

Social networks of adolescents with ADHD

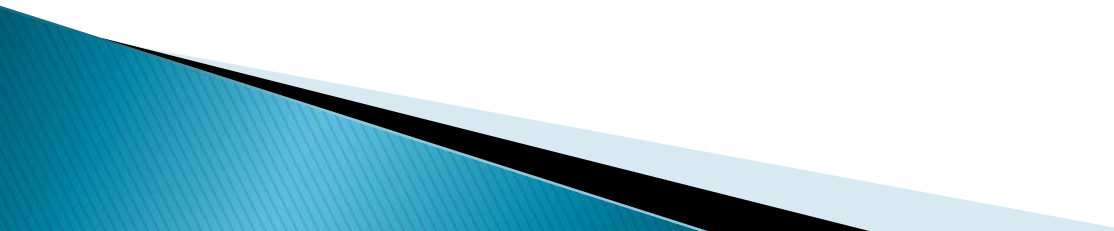
Barbara Wise, PhD, RN, FNP-BC



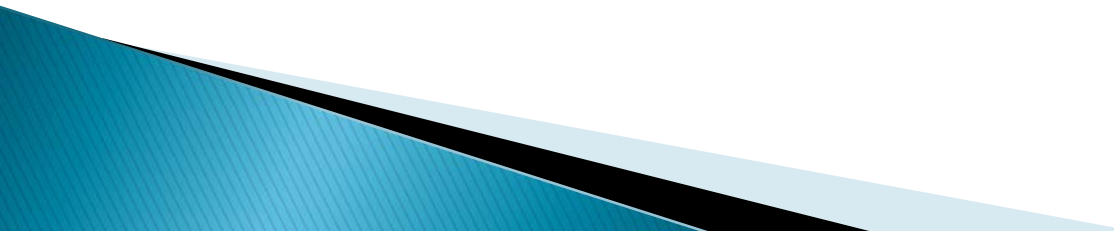
“But if I take my medicine I’ll sit in class quietly and do my work and get good grades...

I won’t have any friends.”

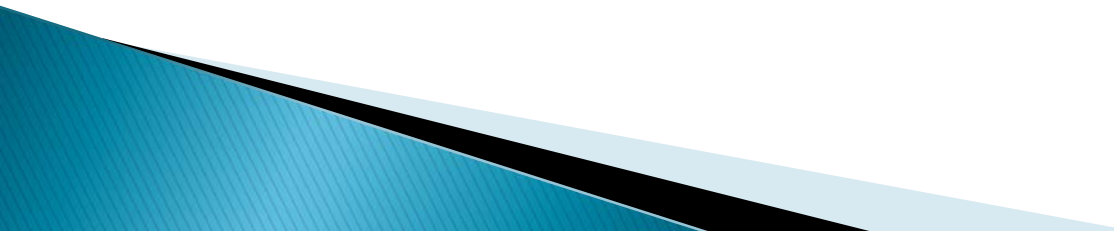
Jeremy, aged 14, explaining why he doesn’t want to take medications for his ADHD



Introduction

- ▶ ADHD prevalence 4 – 8% of US children
 - ▶ Most common chronic mental health disorder of school aged children, one of the most chronic health disorders (AAP, 2011; AACAP, 2007)
 - ▶ Prevalence in adults estimated at 4.5% (Barkley, 2014)
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Childhood peer relationships

- ▶ Peer relationships are the contexts in which children learn cooperation, negotiation and conflict resolution (Hoza, 2007).
 - ▶ It is theorized that peer rejection limits social opportunities, which impairs the development of social skills, leading to further peer rejection (Murray–Close et al., 2010).
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ADHD and peer problems

- ▶ Rated lower by other children on social preference
- ▶ less well liked (less than 1% in the popular category in one large study)
- ▶ more often rejected (50–80%)
- ▶ more likely to be designated “non-friends”
- ▶ fewer reciprocal friendships: up to 70% of children with ADHD have no close friends by third grade
- ▶ More likely to bully and be bullied

(McQuade & Hoza, 2015)

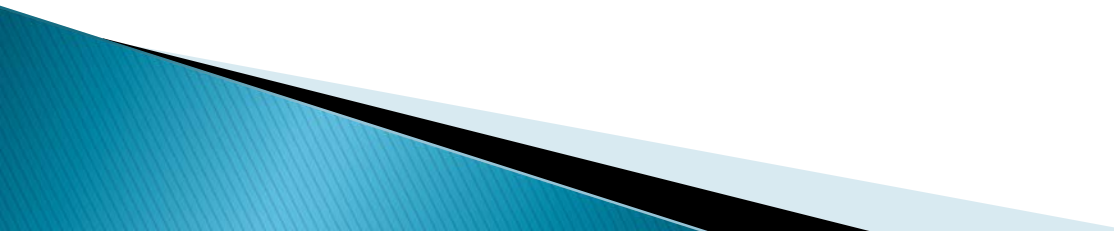
Childhood peer problems among those with ADHD: known later consequences

- ▶ anxiety
- ▶ depression
- ▶ substance abuse
- ▶ eating pathology
- ▶ delinquency
- ▶ dropping out of school
- ▶ global impairments

(McQuade & Hoza, 2015)



