ALL ABM Update

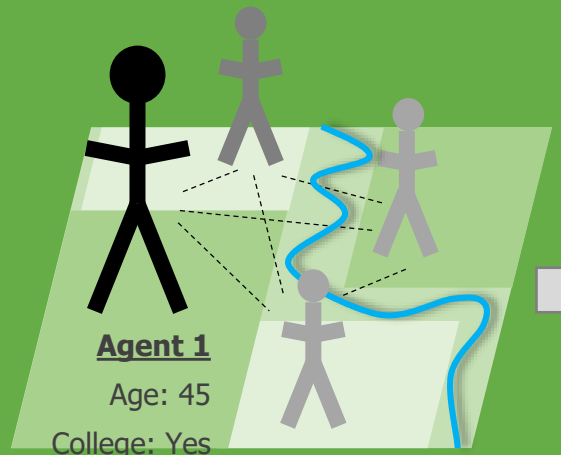
Getting to Zero P with BMPs on the Landscape

BREE Spring ’18 PTAC Meeting

24 May 2018

E. M. B. Doran, PhD
Postdoctoral Researcher

Part I: Farms



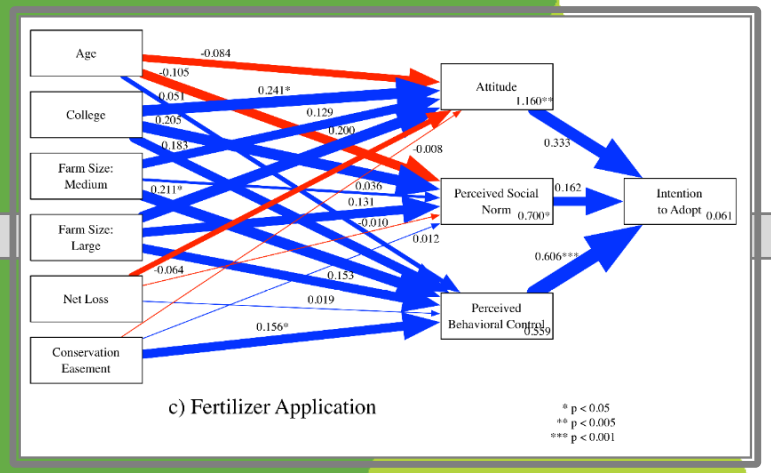
Agent 1

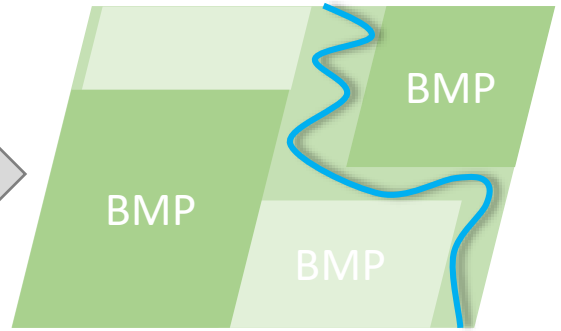
Age: 45

College: Yes

Farm Size: 14 acres

Land use type: Crop

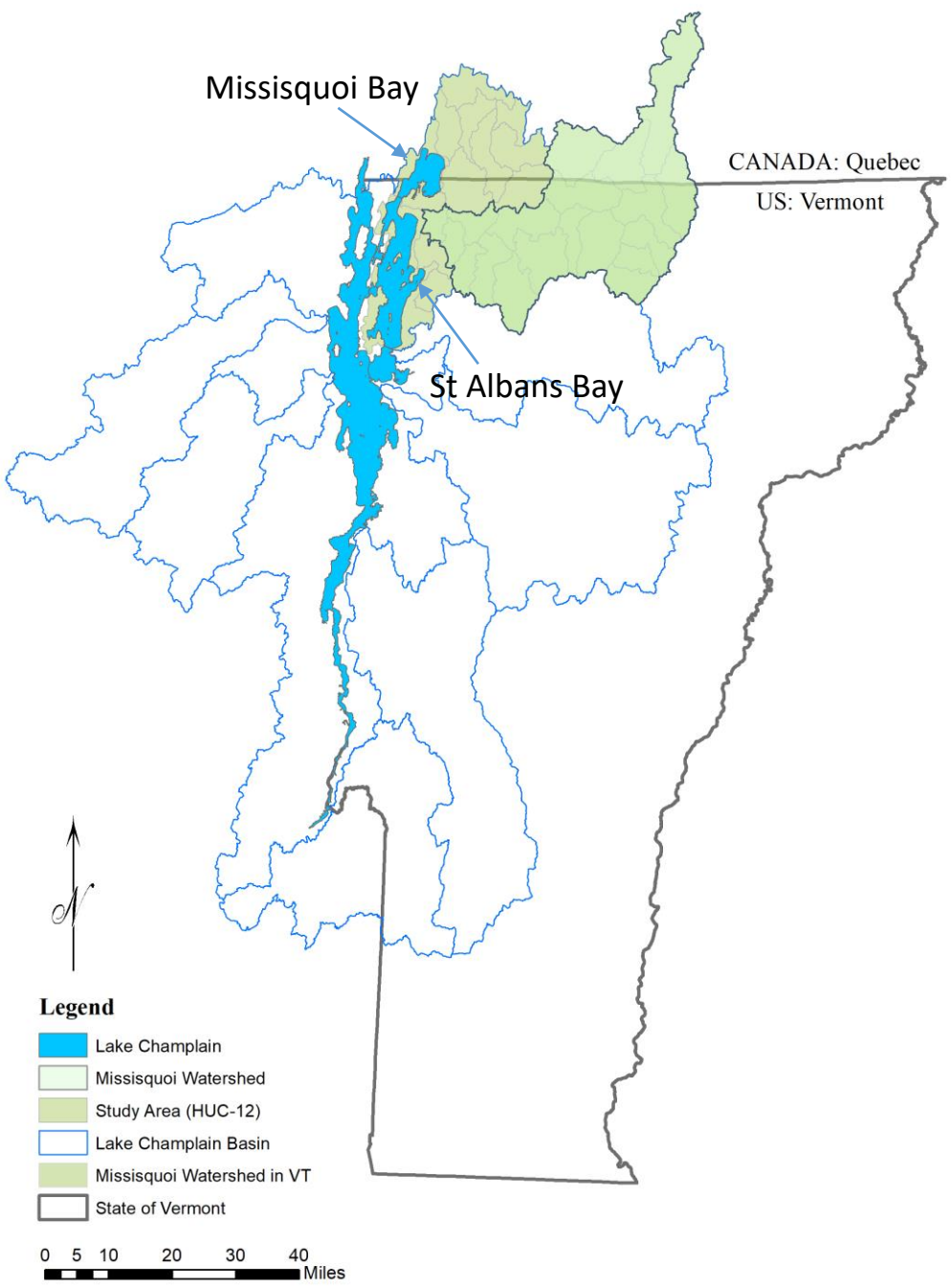




The University of Vermont

The Problem

Excessive nutrient pollution (phosphorus, P) entering Vermont's rivers and water bodies leading to *harmful algal blooms* (HABs).



PC: Burlington Free Press

To reduce excess nutrient input to lake, suite of ***Best Management Practices*** (BMPs) implemented across the watershed.

Landowner Populations

Farmers (9 BMPs)	Households (7 BMPs/GSI)	Foresters (TBD AMP)	Firms (TBD GSI)

Nutrient Inputs

Nutrient Capture

Fertilizer application based on soil testing

Reduced Tillage

Conservation Buffers

Low P Lawn Fertilizer

Picking up dog waste

Rain Barrels

Rain Gardens

Temporary Skidder Bridge

Low/No P Lawn Fertilizer

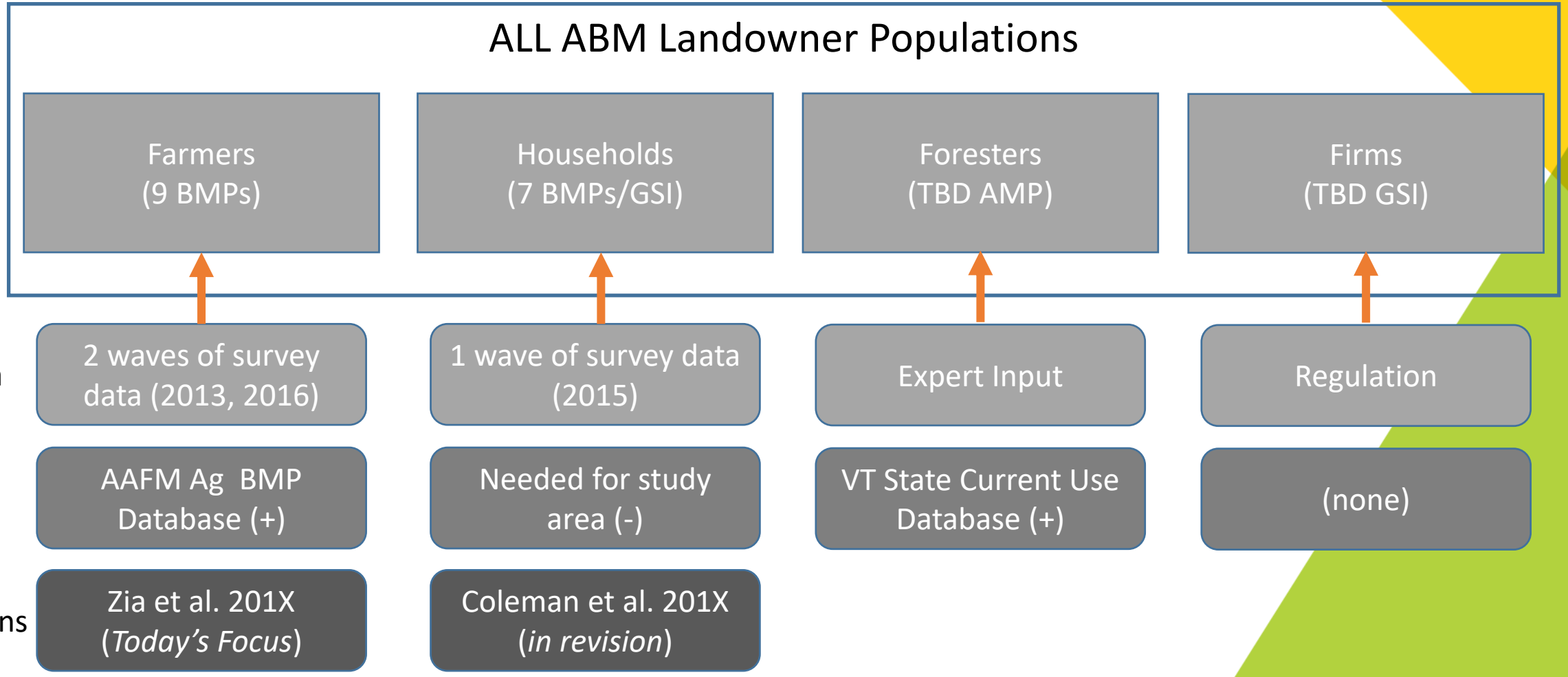
Pervious Pavement

Constructed Wetlands

Retention Ponds

PC: VPR; St Albans Messenger;

