Early loss of normal body weight in multiethnic US populations

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Disclosures

We have no relevant relationships to disclose.
Early Transitions to Overweight and Obesity in Minority Populations

• 69% of American adults are overweight or obese
  – Greatest burden among African Americans (82%), American Indians (83%), and Hispanic/Latinos (77%).

• Minority groups may transition away from normal weight at younger ages.

• Few studies evaluated weight transitions across life course using multi-ethnic, contemporary data.
Overweight and Obesity Transitions: State of the Literature To-Date

• Longitudinal designs leveraging non-contemporary data with narrow age ranges
  – Generalizable to present day?
    • Overweight and obesity secular trends
    • Demographic shifts
  – Estimated transitions across narrowly defined ages.
    • Are there “at-risk” age epochs?
Overweight and Obesity Transitions: State of the Literature To-Date

• Longitudinal designs leveraging non-contemporary data with narrow age ranges
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Are there any potential compromises?
Net Transitions

• Markov-type model used in operations research
• Offers a compromise: estimation of net transitions from cross-sectional data given assumptions are satisfied:
  – Transitions remain stable across time
• Estimation of individual transitions would require longitudinal data.

Kassteele et al., 2012
Net Transitions: Longitudinal Data Example

2014

Normal weight
N=100

Overweight
N=100
Net Transitions: Longitudinal Data Example

2015

Normal weight
N=94

Overweight
N=106
Net Transitions: Longitudinal Data Example

Normal weight
N=94

2015

Overweight
N=106
Net Transitions: Longitudinal Data Example

Net movement:
• A net $8 - 2 = 6$ people transition from normal weight to overweight.
Net Transitions: Longitudinal Data Example

Net movement:
- A net $8 - 2 = 6$ people transition from normal weight to overweight.
- The net transitions from overweight to normal weight = 0.
Net Transitions: Longitudinal Data Example

Net transition probability: 6/100 or 6%.
Net Transitions: Longitudinal Data Example

We can use cross-sectional data to validly estimate net transitions under the assumption that transitions remain stable over time. Estimation of individual transitions requires longitudinal data.
Objective

Estimate race/ethnic, sex- and age-specific (18-75) weight category 1-year net transitions in multi-ethnic populations:

– American Indians
– African Americans
– Hispanic/Latinos
– European Americans
## Cross-Sectional Data Sources and Measurements

<table>
<thead>
<tr>
<th>Study</th>
<th>N</th>
<th>Race/ethnic population</th>
<th>Years data collected</th>
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</thead>
<tbody>
<tr>
<td>National Health and Nutrition Examination Survey</td>
<td>11,901</td>
<td>African American/European American</td>
<td>2007-12 (3 waves)</td>
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<tr>
<td>Strong Heart Family Study</td>
<td>3,365</td>
<td>American Indian</td>
<td>2001-03 (phase IV)</td>
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<td>Hispanic Community Health Study/Study of Latinos</td>
<td>16,332</td>
<td>Hispanic/Latino</td>
<td>2008-11 (baseline)</td>
</tr>
</tbody>
</table>

- **Outcome**: BMI-classified weight categories
  - Growth curves used for populations <20 years
<table>
<thead>
<tr>
<th>Race/ethnicity</th>
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## Participant Demographics By Race/Ethnicity and Sex

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**Age 18:** 49-73% of participants classified as normal weight.
American Indian Females: Normal Weight-Overweight Net Transitions

1-year net transition probability (95% CI)
American Indian Females: Normal Weight-Overweight Net Transitions

Age 18: 6.0% (5.1, 6.9%)
American Indian Females: Normal Weight-Overweight Net Transitions

Interpretation: Among normal weight American Indian females aged 18 years, a net 6.0% transitioned to overweight one year later.
Race/Ethnic and Sex-Specific Normal Weight-Overweight Net Transitions

American Indians  African Americans  European Americans  Hispanic/Latinos

1-year net transition probability (95% CI)

Age
Race/Ethnic and Sex-Specific Normal Weight-Overweight Net Transitions

American Indians  African Americans  European Americans  Hispanic/Latinos

Males

Females

1-year net transition probability (95% CI)

Age

23
Consistent Patterning of Normal Weight-Overweight Net Transitions

American Indians    African Americans    European Americans    Hispanic/Latinos

Males

Females

1-year net transition probability (95% CI)

Age
Normal Weight-Overweight Net Transitions Peak at Different Ages

Peak at ~20 years

American Indians  African Americans  European Americans  Hispanic/Latinos

1-year net transition probability (95% CI)

Age
Normal Weight-Overweight Net Transitions Peak at Different Ages

- Peak at ~20 years
- Peak at ~30 years

- American Indians
- African Americans
- European Americans
- Hispanic/Latinos

Age

1-year net transition probability (95% CI)
Race/Ethnic and Sex-Specific Overweight to Obesity Net Transitions

American Indians  African Americans  European Americans  Hispanic/Latinos

Females

1-year net transition probability (95% CI)

Males

1-year net transition probability (95% CI)
Overweight to Obesity Net
Transitions Peaked at 18 Years

American Indians  African Americans  European Americans  Hispanic/Latinos

Males

Females

1-year net transition probability (95% CI)
Overweight to Obesity Net Transitions Peaked at 18 Years

American Indians  African Americans  European Americans  Hispanic/Latinos

Age 18: 10.6% (7.0, 14.2%)
Overweight to Obesity Net Transitions Peaked at 18 Years

American Indians  | African Americans  | European Americans  | Hispanic/Latinos

Females

1-year net transition probability (95% CI)

Age 18: 10.6% (7.0, 14.2%)  
Age 18: 5.6% (4.1, 7.2%)
Key Modeling Assumption: Transition Stability Over Time

• Assumption evaluated using NHANES data:
  – 2007-2008, 2009-10, and 2011-12 waves

• Key steps:
  – Calculate normal weight, overweight, and obesity prevalence in 2009-10 and 2011-12 (observed)
  – Use 2007-08 net transitions to project normal weight, overweight, and obesity prevalence in 2009-10 and 2011-12 (estimated)
Overlapping Observed and Estimated Prevalence Proportions Suggest Stability

**Observed** normal weight prevalence, 2011-12

**Estimated** normal weight prevalence (2007-08 data)
Study Limitations

• Generalizability of results?
• Secular changes in obesity environment?
• Key modeling assumptions only evaluated in NHANES data.
Conclusions

- Until middle-age, net transitions favored movement towards overweight and obesity.
  - Disparities in net transitions already apparent at age 18
- Population-specific targeting of programs to promote normal weight among American Indian, African American female, and Hispanic/Latino adolescents warranted.
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