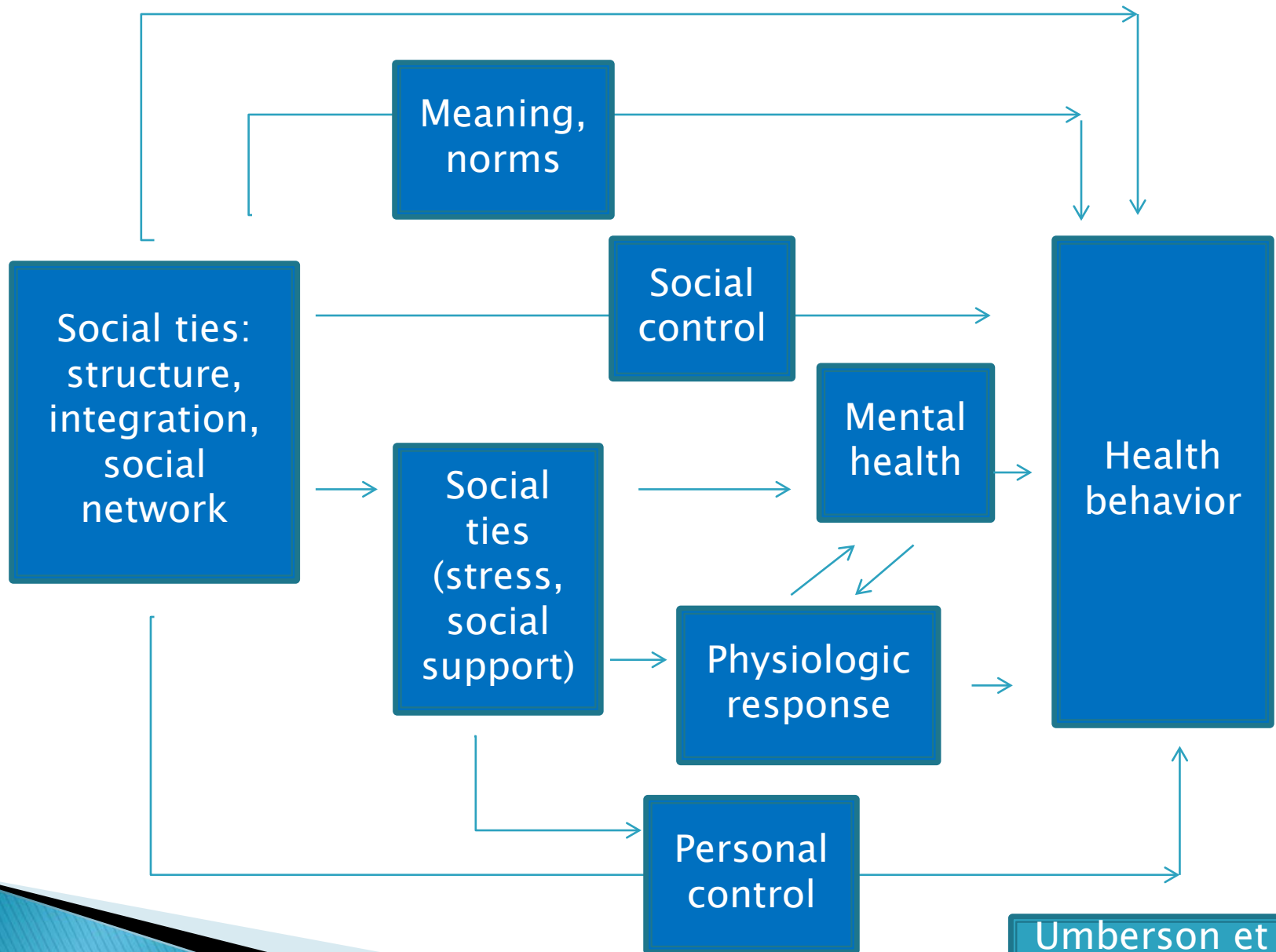
Why this study?

- ▶ Most studies about peer relationships among those with ADHD are elementary school studies, few about adolescents with ADHD; those that did ended with age 14.
 - ▶ Almost no social network analysis of adolescents with ADHD
 - ▶ Add Health database contains social network data that has not been explored for this population
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Theoretical framework: mechanisms linking social ties to health behaviors