BMP Adoption within BREE ALL ABM



Not shown: Municipal Agents in the GovNET model (19 BMP/GSI); Streams/Roads

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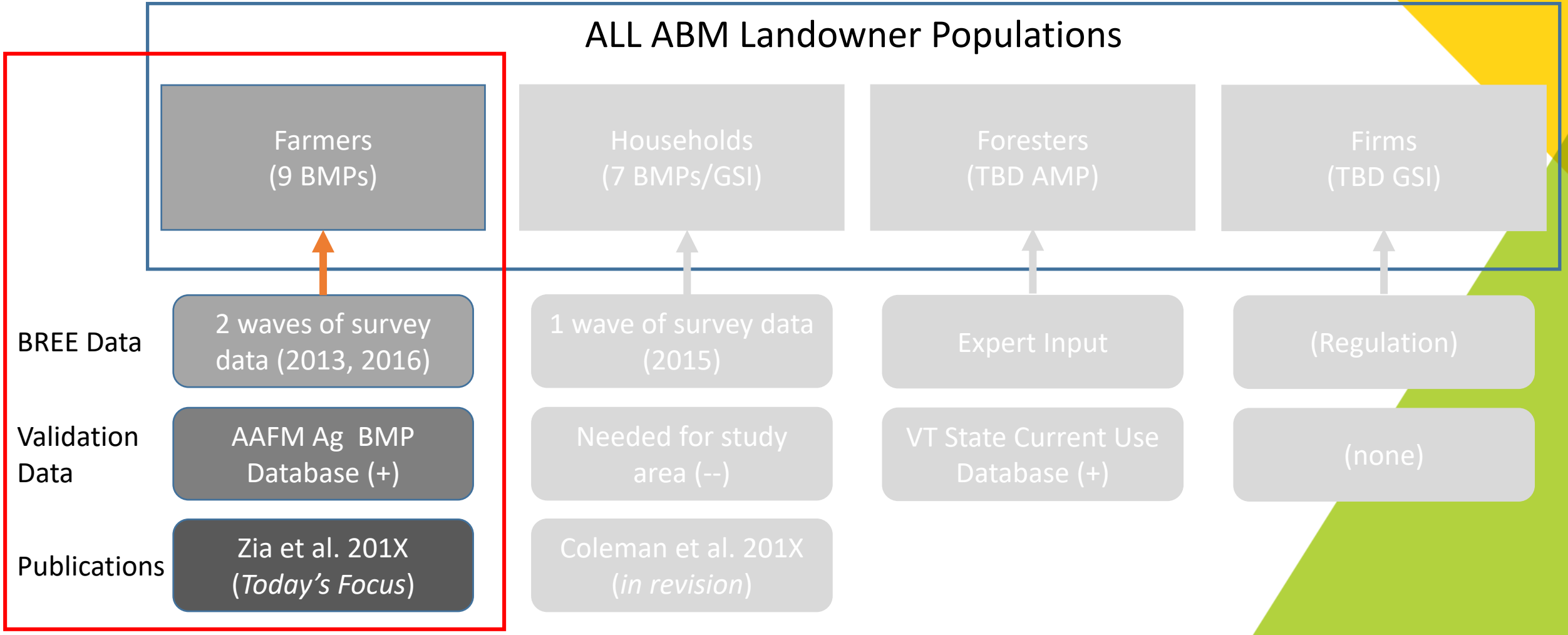

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Who, and how likely are people – *farms* – to adopt specific best management practices?

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Theory of Planned Behavior (TPB) to build a model of likely adoption for *each* BMP

FIVE High Level Take Aways

1: ***Perceived Behavioral Control*** is the **largest and statistically significant** driver of farm intention to adopt for *all* BMPs measured.

2. Holding a ***Conservation Easement*** is a **statistically significant** (x4 BMPs) **positive** influence on ***Perceived Behavioral Control***.

3. Being a ***Large Farm*** and having a ***College Education*** each have a **positive** influence on adoption.

4. Experiencing a ***Net Loss*** in the last three years each have a **negative** influence on ***Attitude*** about all BMPs

5. Increased ***Age*** has a **negative** impact on Perceived Social Norms around BMP adoption.

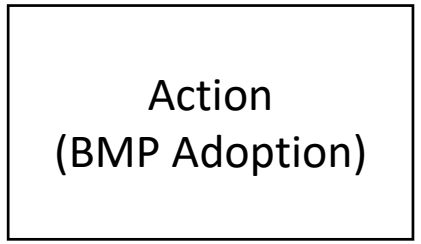
Two General Observations

1: Cropping practices (x3) have similar patterns of influence

2: **Manure Setbacks BMP** has different pattern of influence compared to all the other BMPs measured

Theory of Planned Behavior Structural Equation Models

(Azjen, 1991)



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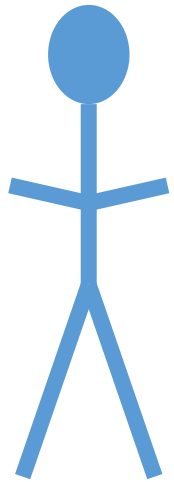

Age

College

Farm Size

Farm Profitability
(Net Loss)

Conservation
Easement

Action
(BMP Adoption)

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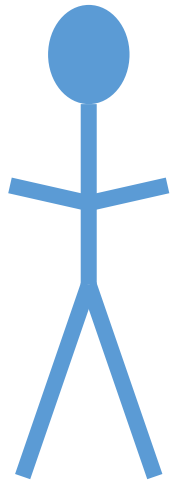

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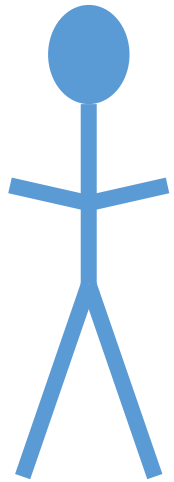

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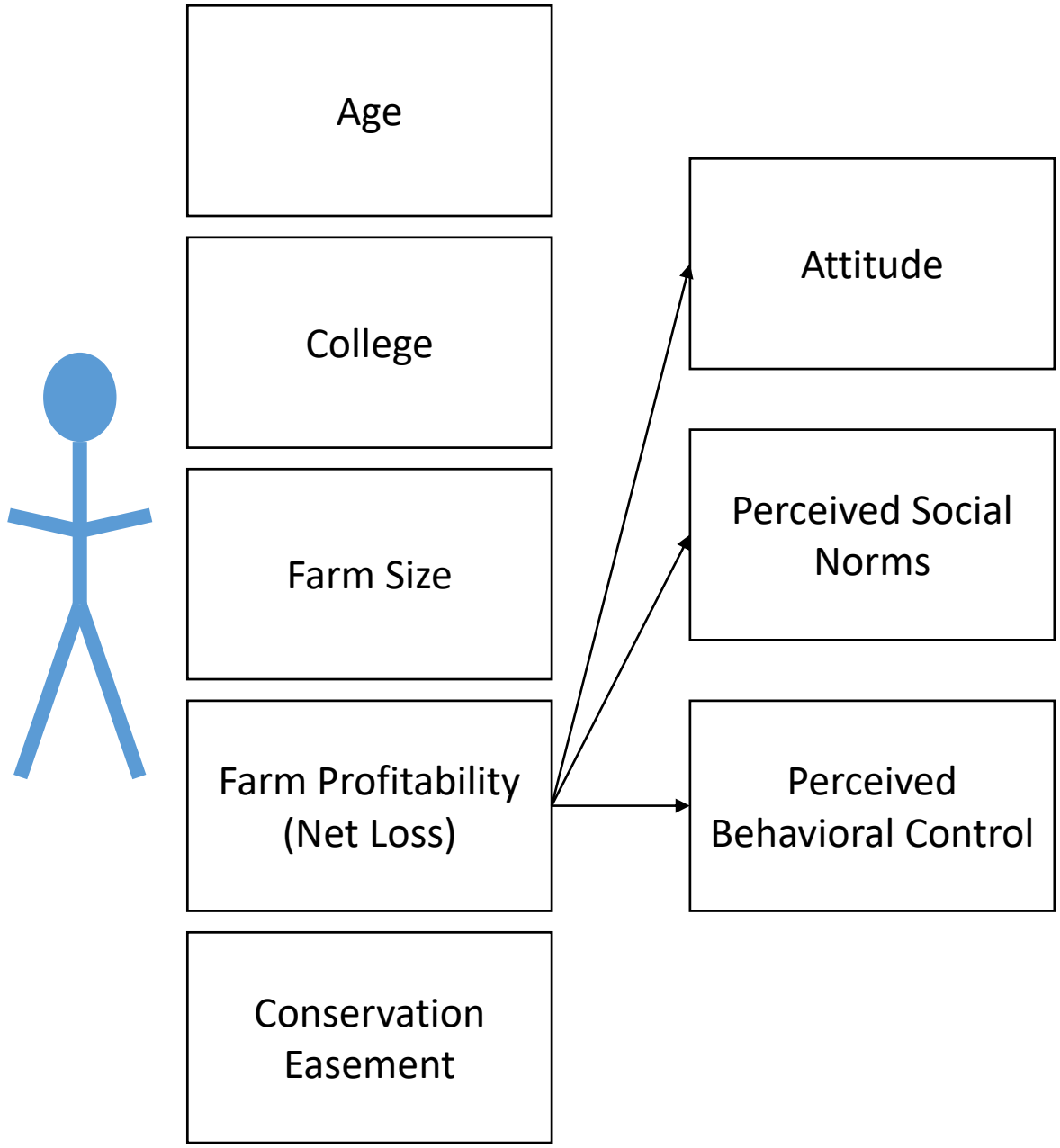

