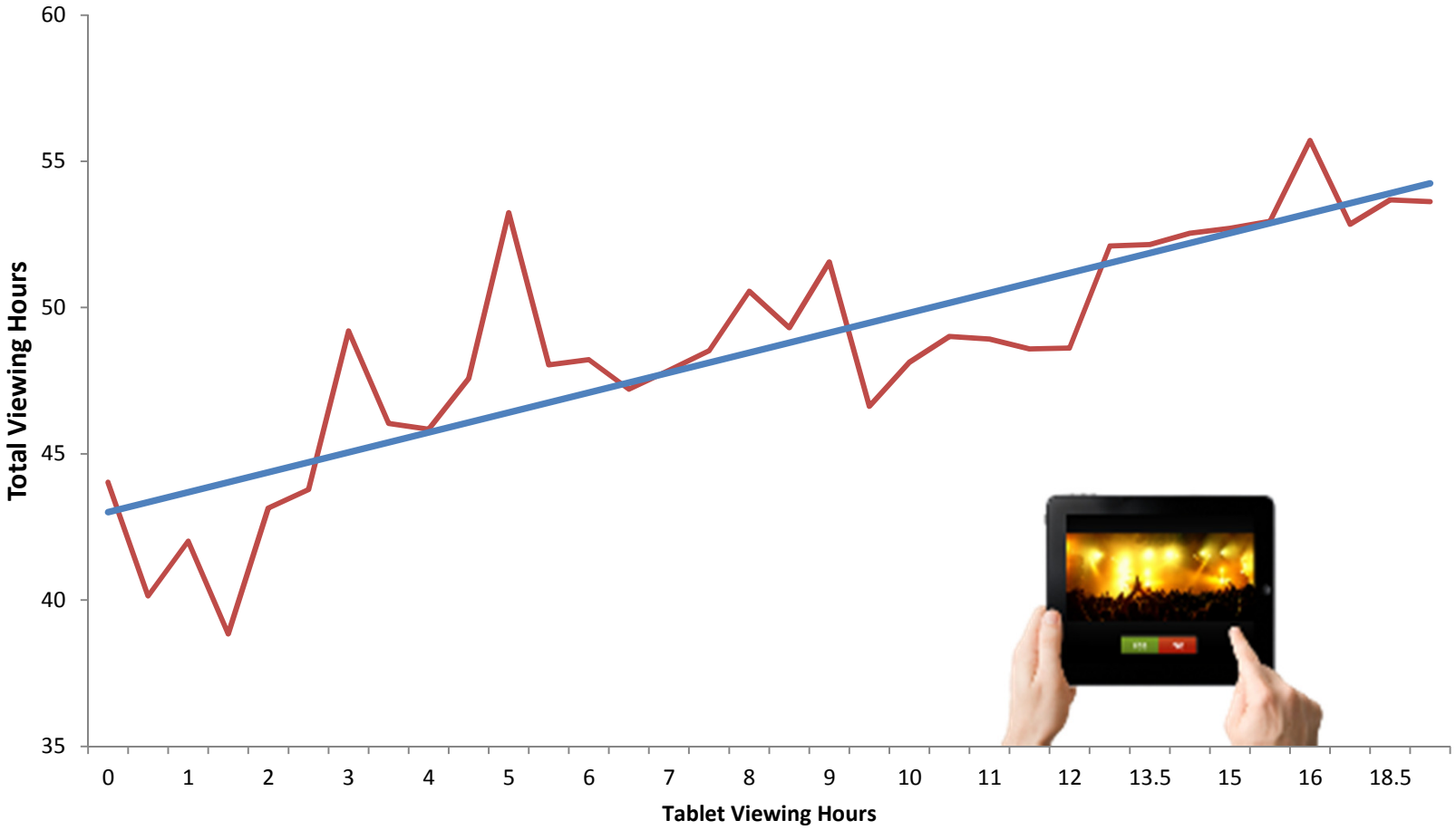
More hours of TV viewing on a tablet results in slightly more hours TV viewing