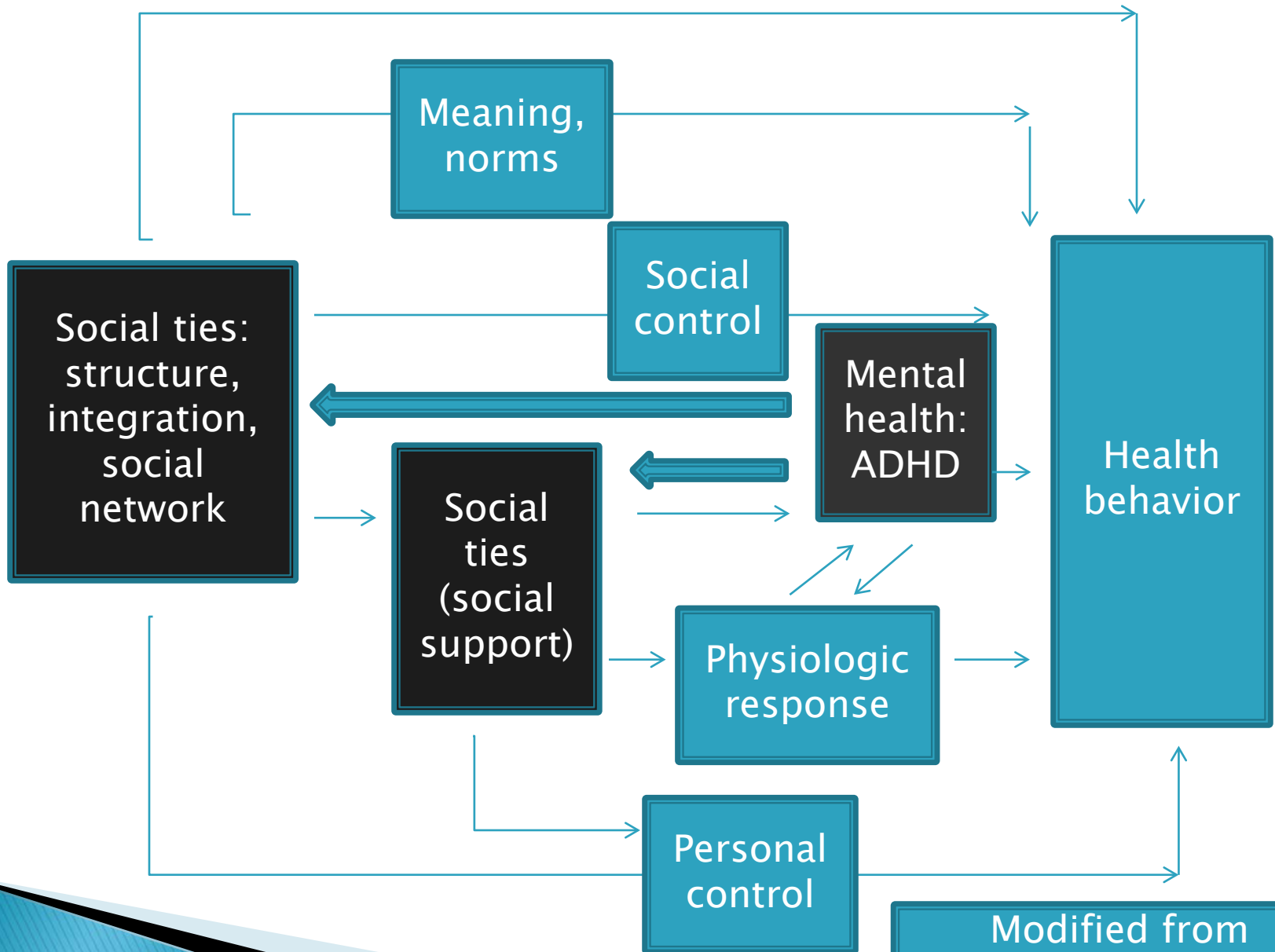
- ▶ **social networks:** the structural linkages between an individual and his/her network
- ▶ **social integration:** the presence, quantity, and frequency of contact with social ties.
- ▶ This study operationalizes structural linkages and integration as
 - social network variables
- ▶ Social integration is operationalized as
 - In-degree, out-degree
 - frequency of contact with ties

Mechanisms linking social ties to health behaviors



Umberson et al,
2010

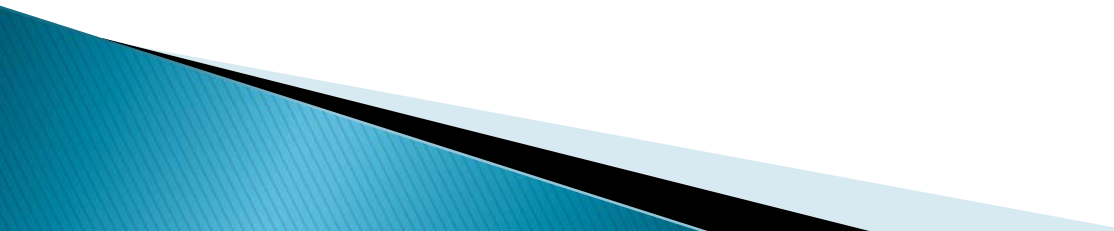
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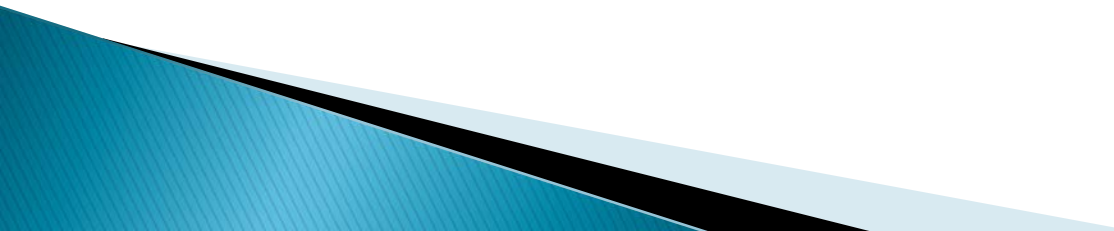
Modified from
Umberson et al., 2010

Aim

Examine the social networks and social support of adolescents with ADHD symptoms in a large nationally representative population based sample



Research questions

1. How do adolescents with ADHD compare with adolescents without ADHD on measures of social networks and social support?
 2. Are there differences in these measures among the ADHD subtypes of inattentive, hyperactive, and combined?
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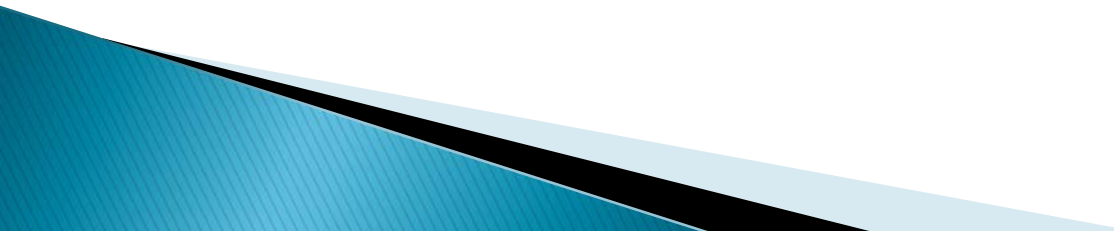
Add Health social network data

- ▶ Nationally representative longitudinal complex survey of youth in grades 7–12, 122 high schools and over 90,000 participants in wave I, initially sampled 1994–5. Waves II and III conducted on a subsample, one and 5 years later, 15,000 in wave III.
- ▶ Wide variety of behavioral, family, friendship and other questions, including friendship nominations
- ▶ 5 male 5 female nominations possible
- ▶ Suite of pre-constructed network variables made available, but only available for certain schools