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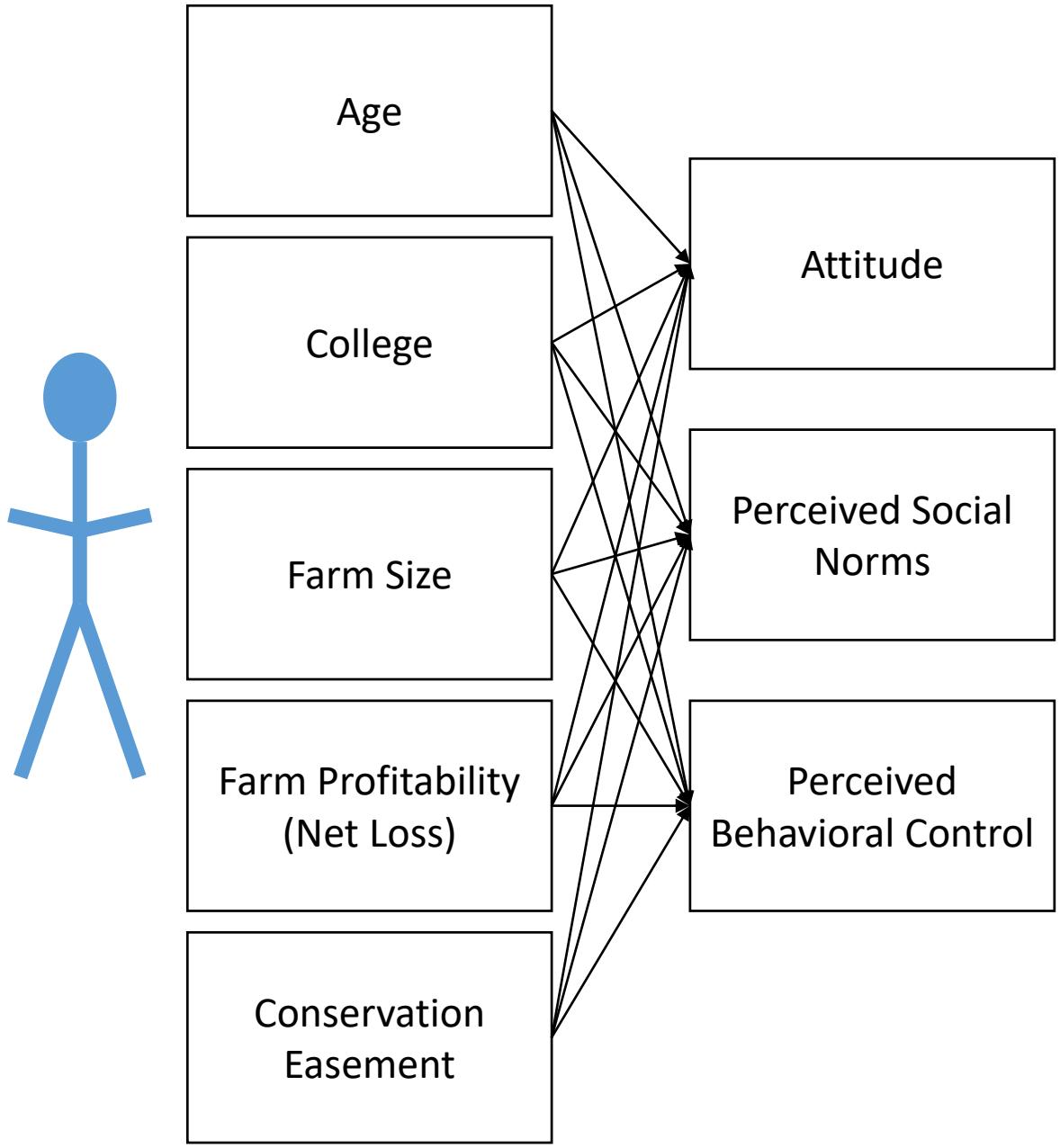

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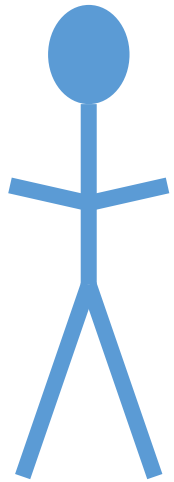

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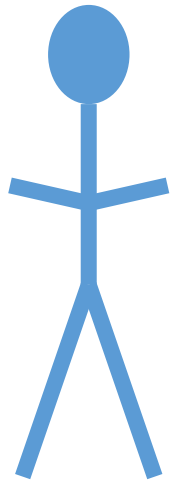