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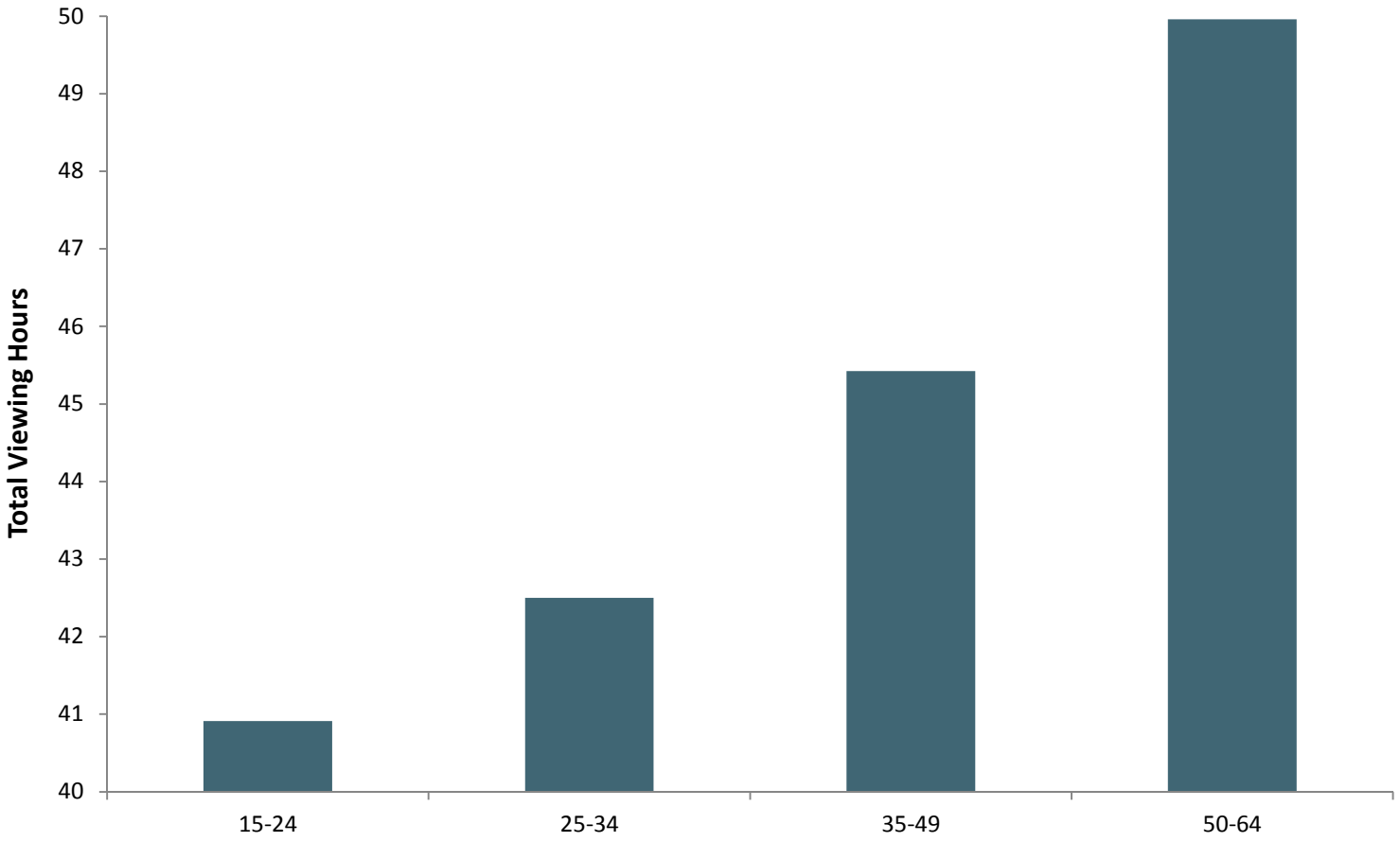
Older demos watch more TV in general



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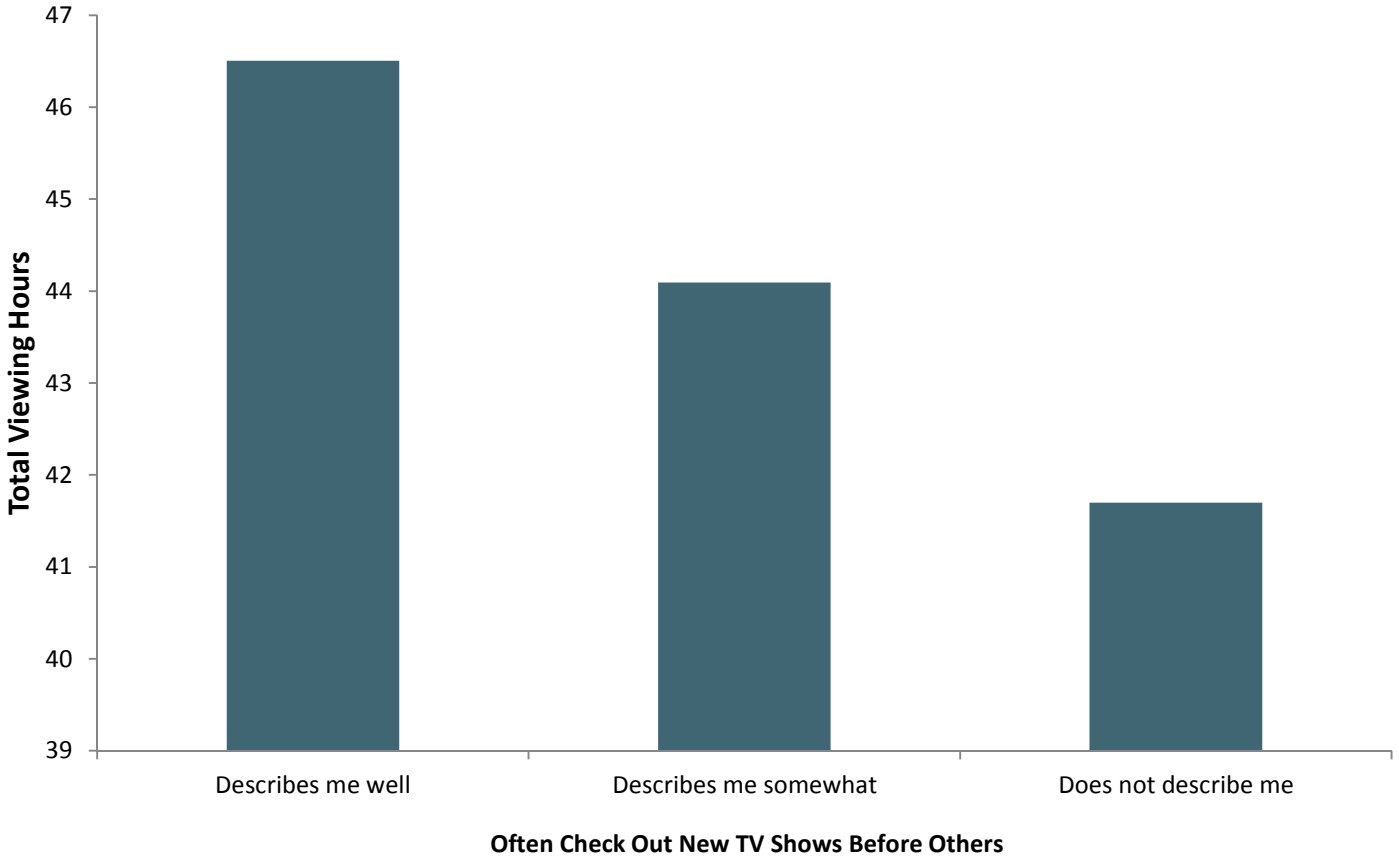
Early adopters of new TV shows have more TV viewing hours