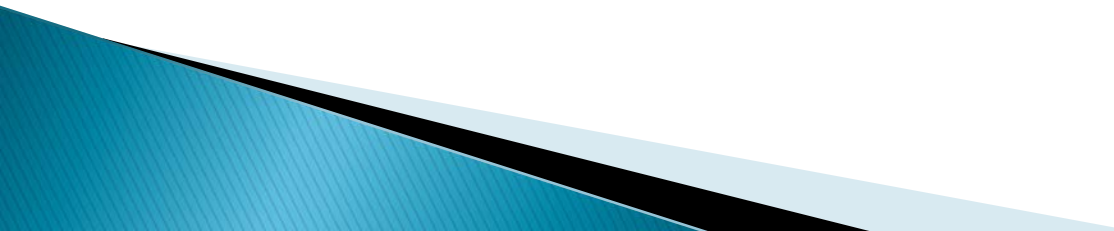
Variables

- ▶ Independent variable: ADHD symptoms
 - Retrospective ADHD symptom questionnaire was included in Wave III
 - Questions same as DSM III–R except for one of the hyperactivity questions which was replaced with a question that was not part of the instrument; participants asked if they had any of these behaviors between the ages of 6 and 12
 - Answers dichotomized into often/very often=1 and sometimes/never=0

ADHD variable

- ▶ Diagnostic guidelines require 6 of 9 questions be positive, either in the inattentive or hyperactive subscale.
 - ▶ For ADHD combined, criteria must be met for both
 - ▶ If 3 or more answers missing on either scale, respondent coded as missing
 - ▶ ADHD inattentive, hyperactive and combined based on meeting diagnostic cutoffs
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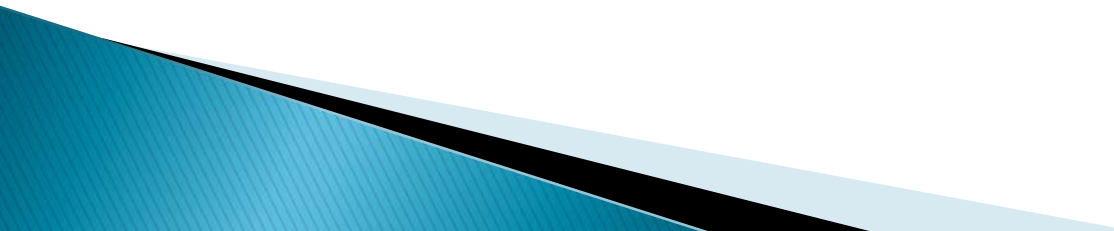
Control variables: demographic

- ▶ Grade
 - ▶ Race
 - ▶ Gender
 - ▶ Residential instability: if less than one year in current residence
 - ▶ Parental education
- 

Control variables: comorbidities

- ▶ Depression score
- ▶ Conduct disorder score

Control variables: school level

- ▶ Density of school social network:
Number of actual ties in the total friendship network divided by the number of possible ties in the total friendship network
 - ▶ Closely related to size of school, so size not included in models
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Isolates and pendants

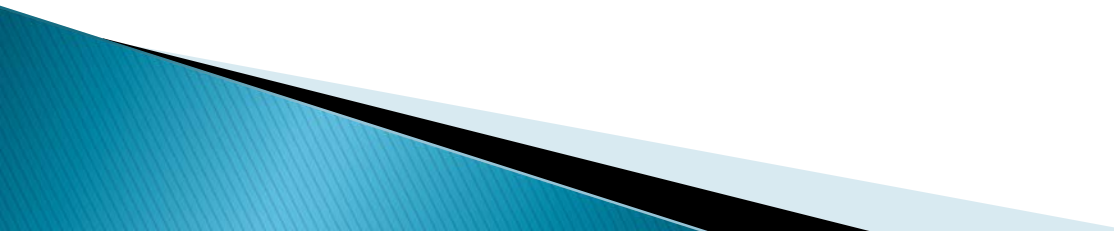
- ▶ Isolates: if $\text{out-degree}=0$ and $\text{in-degree}=0$
Could have nominated friends outside the school
- ▶ Pendants: either $\text{in-degree}=0$ and $\text{out-degree}=1$ or visa versa
- ▶ Isolates not included in the analysis for network measures, but included in non-network-based dependent variables.
Pendants were included in some social network measures but not others

Dependent variables

- ▶ Perceived social acceptance
- ▶ Strength of ties
- ▶ Extracurricular activity participation
- ▶ One reciprocated friendship*
- ▶ Social network measures (described in following slides)*
 - In-degree
 - Out-degree
 - Bonacich's centrality
 - Reach
 - 3-step reach

***Pre-constructed measures**

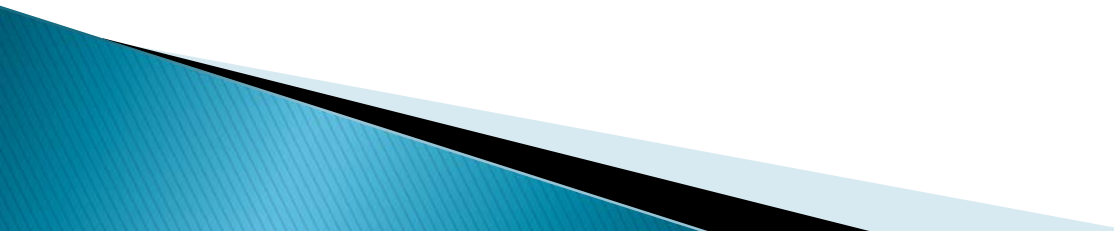
Perceived social acceptance

- ▶ Perceived social acceptance– “I feel socially accepted.”
 - ▶ Choices: 1=strongly agree, 2=agree, 3=neither agree nor disagree, 4=disagree, 5=strongly disagree
 - ▶ Higher number means less accepted
- 

