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Soares FLP, Ramos MH, Gramelisch M, et al. Intuitive eating is associated with glycemic control in type 2 diabetes. *Eating & Weight Disorders*. 2021;26(2):599-608.

What We Know, Think We Know, or Are Starting to Know

In [a previous Deepdive](#), we covered an intervention trial that had compared a weight-neutral program to a weight-loss program, with the surprising result that the weight-neutral intervention resulted in a 10mg/dl [0.25mmol/L] decrease in LDL-cholesterol. And previous research showed women with higher intuitive eating scores had lower total and LDL-C compared to low intuitive eating scores ⁽¹⁾.

These findings are unsurprising in one sense, which is that weight loss doesn't really produce much meaningful blood cholesterol lowering anyway ⁽²⁾. However, it may be surprising in another sense, which is that there appears to be a degree of resistance in the medical, nutritional, and dietetic worlds regarding the utility and application of “non-diet” approaches, which may reflect weight bias among healthcare professionals ⁽³⁾.

The question remains open for weight-neutral/non-diet approaches: what is the relationship between objective risk factors and eating by internal cues? The literature to date indicates that improved blood cholesterol levels may be a more consistent finding, but overall, the evidence, including for other risk factors like blood pressure and glucose, is mixed ⁽⁴⁾.

In the limited prospective observational research, higher intuitive eating scores* are associated with better emotional wellbeing, lower levels of binge eating, and less unhealthy weight control behaviours ⁽⁵⁾. Yet, cardio-metabolic risk factors were not examined in that cohort. The present study investigated the associations between intuitive eating scores and glycaemic control in participants with type-2 diabetes [T2D].

*Geek Box: Assessing Intuitive Eating

It is important to note that intuitive eating [lowercase] may refer to a measure of psychometric evaluation and may refer to a specific intervention itself guided by the principles of Intuitive Eating [uppercase IE], as set out by Tribole and Resch.

The ten principles of IE include: i) reject the diet mentality; ii) honour your hunger; iii) make peace with food; iv) challenge the food police; v) respect your fullness; vi) discover the satisfaction factor; vii) honour your feelings without food; viii) respect your body; ix) exercise - feel the difference; x) honour your health. These 10 principles were initially clustered into three domains by Tylka, including: 1) unconditional permission to eat; 2) eating for physical rather than emotional cues; 3) reliance on hunger and satiety cues. These domains, and the principles contained therein, formed the basis of the first validated instrument to measure intuitive eating, the Intuitive Eating Scale [IES] ⁽¹⁰⁾.

Tylka et al. updated the domains of IE to include a 4th domain, that of body-food choice congruence. However, the original IES was validated in women only. Thus, in 2013 Tylka & Kroon Van Diest validated an updated version, the IES-2, which contains 23 items and included the body-food choice congruence domain and was validated in both sexes ⁽⁶⁾. Factor analysis, which identifies factors that correlate within the same person, confirmed the 4-domain construct of the IES-2. Cronbach's alpha, which is a measure of internal consistency for scale or test [over 0.70 is considered good consistency, >0.80 is stronger] for the IES-2 during validation was 0.89 and 0.87 for men and women, respectively. The IES-2 has also shown to be reproducible over time, albeit over a period of weeks [something to consider for prospective studies]. Thus, as an instrument used to assess intuitive eating in individuals, the IES-2 is a well-validated scale.

The Study

The study was a cross-sectional design observational study conducted in Brazil. Adults aged 20yrs or older with a diagnosis of T2D for over 1yr were recruited. Data on demographics and participant characteristics, current medication use, BMI, and lifestyle habits, were assessed using a questionnaire.

The outcome of interest was glycaemic control determined by HbA1c levels [a marker of blood glucose regulation over the previous ~90 days]. HbA1c data was obtained from the participants' medical records.

Participants were characterised according to HbA1c >7% or <7% [i.e., over 6.5% is the threshold for diagnosis of T2D, and under 7% generally used a cut-off for 'good' glycaemic control in management of diagnosed T2D].

The exposure of interest was the Intuitive Eating Scale 2 [IES-2; see ***Geek Box**, above], and the four IES-2 subdomains. The results were expressed as odds ratios [OR].

Results: 179 participants were analysed for the study, of which 74.3% were female and 54.2% were aged over 60yrs. 44% had been treated for T2D for the prior 5yrs, and 48% had been classified as overweight/obese for the previous 10yrs. 55.3% had HbA1c >7%.

- **IES-2 Score:** The total intuitive eating score was associated with 89% lower odds [OR 0.11, 95% CI 0.02 to 0.54] of having HbA1c >7%.
- **IES-2 Subscales:** Of the four intuitive eating subscales, the subscale of body-food congruence was associated with 66% lower odds [OR 0.34, 95% CI 0.13 to 0.89] of having HbA1c >7%.
- **Diabetic Medications:** Compared to participants taking both oral antidiabetic agents and insulin, those taking only oral antidiabetic drugs had 90% lower odds [OR 0.10, 95% CI 0.03 to 0.29] of having HbA1c >7%, while those taking insulin alone had no significant difference in odds of glycaemic control <7%.