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Modeling Mobile Viewing's Impact on Television Set Viewing Volumes

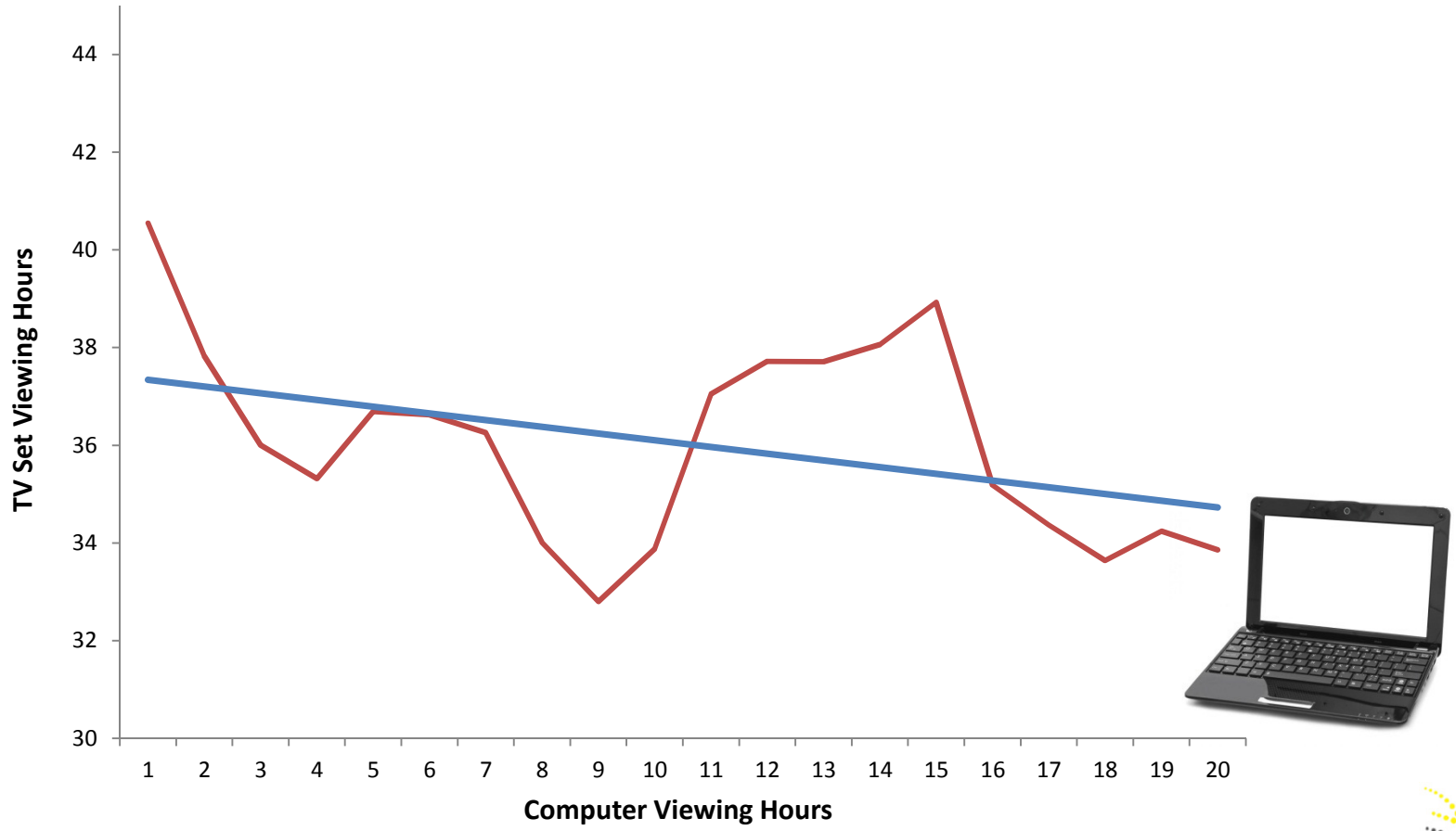
Smartphones are the only device that have a positive relationship with *television set* viewing

- Viewing on computers, by contrast, has a strong *negative* relationship with viewing on a television set, while tablets net out in between the two extremes

	Importance Rating	Association with total *television set* viewing hours
Computer hours watched	100	More computer viewing ->*less* TV set viewing
Level of Education	93	Advanced degrees -> *less*
Tech Adopter Status	88	Late Majority -> *more*
Smartphone hours watched	84	More SP viewing -> *more*
Race/Ethnicity	80	African-American -> *more* Asian-Americans -> *less*
Age	75	Older -> *more* Younger -> *less*
Tablet hours watched	69	More tablet viewing -> *less*
New TV show watcher	65	Early adopters -> *more*

TreeNet predictive modeling importance scores

More hours spent viewing on a computer result in fewer hours watching on a TV set