Strength of ties

- ▶ In the past week have you:
 - gone to their house,
 - hung out after school,
 - talked on the phone,
 - spent time over weekend,
 - talked to them about a problem (yes/no)
- ▶ Asked for each friend (5 possible)
- ▶ I utilized only same gender friends
- ▶ Scores summed and divided by number of same gender friends to produce average score

Extracurricular activities

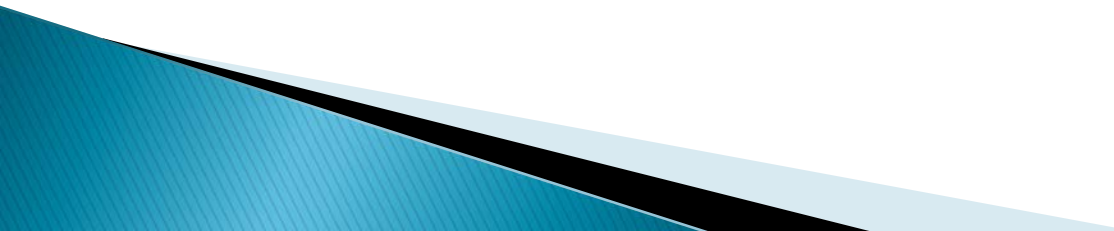
- ▶ **Number of extracurricular activities.** Students checked their extracurricular involvements from of a list of 33 options. This variable simply summed them.
 - ▶ **Type of extracurricular activities.** Categorized into academic, sports and arts, following the categorization used by several other studies in Add health.
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One reciprocated friendship

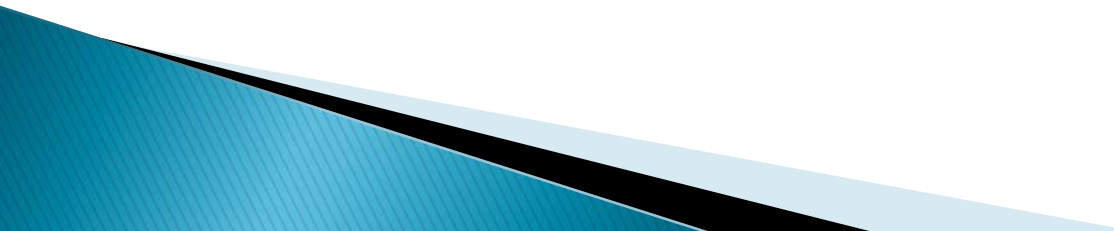
1. Yes/no: the person a student nominated as best friend nominated that student as a friend