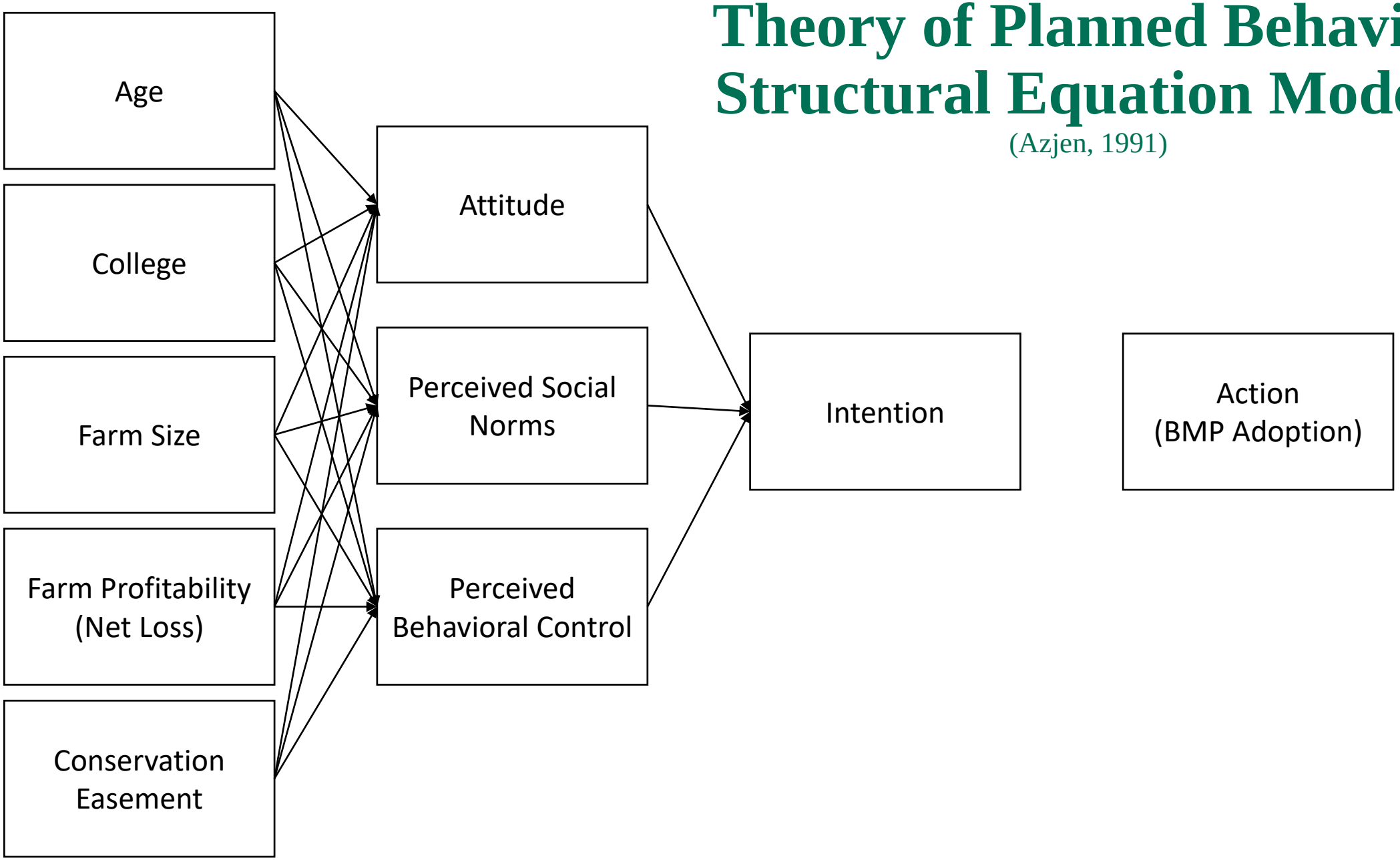

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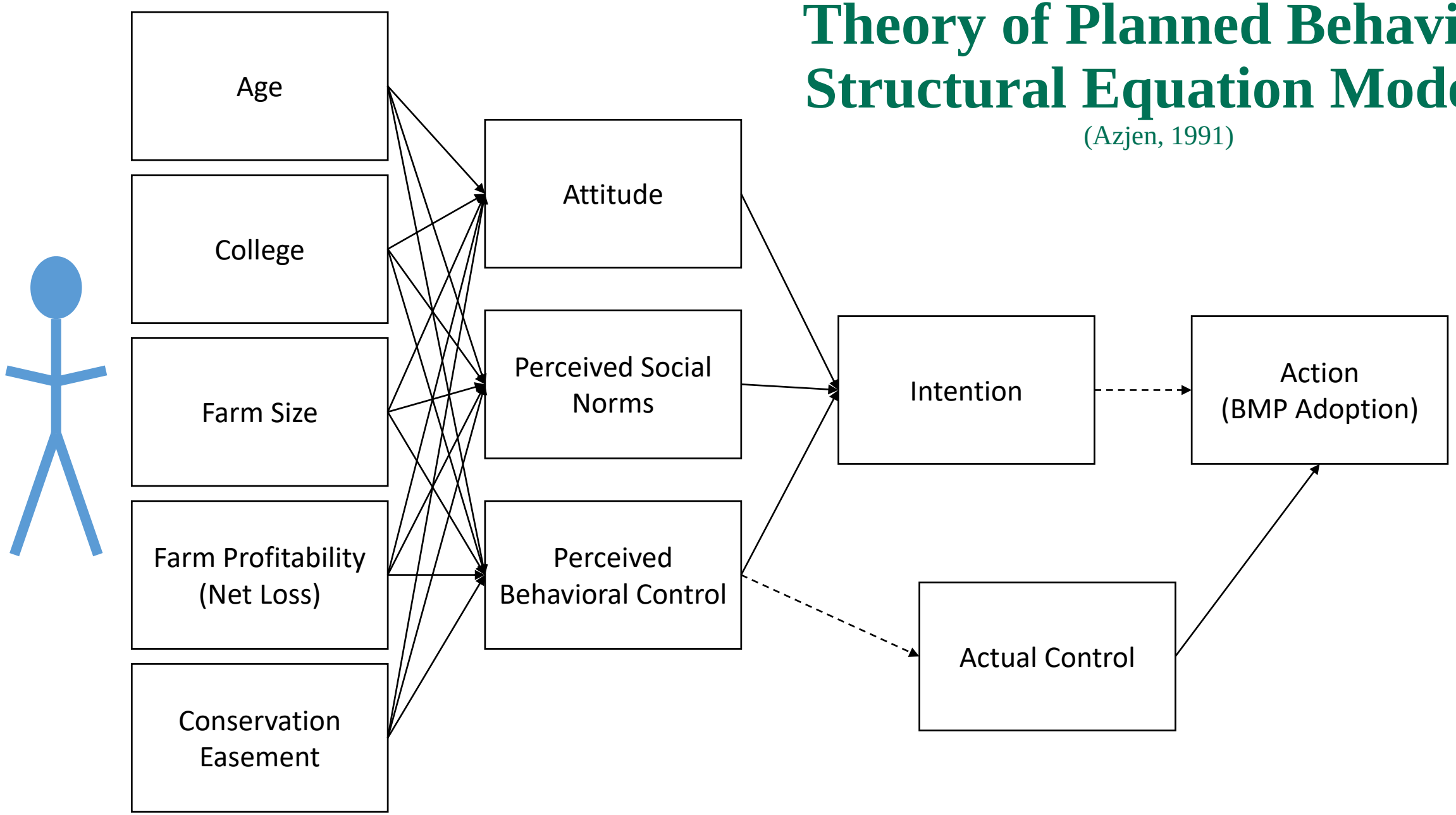

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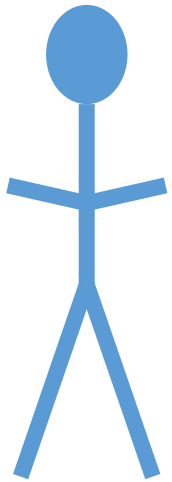

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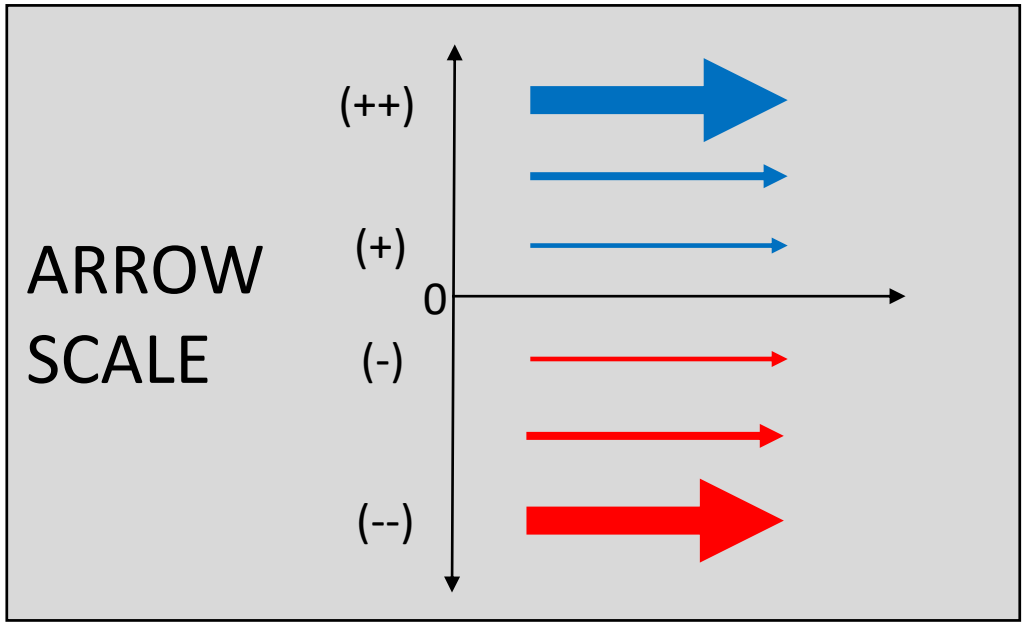

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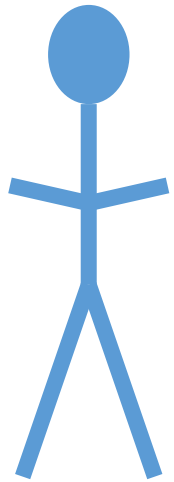

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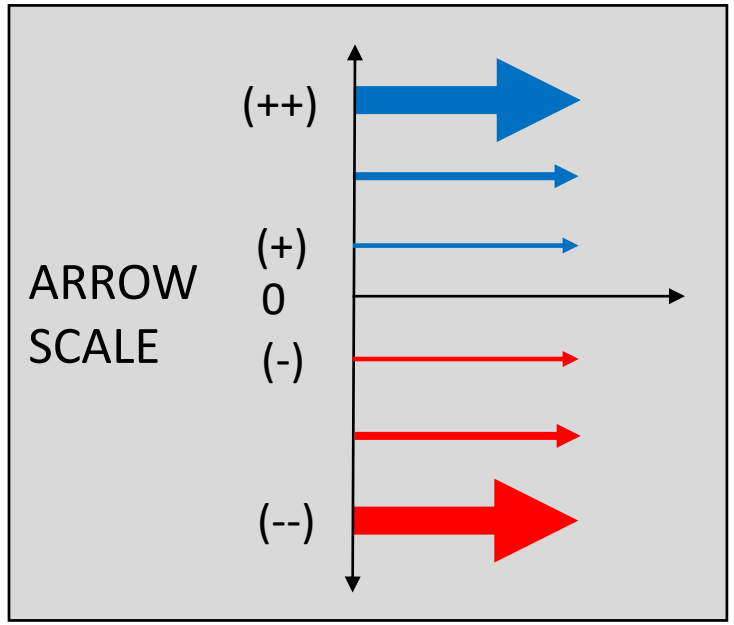
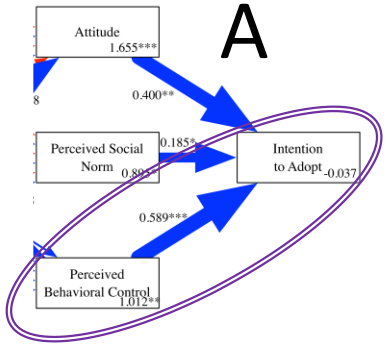


Nutrient Inputs

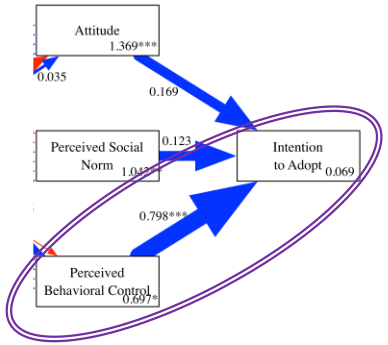
A



a) Soil Testing

* p < 0.05
** p < 0.005
*** p < 0.001

P. Behavioral Control



b) NPK Application

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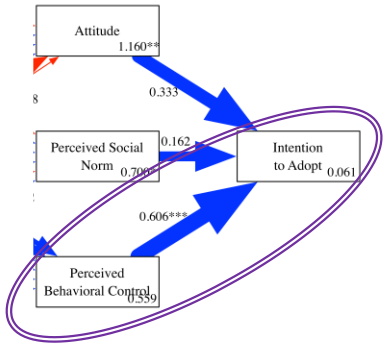

c) Fertilizer Application

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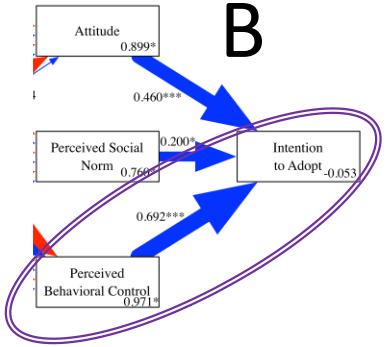
Cropping Practices