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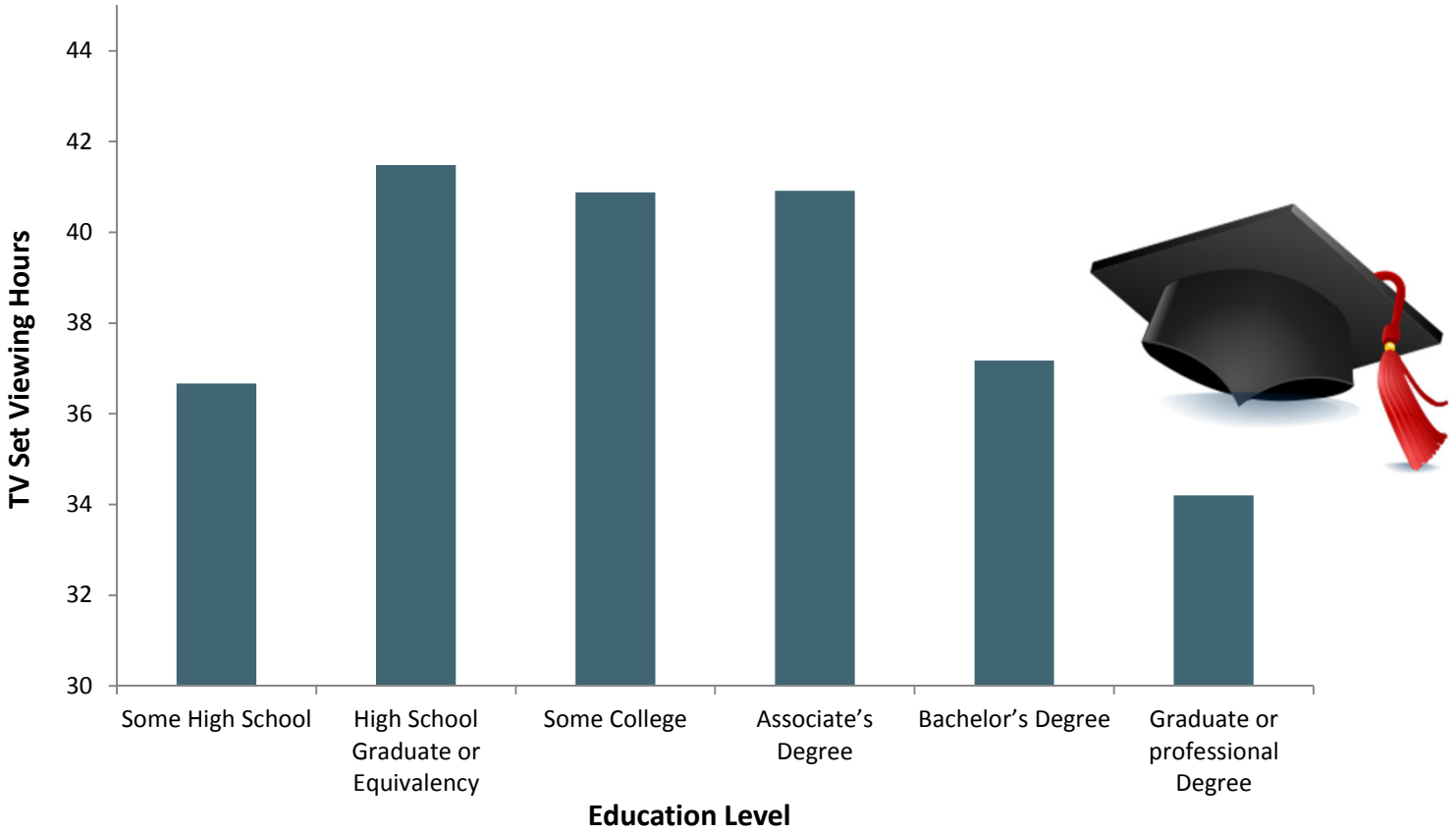
Those with advanced degrees watch less



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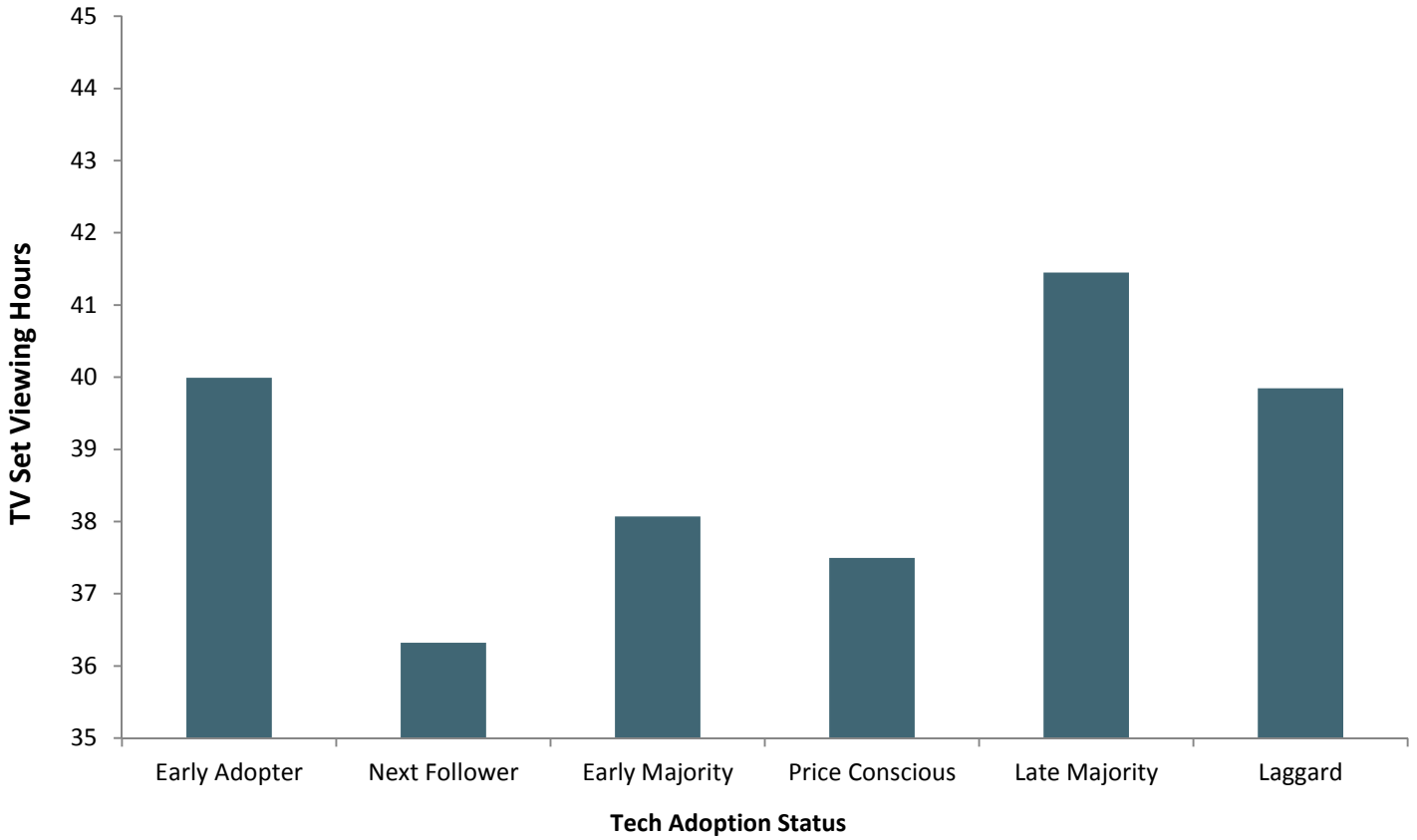
“Next Followers” watch less; “Late Majority” watch more