- ▶ If the respondent did not nominate a best friend, counted as missing

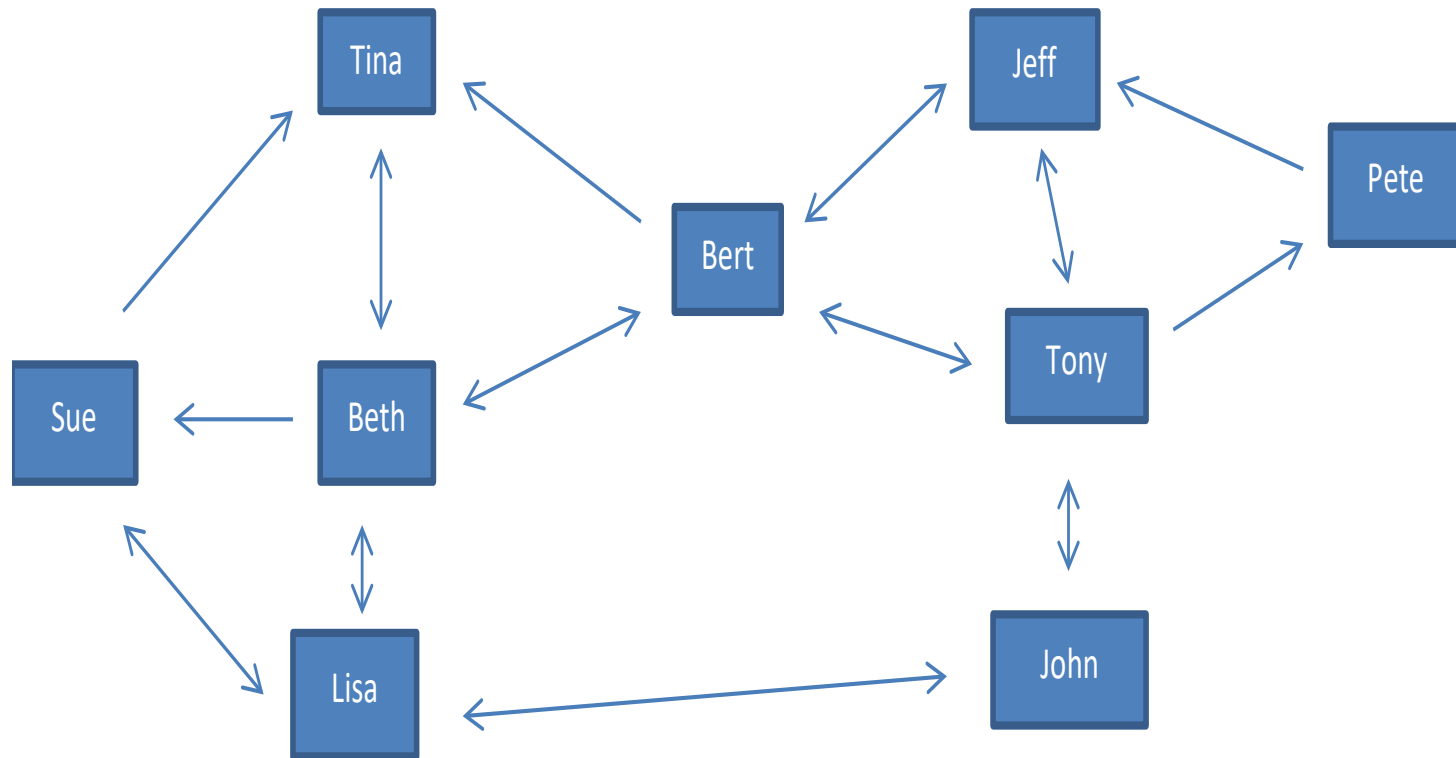
In-degree and out-degree

- ▶ **In-degree:** Number of nominations a student receives from others in their school or a “sister school”; also known as popularity
 - ▶ **Out-degree:** Number of nominations a student makes in their school or sister school
- 

Degree based network measures

- ▶ Bonacich centrality: The out-degree of the respondent, weighted by the out-degree of those to whom he/she sends ties and the out-degree of those to whom they send ties.
 - ▶ Reach: maximum number of others a student can reach in the total friendship network
 - ▶ 3 step reach: number of others a student can reach in 3 steps
 - ▶ In both cases if out-degree=0, centrality and reach= 0
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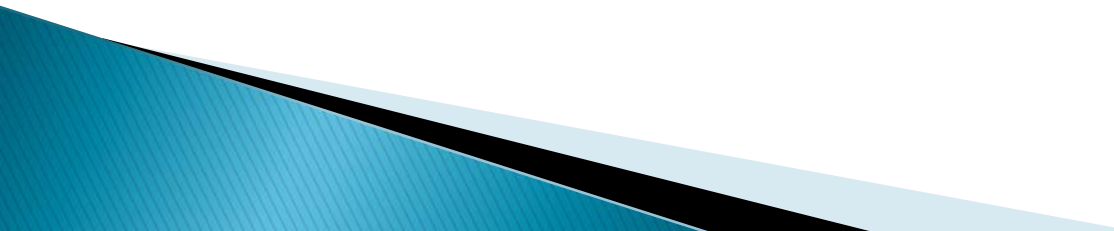
Example social network



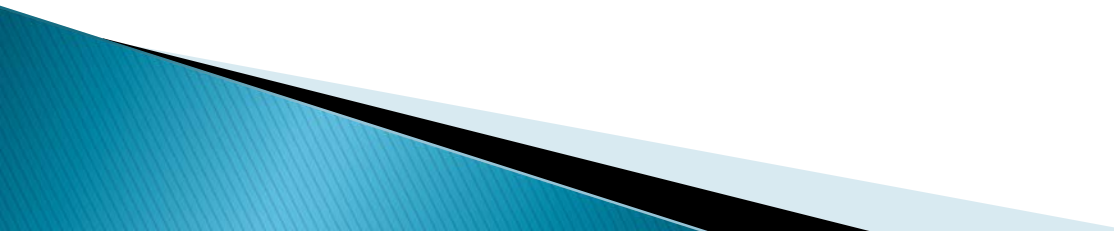
Results: sample

- ▶ Sampling frame: participated in wave I in-home interviews and had sampling weights ($N = 20,745$), participated in the wave III in-home interviews ($n = 15,197$), completed the ADHD scale ($N = 15,180$), had valid nomination data on social network measures in the pre-constructed Add Health variable ($N = 10,571$), and had at least one social tie in the school or sister school ($N = 10,217$).
- ▶ Missing data: Complete case analysis used, led to analytic sample size of 9626.

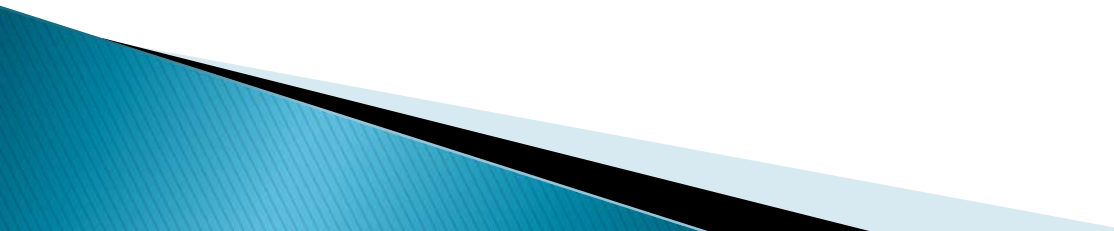
Sample: ADHD

- ▶ 225 scoring in the diagnostic range for ADHD inattentive
 - ▶ 286 for ADHD hyperactive
 - ▶ 192 for ADHD combined
 - ▶ 703, or 7.3% of the analytic sample for any type of ADHD
 - ▶ Consistent with other population based studies
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Sample: those with ADHD were

- ▶ More likely to be male & white
 - ▶ Had higher scores on depression and conduct disorder scales
 - ▶ Consistent with other studies
 - ▶ No difference in age, parental education or residential stability
 - ▶ Likely to attend a smaller school with higher social density (probably race related)
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Isolates were

- ▶ More likely to be a poor, male, black or Asian, have moved in the past year, and be in a school with less dense social networks than non-isolates.
 - ▶ Among those without ADHD, 3.5% isolates.
 - ▶ Among those with ADHD overall, 5% isolates
 - ▶ Inattentive = 5%, Hyperactive = 3.3%, Combined = 6%.
 - ▶ Differences were non-significant.
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Pendants

- ▶ $129/2737=4.5\%$ in analytic sample
- ▶ $11/222=5\%$ in ADHD group
- ▶ Non-significant difference