B



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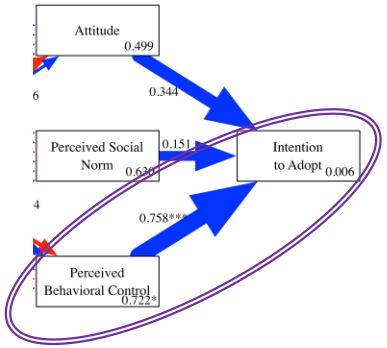

b) Strip Cropping

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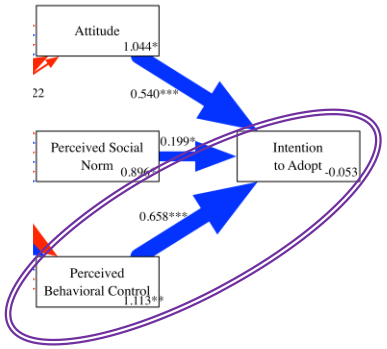

c) Cover Cropping

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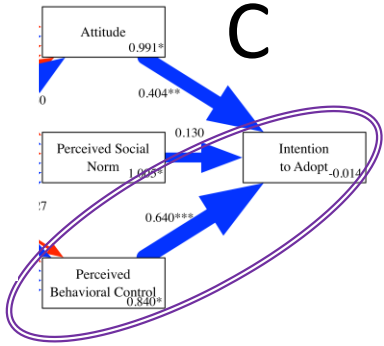
Nutrient Capture

C



a) Reduced Tillage

* p < 0.05
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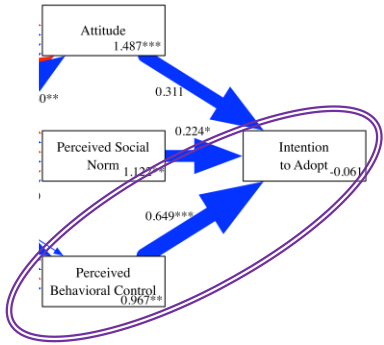

b) Conservation Buffers

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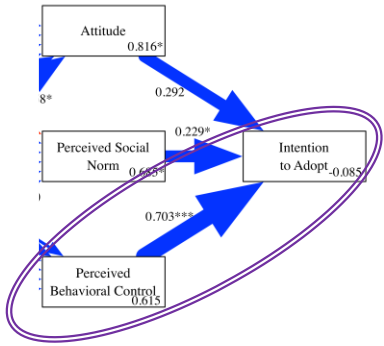

c) Manure Setbacks

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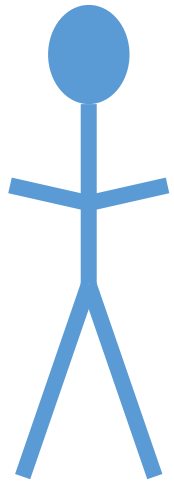

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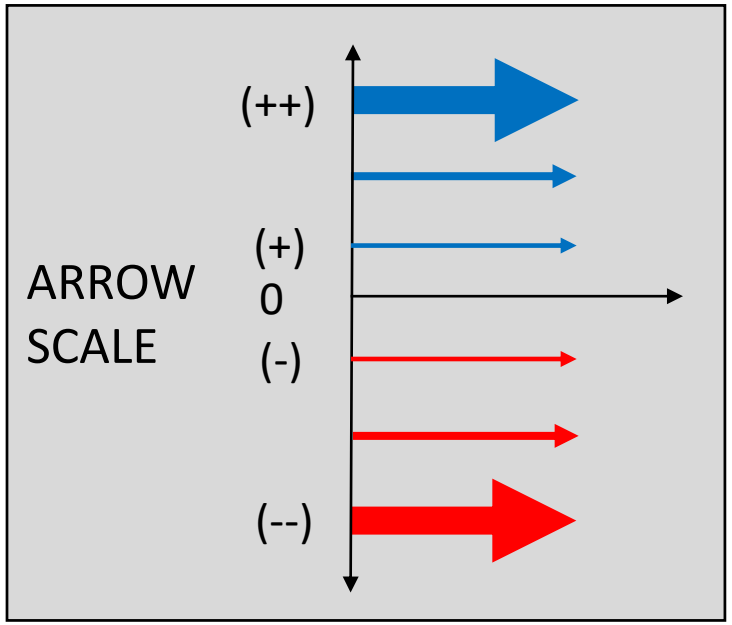

anned Behavior
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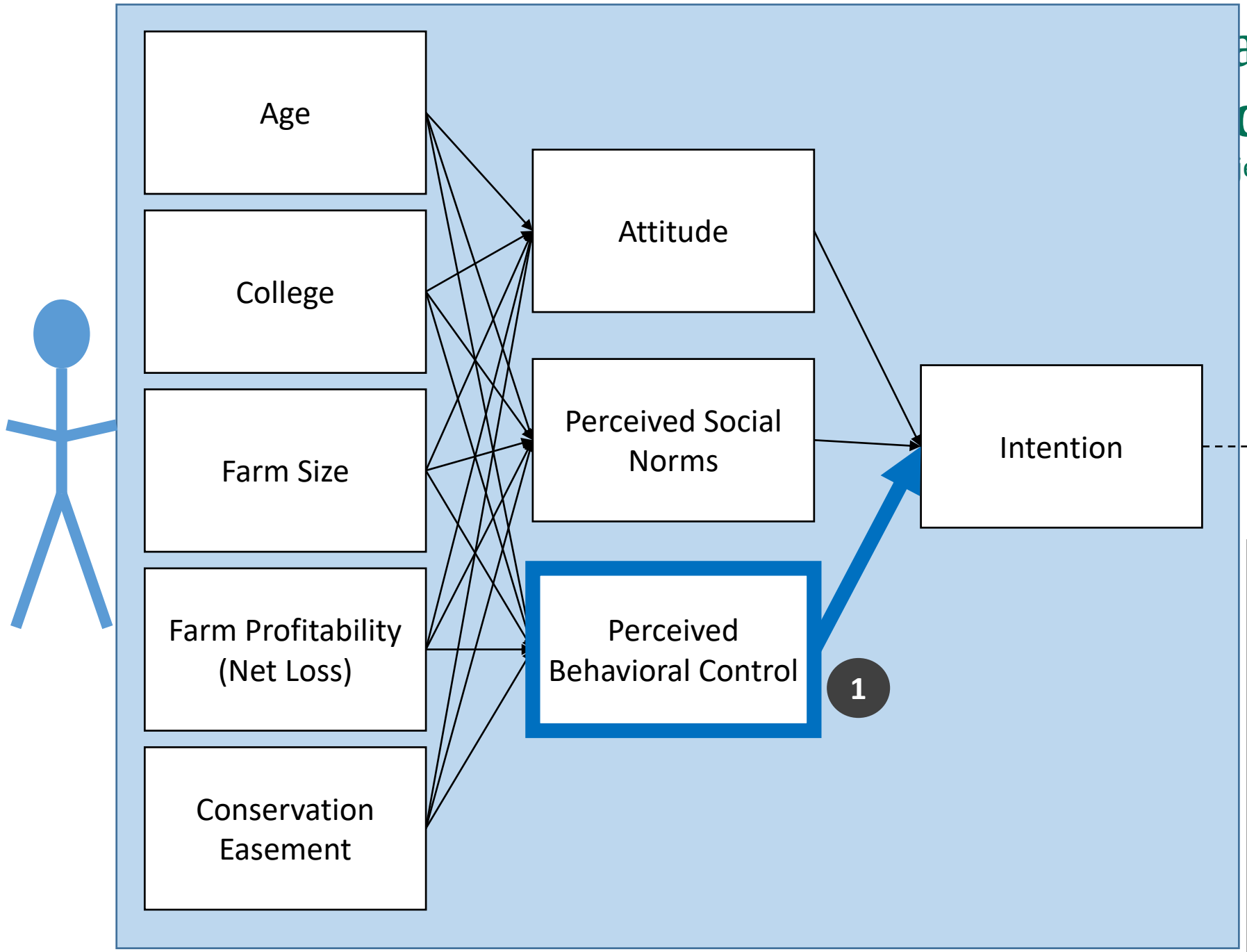