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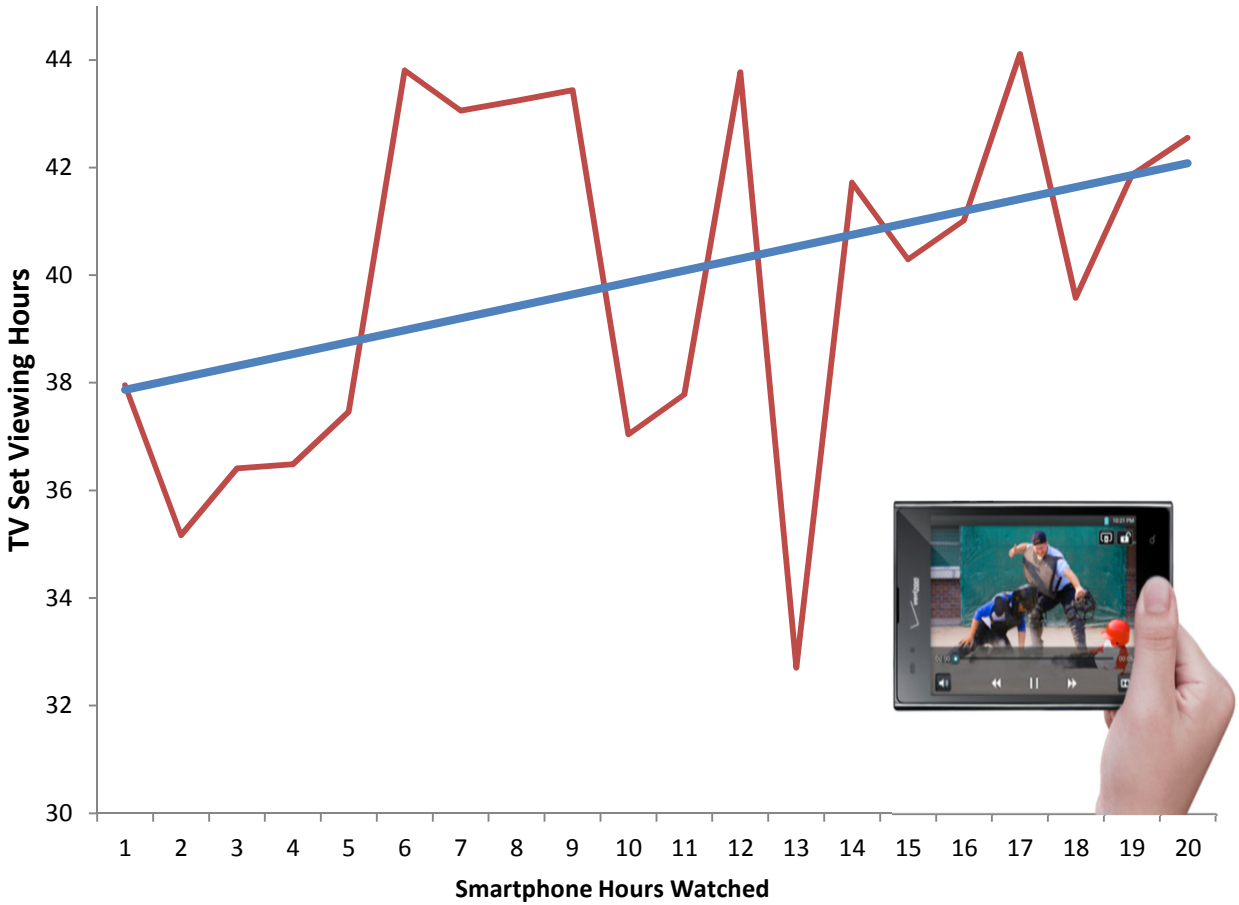
SP viewing can increase television viewing, but the relationship is bumpy