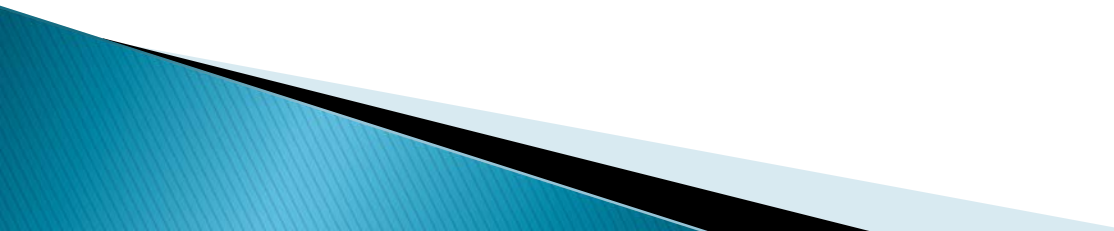
Results

	Social acceptance	Strength of ties males	Strength of ties females	Extra-curricular activities	One reciprocated friendship
ADHD inattentive	$p < .001$ 18% less accepted	ns	ns	ns	ns
ADHD hyperactive-impulsive	$p < .001$ 13% less accepted	$p < .001$ 15%↑	ns	ns	ns
ADHD combined	ns	ns	ns	ns	ns

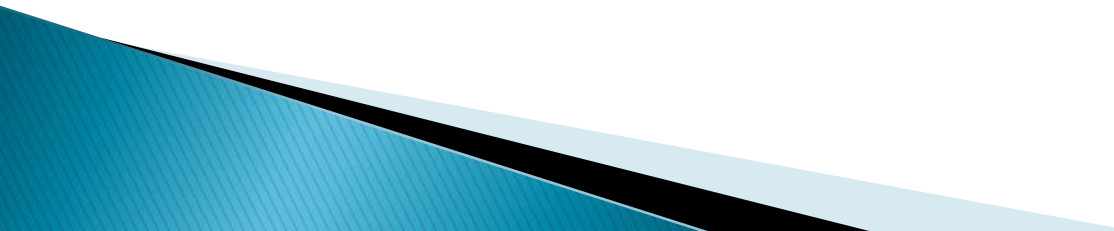
Social network measures

	In-degree (popularity)	Out-degree	Bonacich centrality	Reach	3 step Reach
ADHD inattentive	ns	p<.01 30%↓	p<.01 28%↓	P<.05 15%↓	p<.01 25%↓
ADHD hyperactive /impulsive	ns	ns	ns	ns	ns
ADHD combined	ns	ns	ns	ns	ns

In summary, compared to those without ADHD, those with ADHD were

- ▶ No more likely to be isolates or pendants (to have no or only one social tie)
 - ▶ Similar strengths of ties with their friends
 - ▶ No differences in popularity
 - ▶ No differences in overall extracurricular activity involvement
 - ▶ Overall, less social difficulties than expected based on previous studies
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Those with ADHD

- ▶ Self-reported significantly less social acceptance. Consistent with other research.
 - ▶ Those with inattentive ADHD reported fewer friends on average and had lower centrality and reach.
- 


Comparison to previous research

- ▶ Previous research
- ▶ Much less likely to have one mutual friend
- ▶ Friendship quality lower (except one study)
- ▶ Lower in-degree
- ▶ Less socially accepted
- ▶ No evidence about social network position
- ▶ This study
- ▶ No difference in having one mutual friend
- ▶ No difference in friendship quality
- ▶ No difference in in-degree
- ▶ Less socially accepted
- ▶ Inattentive only less central with less reach

Discussion

- ▶ If adolescents no differences in popularity or quality of friendships, why do they report being less socially accepted?
 - Social acceptance may mean prestige rather than popularity to adolescents (Borgatti, Everett, & Johnson, 2013)
 - ?part of rejected or lower status social groups?
 - ?lagged effect from childhood rejection?
 - Related to being depressed or anxious?
- ▶ Why is inattentive ADHD lower on out-degree based social network measures?
 - More likely to be girls
 - Lack social confidence?