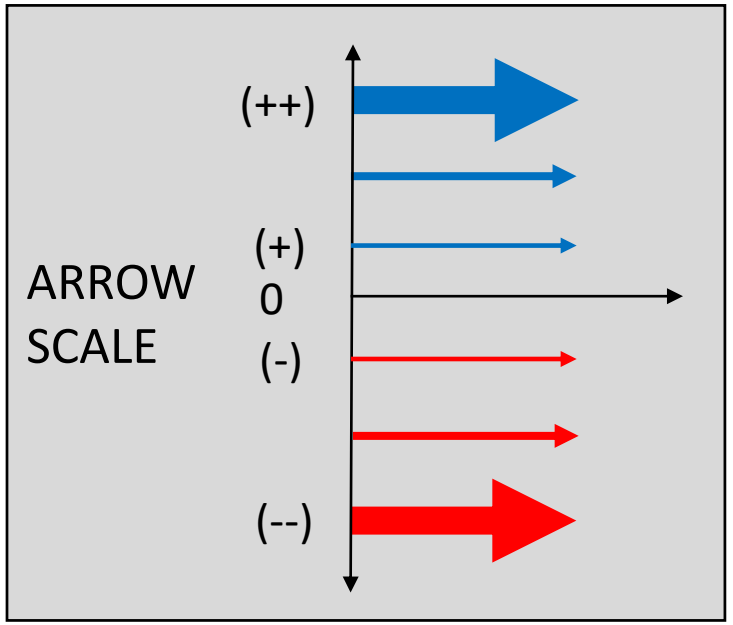

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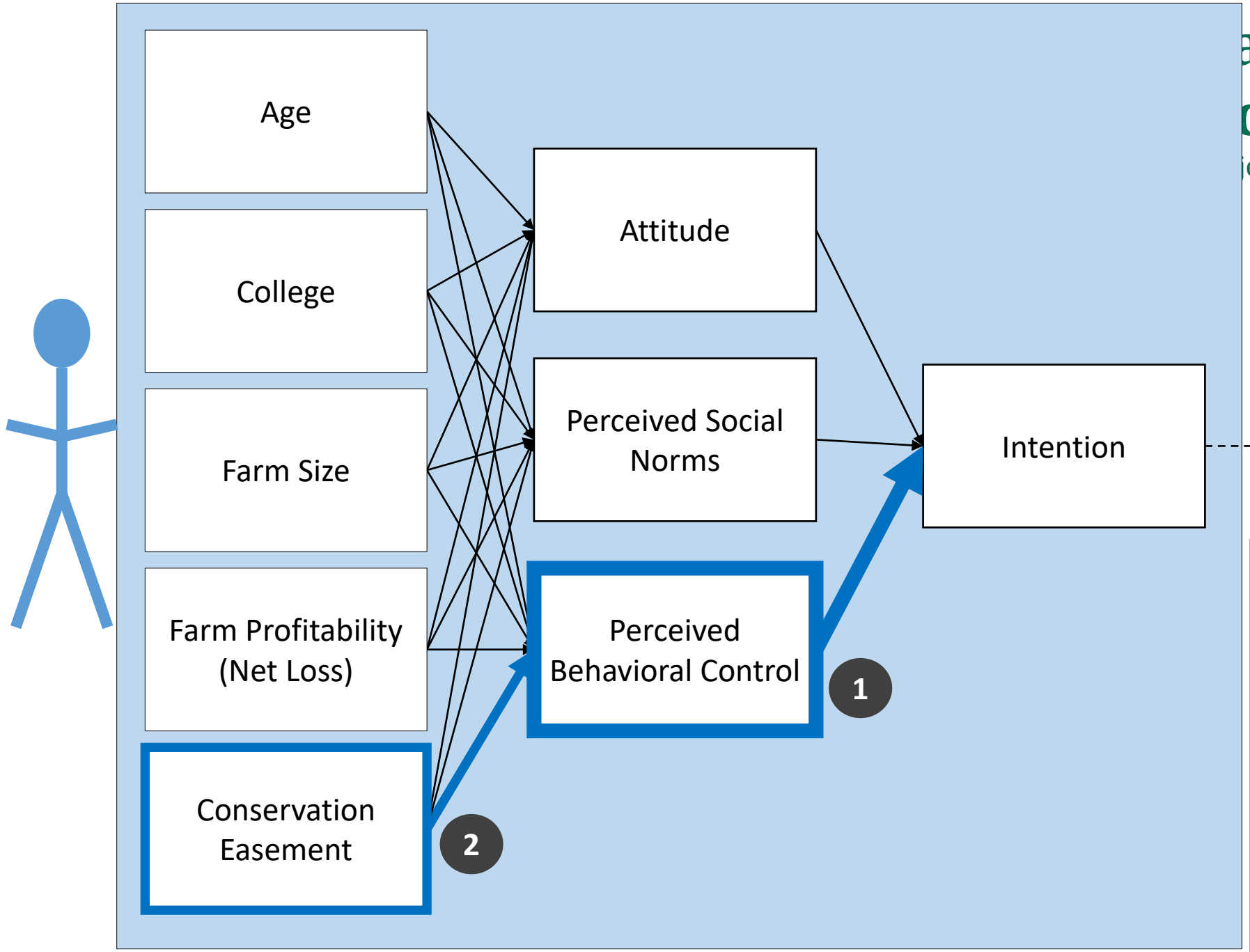

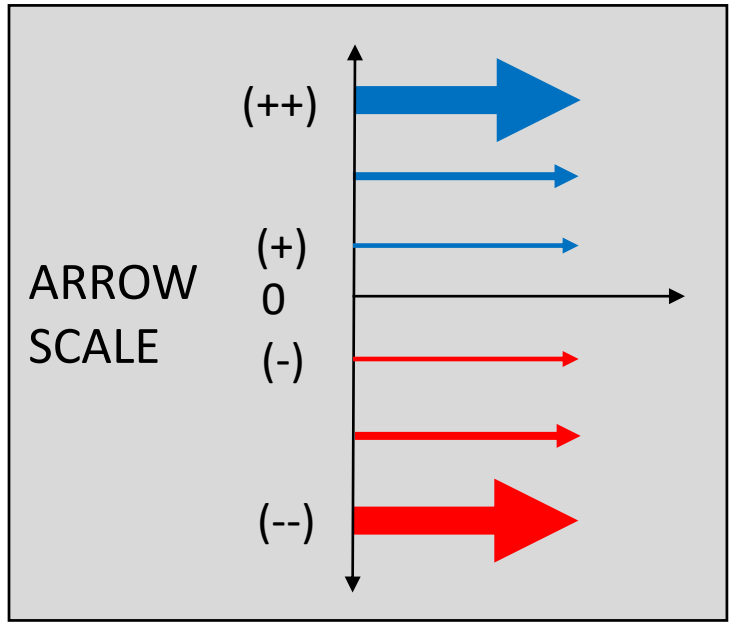

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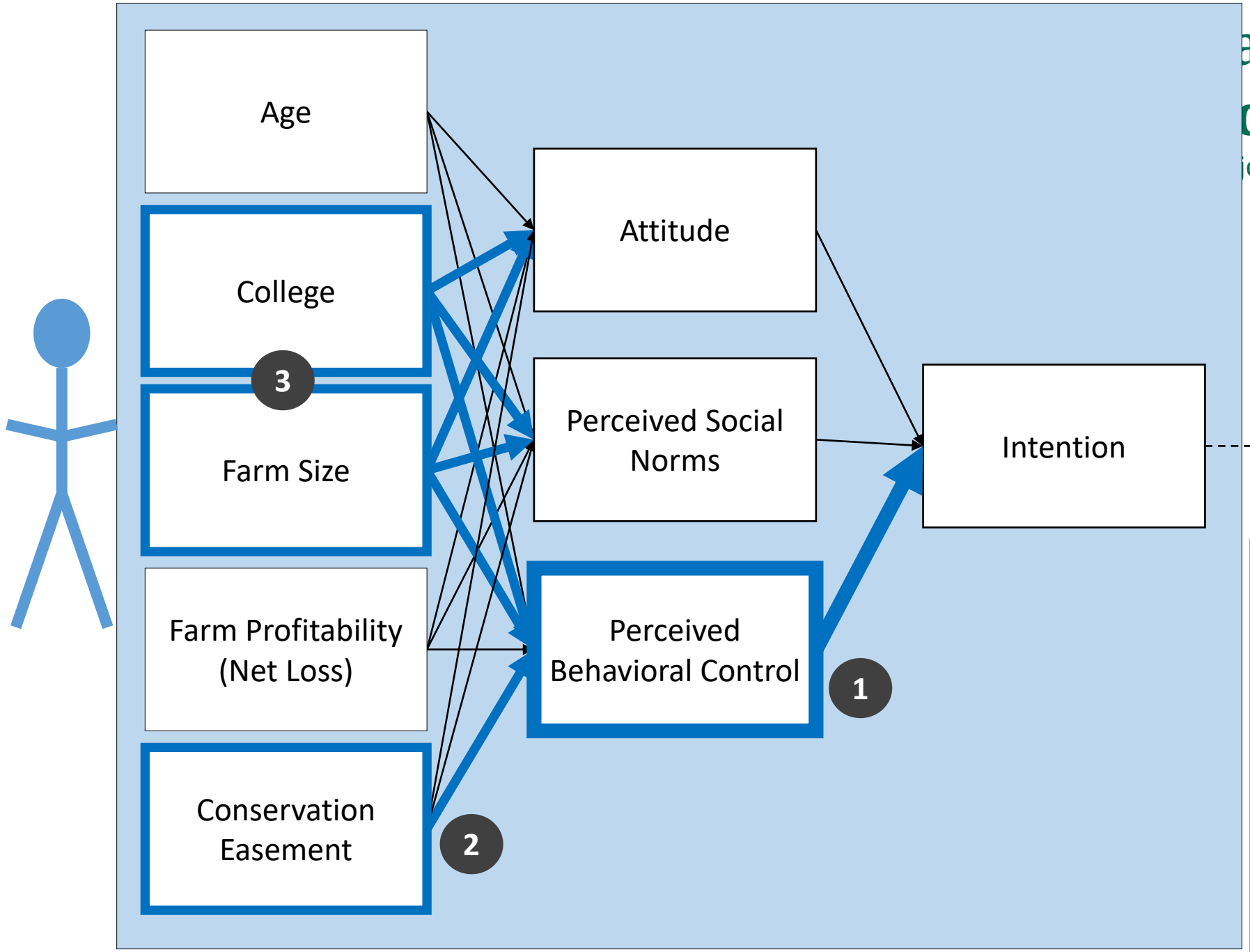