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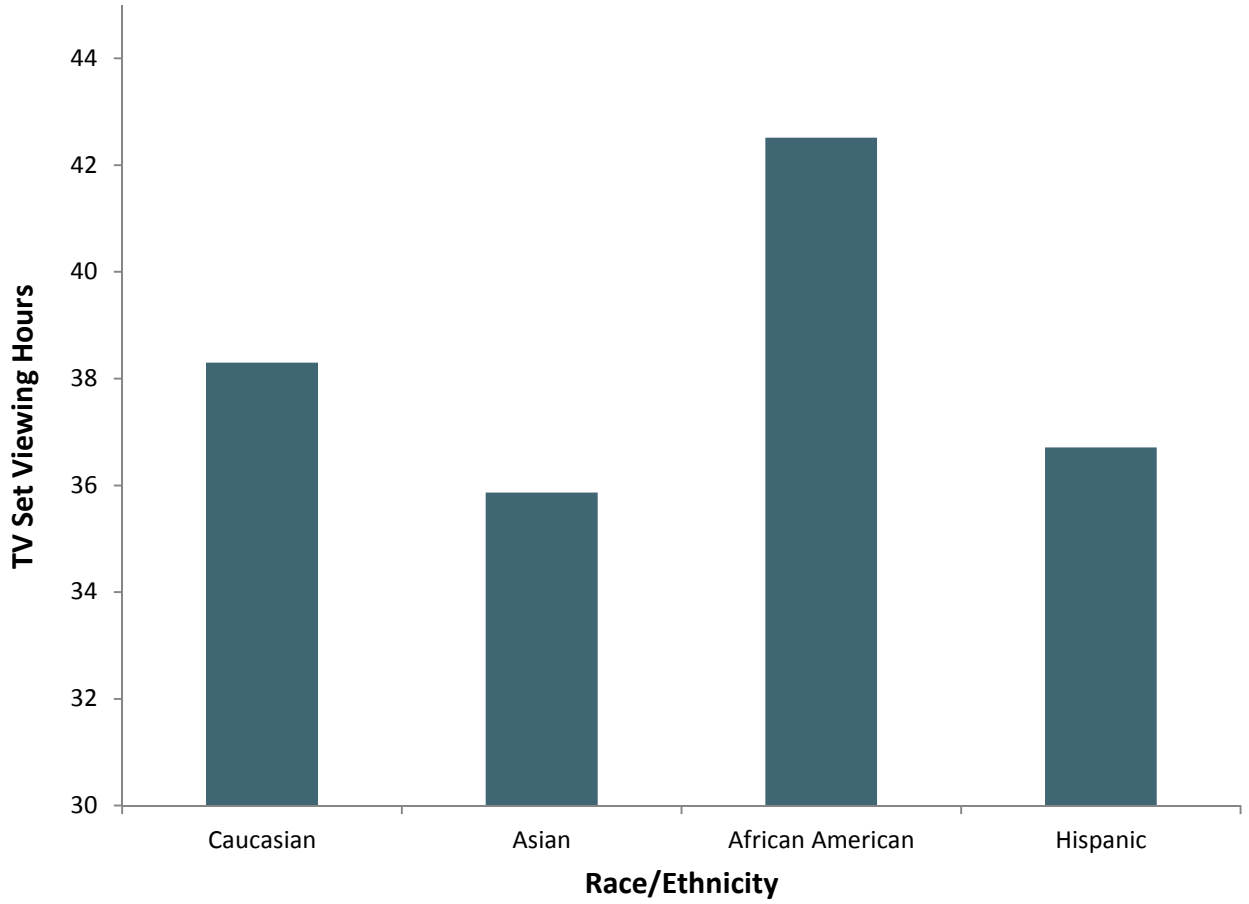
African-Americans watch more on television sets; Asian-Americans watch less



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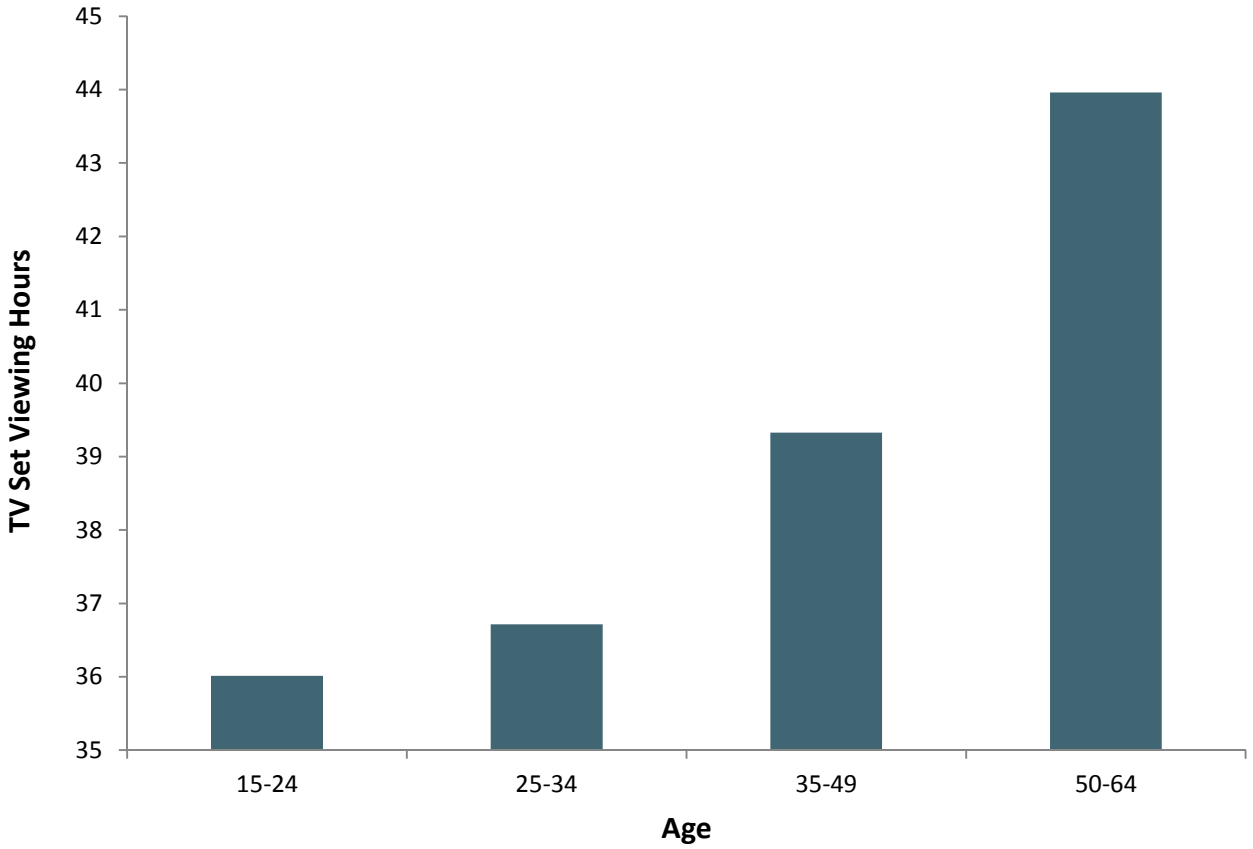
Older demos watch more on television sets