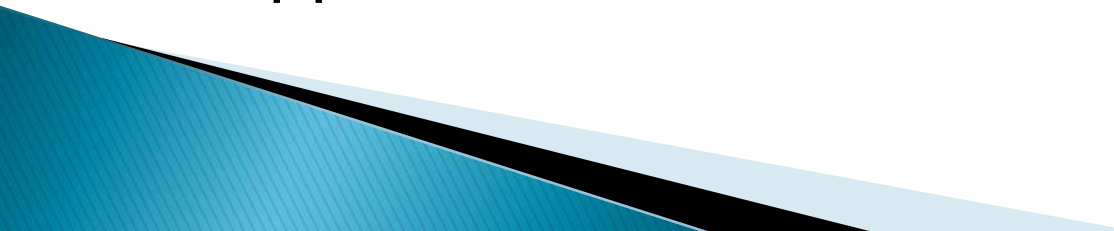
Discussion

- Why less social difficulties than previously reported?
 - Whole social network compared to other studies
 - Older sample:
 - “growing out of” their social difficulties?
 - greater variety of social groups to join in older grades?
 - more tolerance for deviance from the norm in high school compared to younger grades?
 - Community based (non-clinical) sample (generally more externalizing behaviors in clinical samples)
 - Upper limit on nominations
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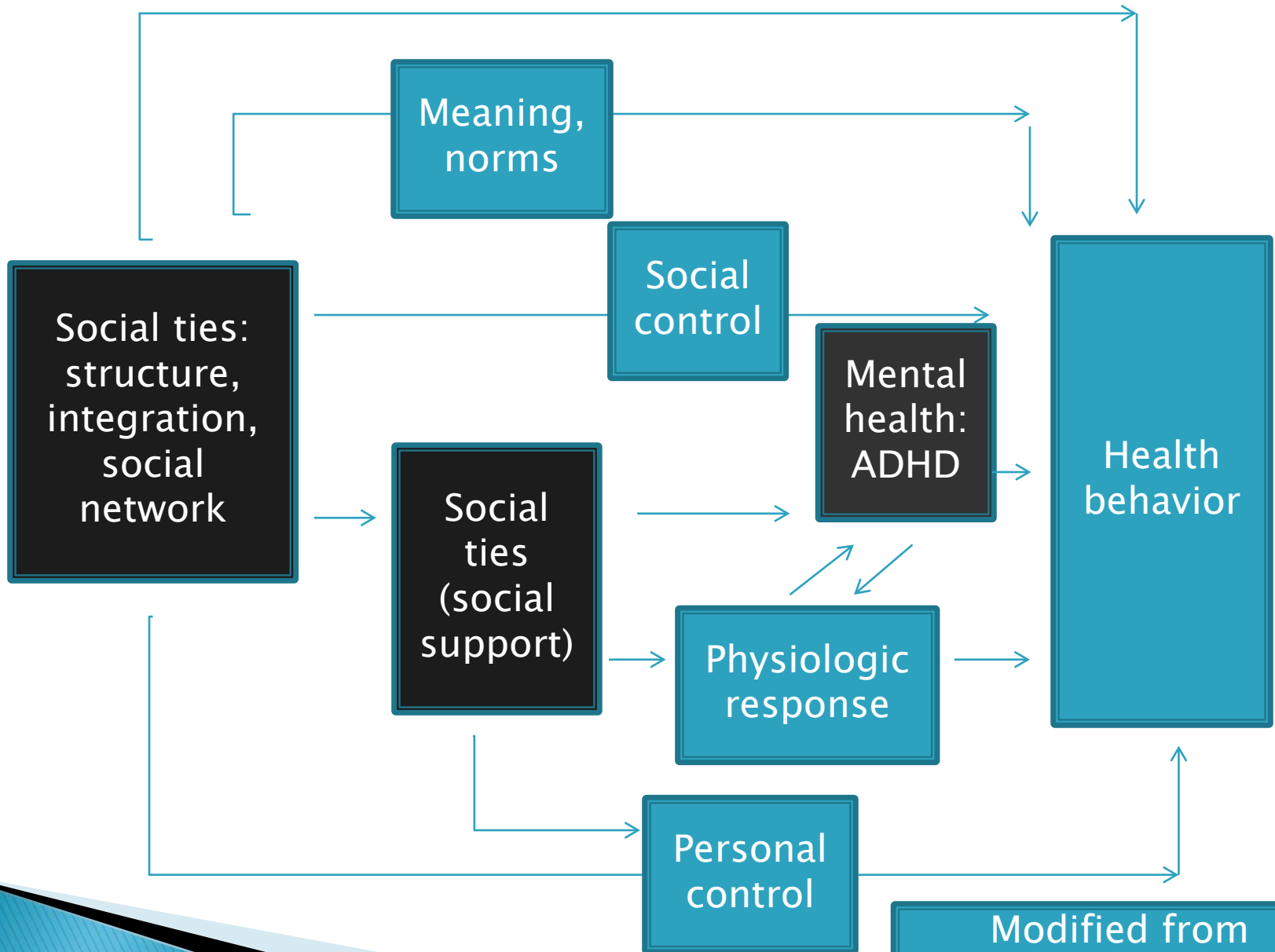
Clinical implications

- ▶ Anticipatory guidance
- ▶ Strengths based approach
- ▶ Implications for interventions

Theoretical implications

- ▶ The theory guided the study and interpretation; this study was not intended to test the theory
 - ▶ Based on this study, social network and social support characteristics among adolescents with ADHD in general are not significantly different than among other adolescents
 - ▶ This suggests that methods for influencing health behaviors among those with ADHD may not need to be different than for other adolescents based on social network and social support differences
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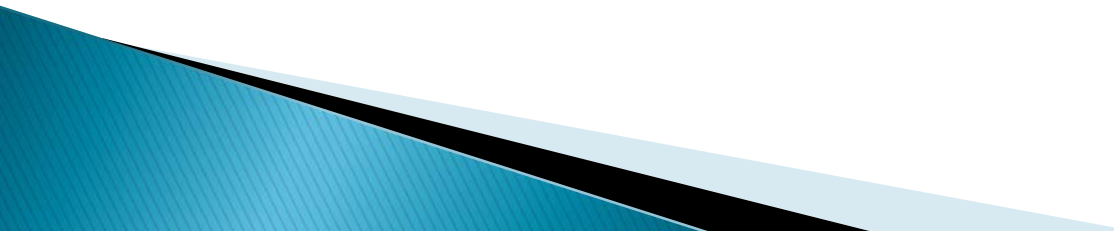


Modified from
Umberson et al., 2010


Research implications for adolescents with ADHD

- ▶ quantify to what extent friendship network position, composition, and characteristics of members predict health behaviors and academic and career success
- ▶ explore the effects of comorbidities on social networks
- ▶ explore specific environmental factors that might be associated with better social outcomes, such as the size of the school and participation in specific types of extracurricular and social activities.
- ▶ Identify adolescents at highest risk in need of intervention to prevent health risks

Longer term

- ▶ Perhaps a qualitative study to identify if there is a trajectory of social development in ADHD that differs in some way from those without ADHD
 - ▶ Ultimate goal is an effective intervention among those with the most problems, and to identify who would most benefit from such an intervention
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Strengths and limitations

- ▶ Largest population based representative sample examining the social position of adolescents with ADHD to date, and the only one describing specific social network characteristics.
 - ▶ Limitations include the age of the data, the lack of longitudinal whole network data, and the self-reported nature of the ADHD symptoms.
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