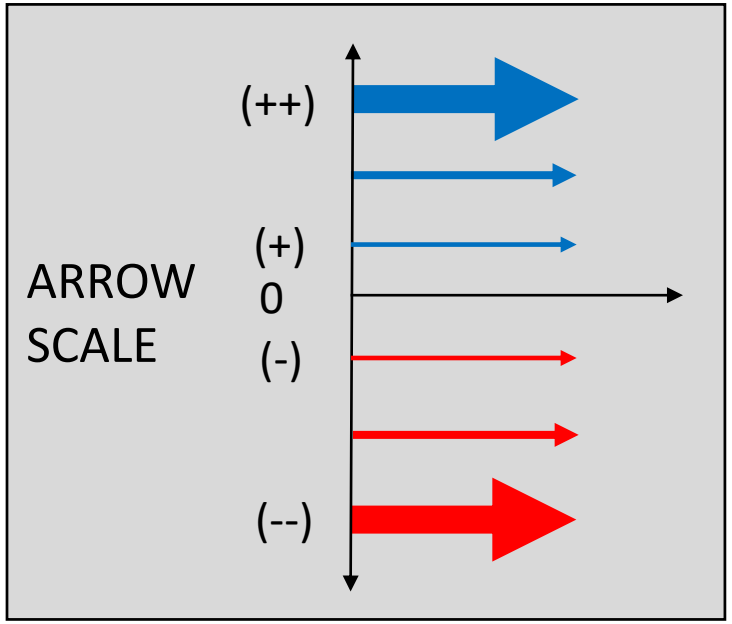

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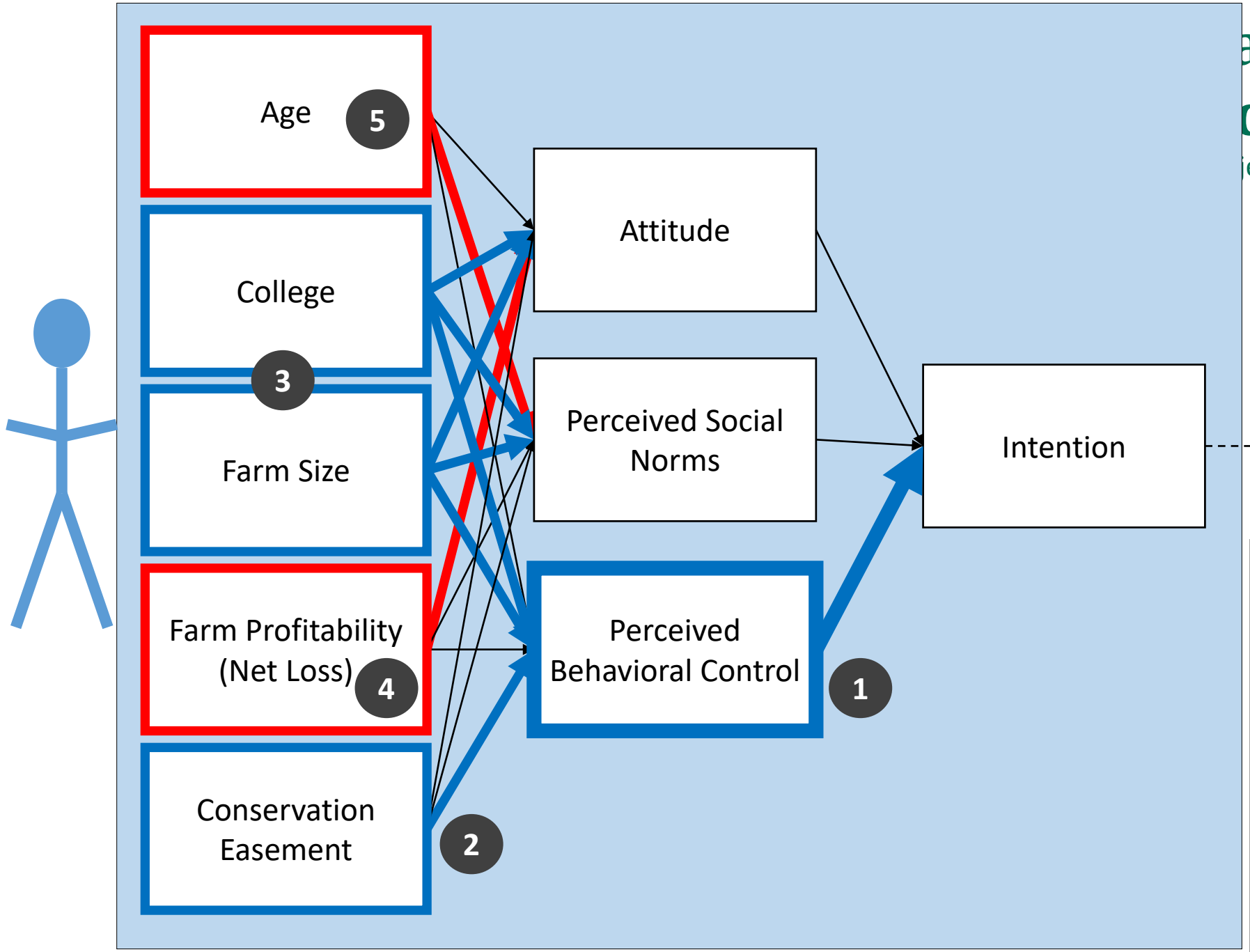

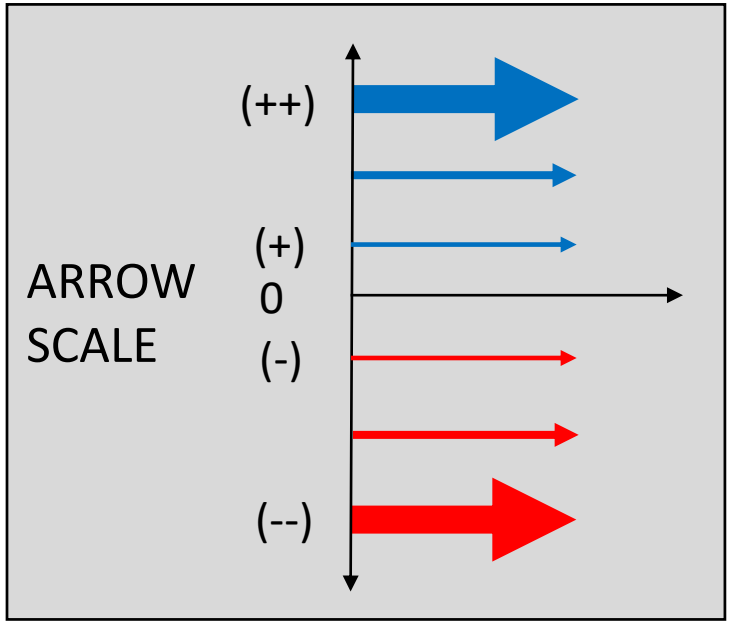

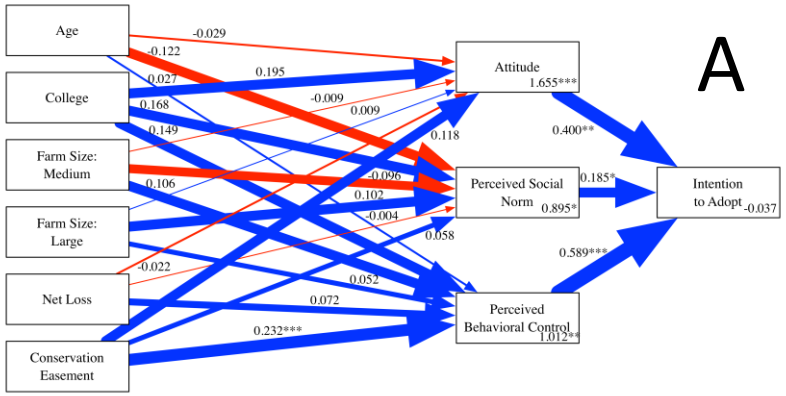

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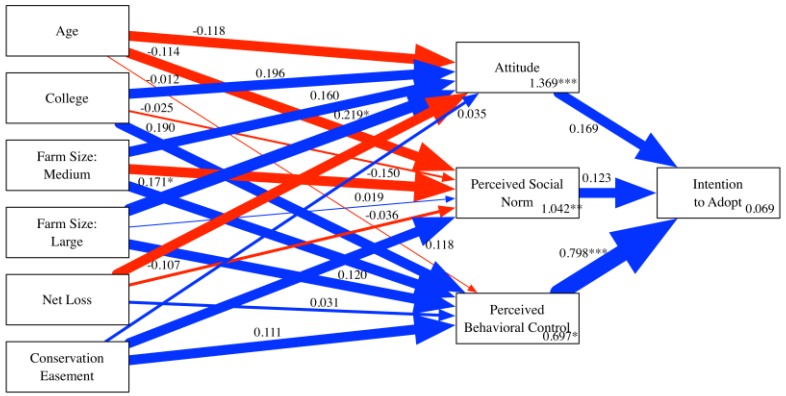

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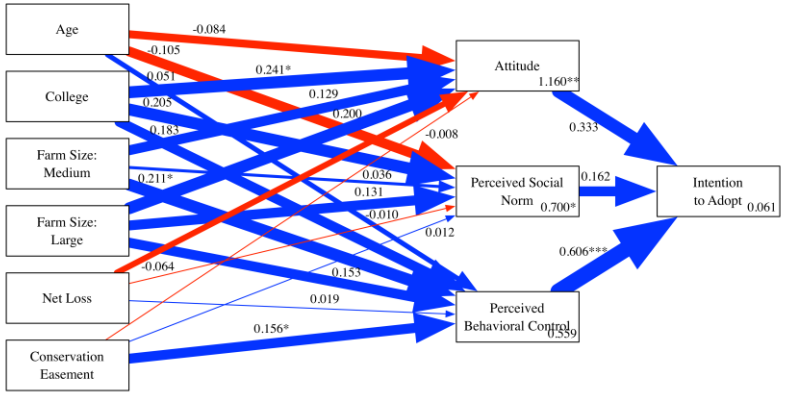

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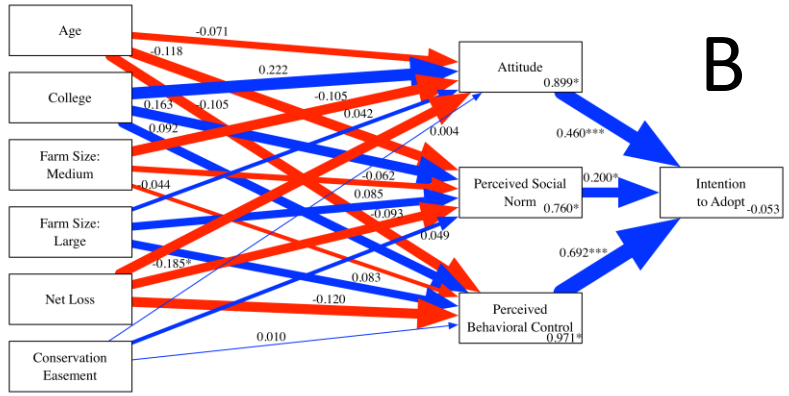