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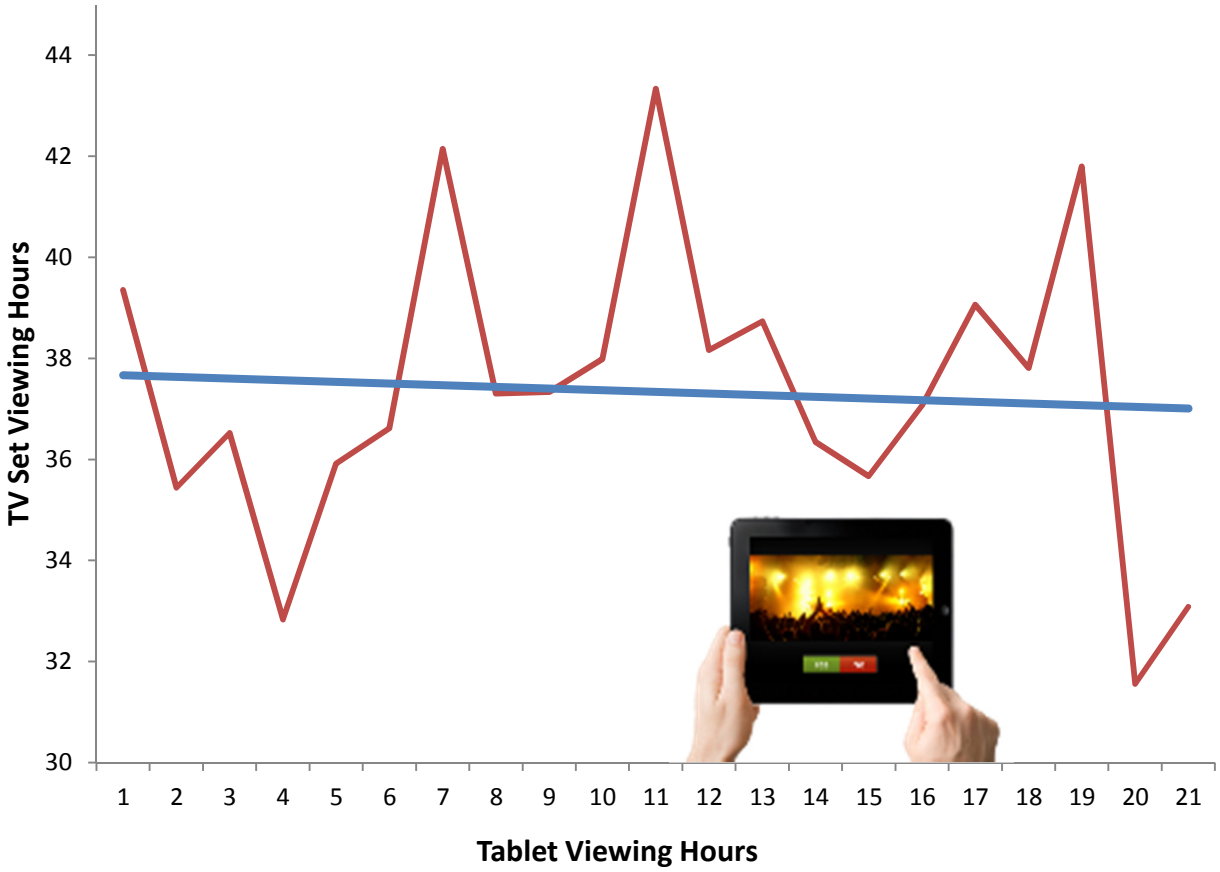
Tablet viewing has a “bumpy” relationship with television set viewing

