

Association between prior Toxic Stressors and development of T2DM in Adolescents



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BACKGROUND

- Chronic stress can activate the hypothalamic–pituitary–adrenal (HPA) axis and the innate immune system, resulting in increased cortisol and cytokines that might be involved in mediating insulin resistance and T2DM pathogenesis¹.
- Psychosocial stress may contribute to unhealthy lifestyle behaviors² that are known risk factors for T2DM.
- Low stress resilience in late adolescence and psychosocial traumatic events in childhood are linked to a higher risk of developing chronic disease, including T2DM, in adulthood³.
- The Adverse Childhood Experience (ACE) study revealed a higher risk for chronic disease in adulthood, including T2DM, in participants endorsing ≥ 4 ACEs compared with participants endorsing 0 ACEs³.
- The ACE questionnaire is a reliable, valid and economic screen for the retrospective assessment of adverse childhood experiences⁴.
- Limited data about the relationship of stressful events to the risk of developing T2DM in children, adolescents or young adults, is available.

OBJECTIVE

- To assess the association of prior toxic stressors and development of T2DM in adolescence.

METHODS

- Prospective case-control, IRB-approved study, started in November 2016.
- Eligible participants: males and females aged 15 to 21 years.
- Cases: diagnosed with T2DM using the ADA criteria no later than 6 mo. prior to enrollment.
- Controls: BMI z-score ≥ 1.5, no T2DM, presented to weight management clinic no later than 6 mo. prior to enrollment.
- Informed consent was obtained by the participants or both guardians for minors: onsite social worker was required upon completion of the questionnaire.
- A sample of 90 subjects (30 cases and 60 controls) was the enrollment goal.
- The ACE questionnaire was used to evaluate prior exposure to stress events.
- A score from 0 to 10 was used to quantify prior exposure to the 10 types of stressors.
- Data on medical history, demographics and clinical outcomes (A1c, BMI) was obtained by self-report and chart review.

ACE Questionnaire

Prior to your 18 th birthday?	No	Yes
1. Did a parent or other adult in the household often or very often...swear at you, insult you, put you down, or humiliate you? or act in a way that made you afraid that you might be physically hurt?	0	1
2. Did a parent or other adult in the household often or very often...push, grab, slap, or throw something at you? or ever hit you so hard that you had marks or were injured?	0	1
3. Did an adult in your household at least 5 years older than you ever...touch or fondle you or have you touch their body in a sexual way? or attempt to actually have sexual intercourse with you?	0	1
4. Did you often or very often feel that...no one in your family loved you or thought you were important or special? or your family didn't look out for each other, feel close to each other, or support each other?	0	1
5. Did you often or very often feel that...you didn't have enough to eat, had to wear dirty clothes, and had no one to protect you? or your parents were too drunk or high to take care of you or take you to the doctor if you needed it?	0	1
6. Was a biological parent ever lost to you through divorce, abandonment, or other reason?	0	1
7. Was your mother or stepmother often or very often pushed, grabbed, slapped, or had something thrown at her? or sometimes, often, or very often kicked, bitten, hit with a fist, or hit with something hard? or ever repeatedly hit or threatened with a gun or knife?	0	1
8. Did you live with anyone who was a problem drinker or alcoholic, or who used street drugs?	0	1
9. Was a household member depressed or mentally ill, or did a household member attempt suicide?	0	1
10. Did a household member go to prison?	0	1

RESULTS

- To date,
 - Approached: 33 cases and 32 controls.
 - Enrolled: 8 cases (24%) and 8 controls (25%).
 - Cases: age 15.2-20.2 years, BMI z-score range 1.15-2.69, A1c range 6.3%-14.3%.
 - Controls: age 15.8-20.5 years, BMI z-score range 2.08- 2.81.
 - Reasons for not enrolling in the study include:
 - Inability to consent both guardians (for minors).
 - Lack of social worker on site during completion of the questionnaire.
 - Refusal of guardian to have child participate after reading the questionnaire.