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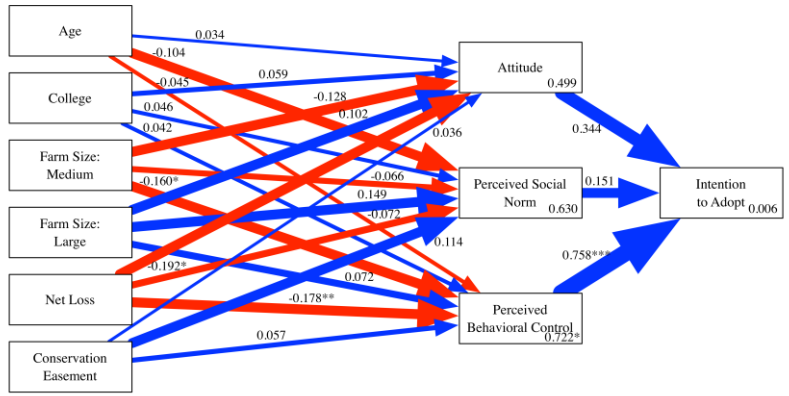

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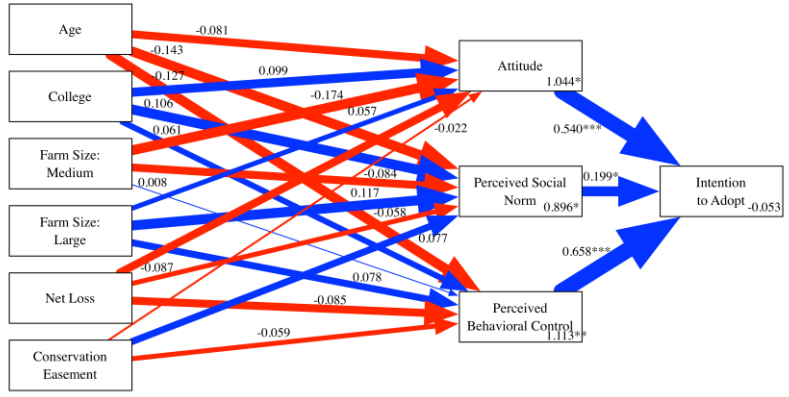

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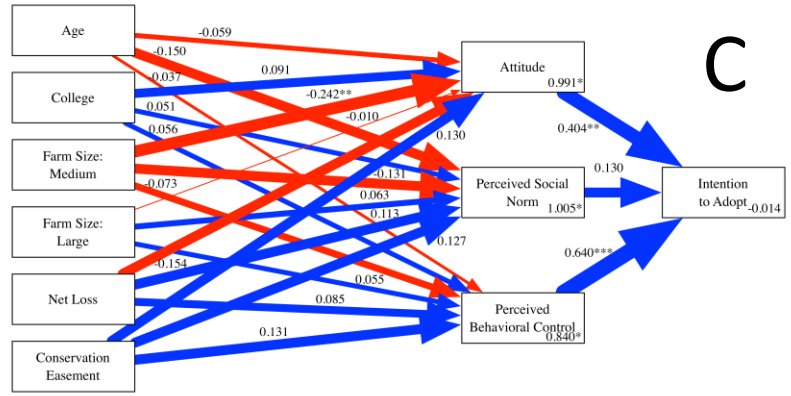
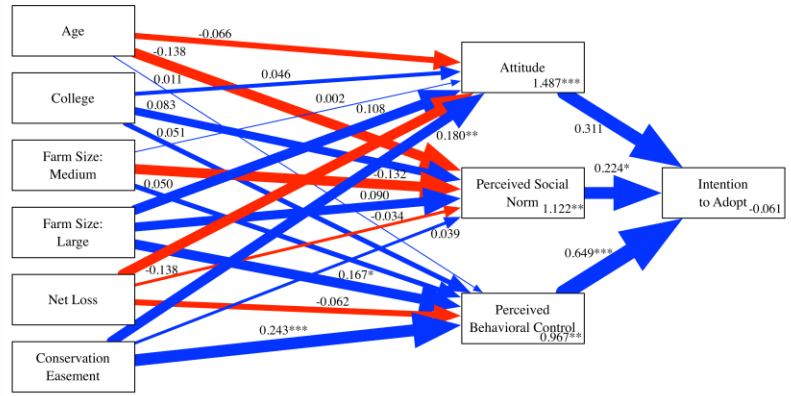
** p < 0.005
*** p < 0.001



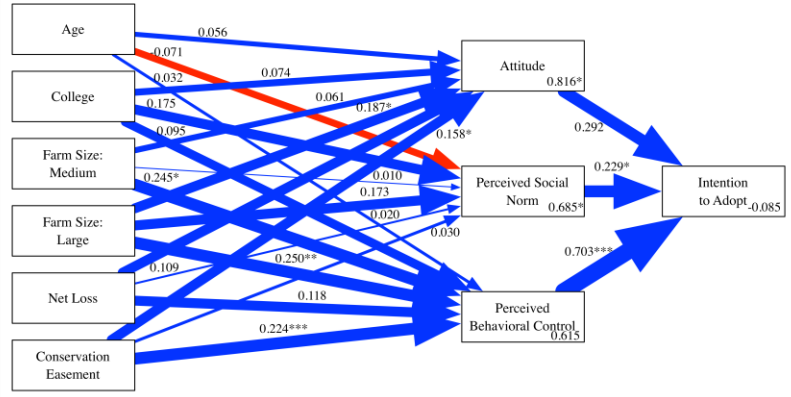
a) Reduced Tillage

* p < 0.05
** p < 0.005
*** p < 0.001



b) Conservation Buffers

* p < 0.05
** p < 0.005
*** p < 0.001



c) Manure Setbacks

* p < 0.05
** p < 0.005
*** p < 0.001

FIVE High Level Take Aways

1: ***Perceived Behavioral Control*** is the **largest and statistically significant** driver of farm intention to adopt for *all* BMPs measured.

2. Holding a ***Conservation Easement*** is a **statistically significant** (x4 BMPs) **positive** influence on ***Perceived Behavioral Control***.

3. Being a ***Large Farm*** and having a ***College Education*** each have a **positive** influence on adoption.

4. Experiencing a ***Net Loss*** in the last three years each have a **negative** influence on ***Attitude*** about all BMPs

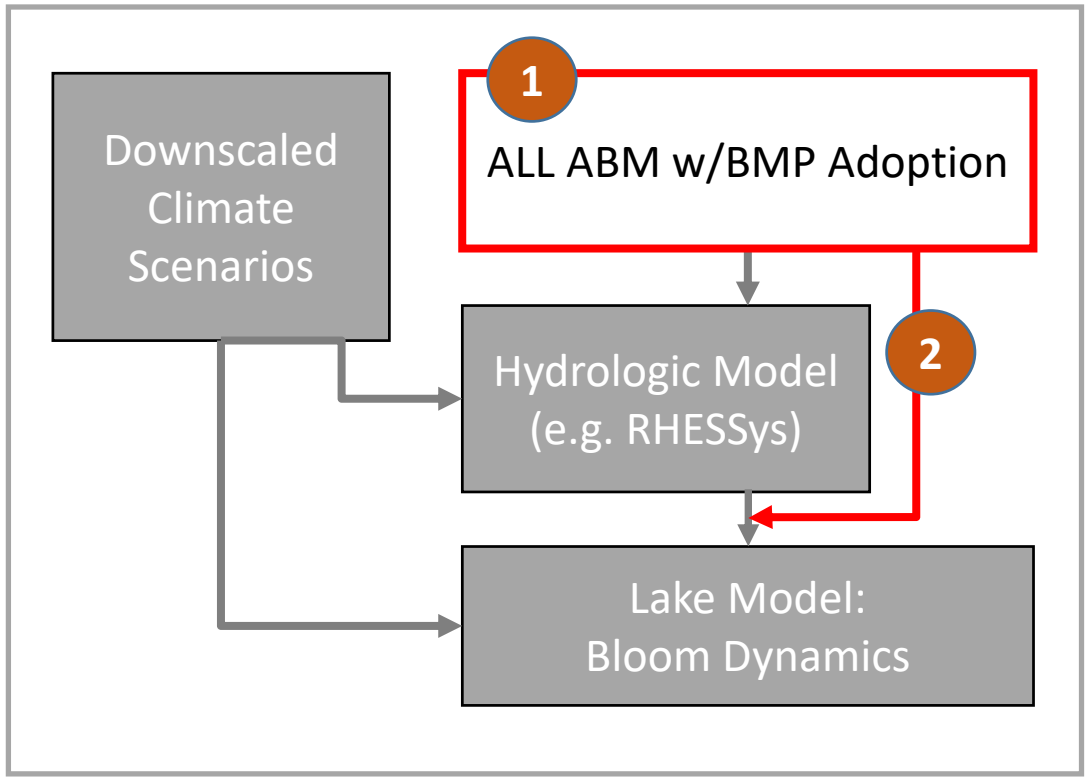
5. Increased ***Age*** has a **negative** impact on Perceived Social Norms around BMP adoption.

Two General Observations

1: Cropping practices (x3) have similar patterns of influence

2: **Manure Setbacks BMP** has different pattern of influence compared to all the other BMPs measured

IAM Model Cascade



Major model changes:

1. BMP Adoption
2. Downstream impact of BMP adoption in lake nutrient loading

Questions

The University of Vermont