- Most commonly, however, the relationship is negative



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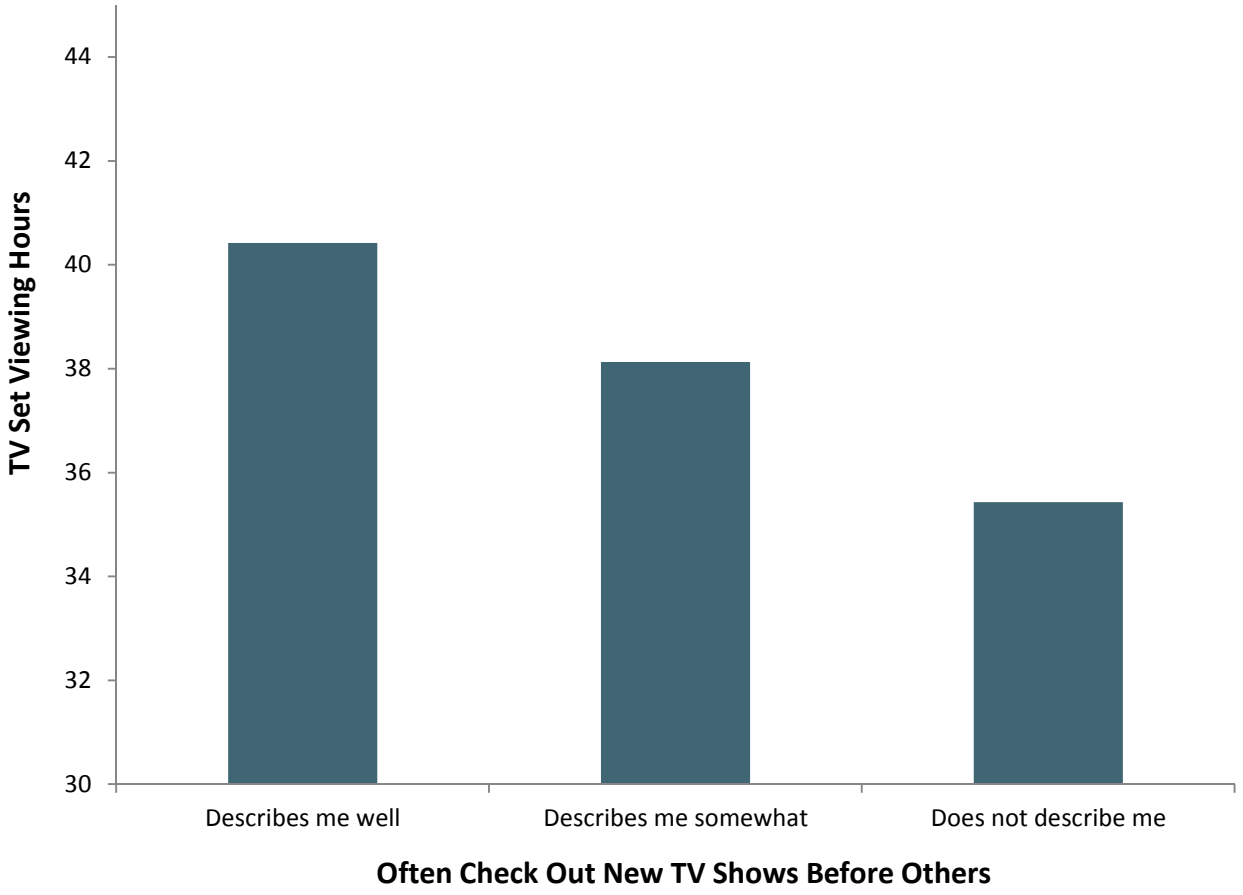
Early adopters of new TV shows log more television set viewing hours



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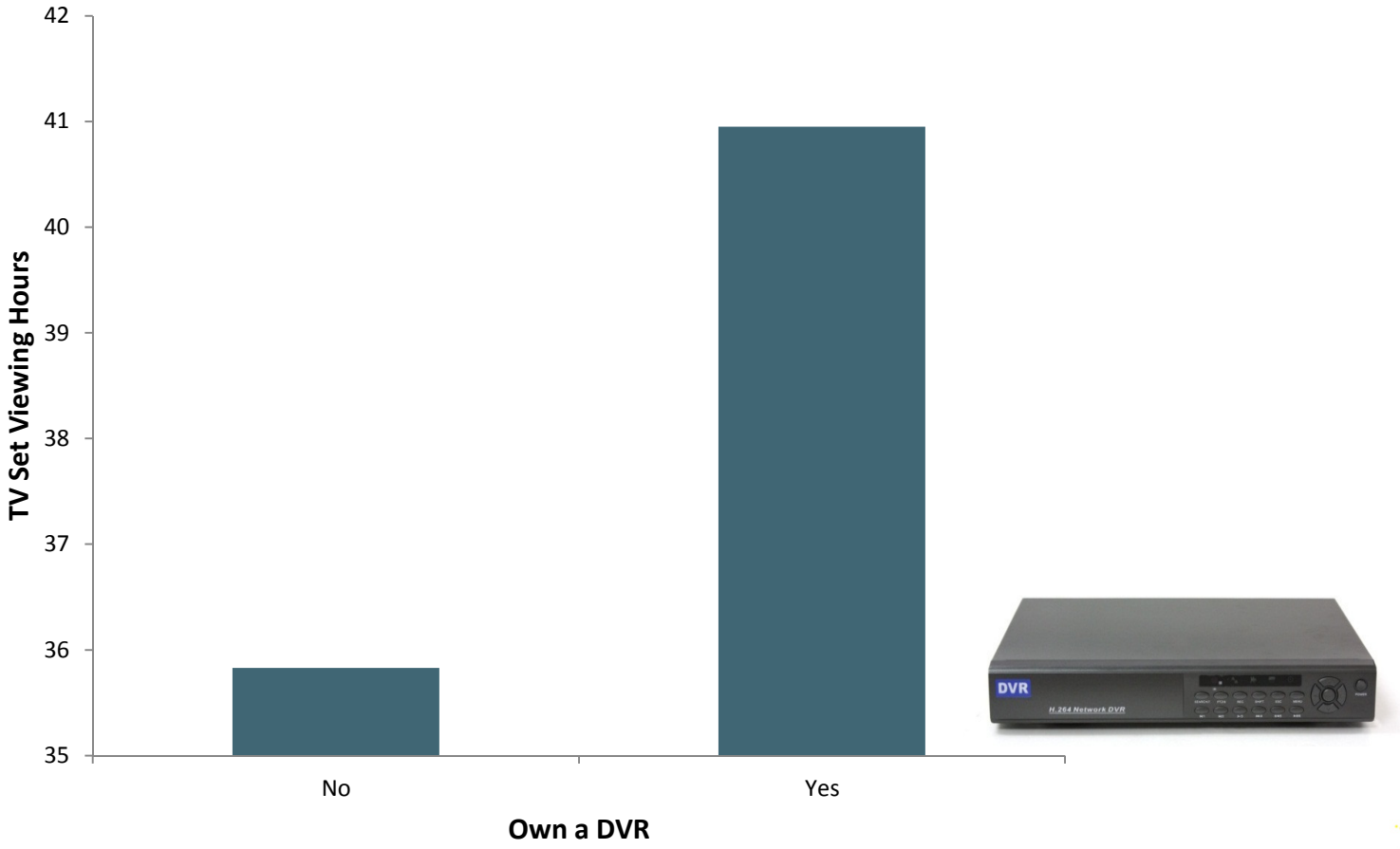
Owning a DVR leads to more television set viewing hours



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Thank You!