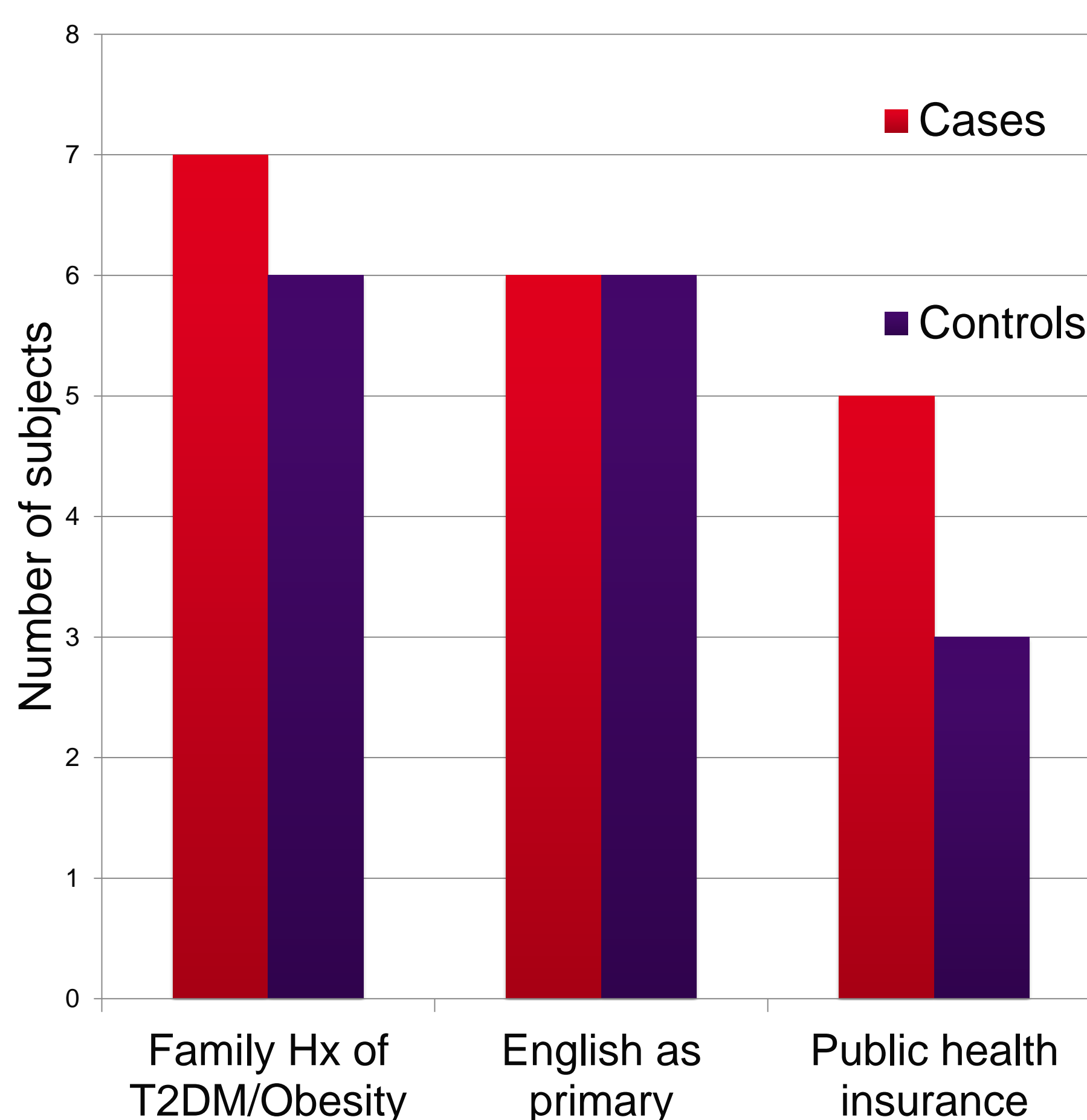


Figure 1

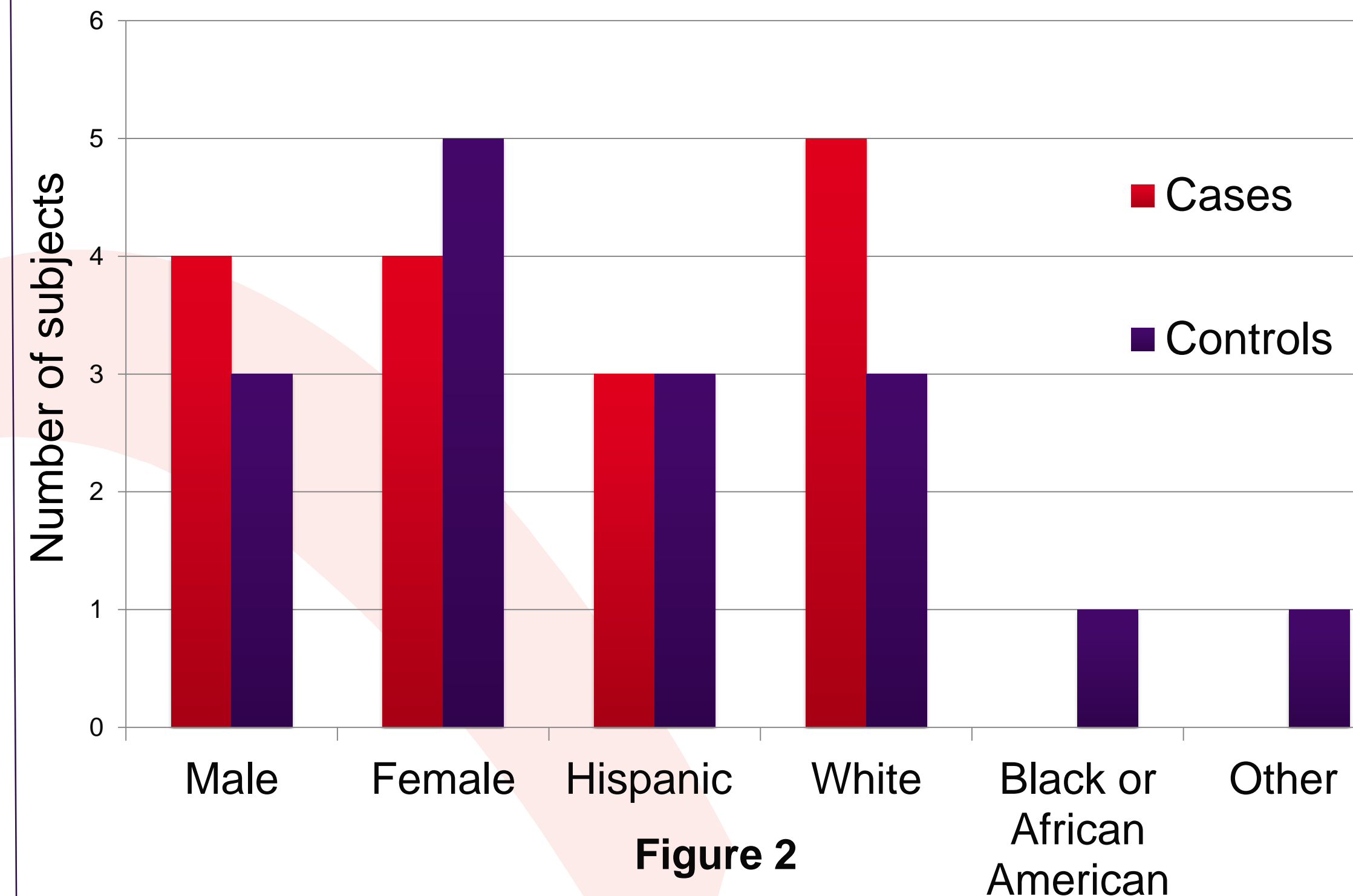


Figure 2

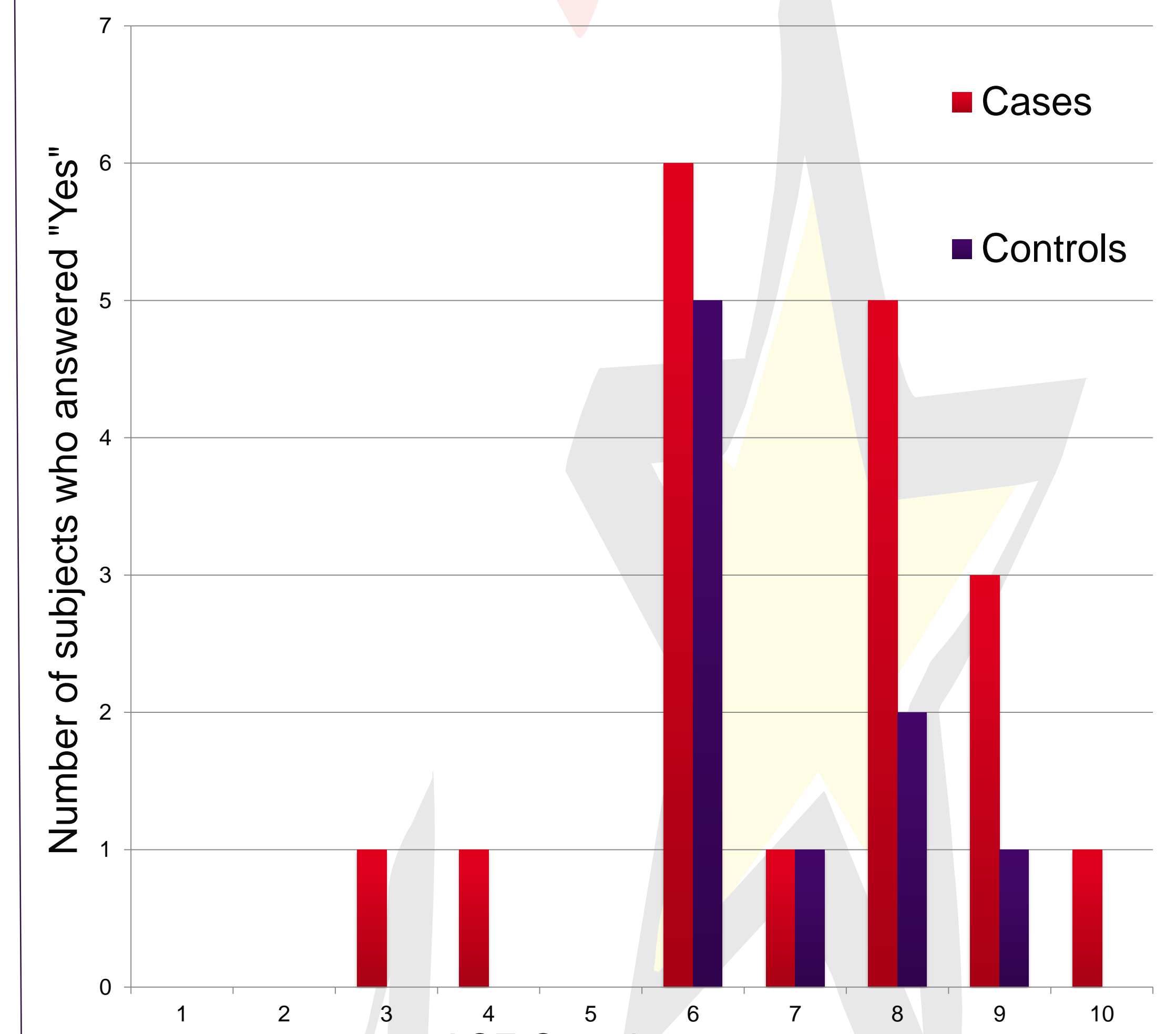


Figure 3

CONCLUSIONS

- The poor enrollment rate highlights the challenge to assess stress events in this population of adolescents using a questionnaire.
- Understanding the impact of stress on the development of T2DM in adolescents and young adults may allow for the development of preventive strategies targeted at psychosocial health.

FUTURE GOALS

- Continue recruiting participants.
- Investigate the underlying causes of inadequate enrollment to increase participation rate.

REFERENCES

- Pickup et al., Diabetes Care 2004
- Bonnet et al., Atherosclerosis 2005
- Felliti et al., Am J Prev Med 1998
- Wingenfeld et al., Psychother Psychosom med Psychol 2011