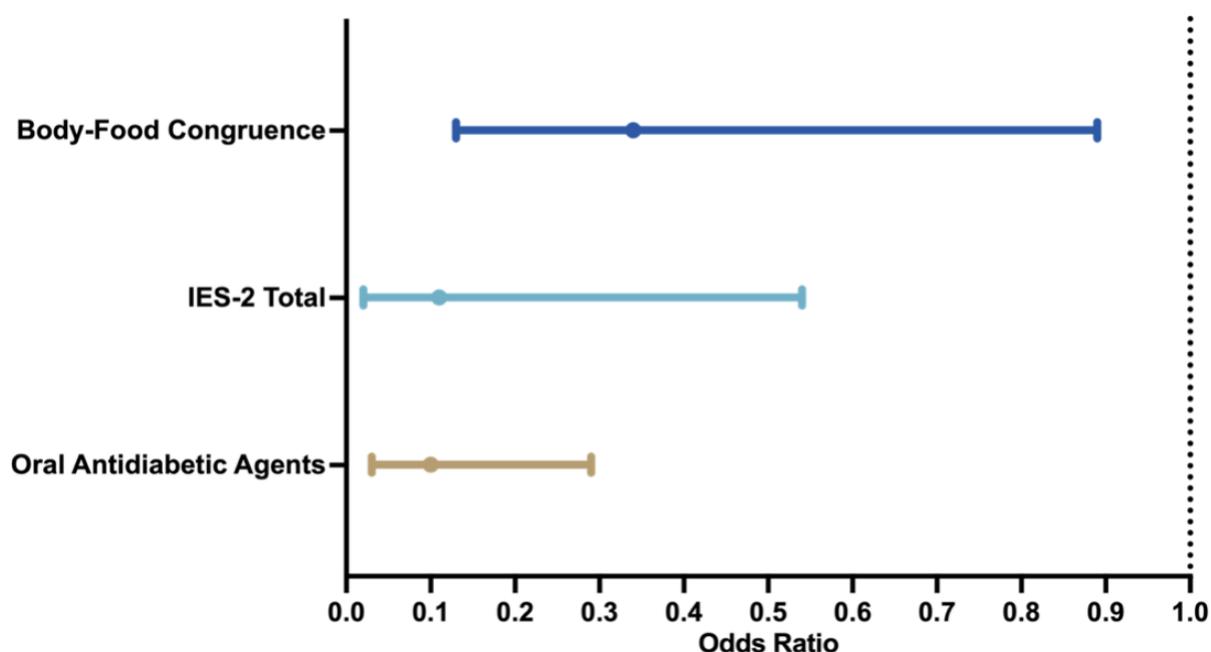


Figure illustrating the main results from the regression analysis in the present study. It is important to note that the outcomes are presented as **odds ratios**, which are different to relative risks or hazard ratios [more under **Key Characteristic**, below]. Note that the effects of the drugs and of the IES-2 are independent in this analysis, i.e., both independently predicted a greater likelihood of having a HbA1c level of <7%.

The Critical Breakdown

Pros: Few studies have assessed metabolic risk associated with intuitive eating, so despite the cross-sectional design, there is always a prop for being a first [while bearing in mind that a study like this is hypothesis-generating, nothing more]. HbA1c levels were derived from patient medical records. Intuitive eating was assessed using the validated IES-2, and the analysis also included each of the IES-2 subscales to determine whether specific components of intuitive eating were associated with the outcome. Based on the sample size estimates, the study was adequately powered with a final sample size of 179 participants. The study was also conducted in a lower income, majority non-White population in Brazil, which is important for a research area – non-diet/weight-neutral approaches – almost exclusively confined to higher socioeconomic status White females in Western countries ⁽⁷⁾.

Cons: As a cross-sectional study, this is a snapshot in time and gives us no indication of whether intuitive eating leads to, or is associated with over time, better glycaemic control. Cross-sectional studies remain prone to certain biases, in particular selection bias [although in this study all participants had a diagnosis of T2D of at least 1yr]. Rather than incorporate all the potential independent variables into their regression, they included only variables that were highly significant using another between-group statistical test, i.e., medication use comparing HbA1c >7% vs. <7%. But these are different statistical approaches. For example, participants with inadequate glycaemic control had a longer duration of T2D and self-rated health status as ‘regular/poor’, but these factors were not included in the final regression model. Given the cross-sectional design, it is possible that certain confounders were not adequately accounted for. Finally, no dietary analysis was carried out, which would have been useful to potentially link the intuitive eating findings to diet.

Key Characteristic

Cross-sectional designs analyse data from a sample population at a specific moment in time, i.e., a ‘cross-section’ of a group – in this case, participants with T2D. Because there is a ‘cross-section’ of the group occurring on a specified outcome, this often means that the outcome may be defined in a binary manner, i.e., dichotomously. Where the aim of the analysis is to predict the probability of being in one or the other of the dichotomous categorisation, a type of regression analysis known as logistic regression is used, and this analysis produces odds ratios.

Now, here is the important point: avoid interpreting the point estimate of an odds ratio as equivalent to relative risk! 90% lower odds are *not* a 90% lower risk! Odds ratios are calculated from a dichotomous outcome, i.e., the probability of falling into one or two categories – in this case HbA1c of either >7% or <7%. Thus, it is an estimation of the likelihood of being in either category based on a given level of the dependent variable, which in this case is the IES-2 scale [and medication usage].

Let’s take the OR of 0.11, which if we were to translate it into risk would be around a 10% lower risk. So, this is important to keep in mind because the effect size from an OR can appear to be huge if you’re only looking at it like it is an RR! OR tend to either over or underestimate relative risk, depending on the direction of effect.

Interesting Finding

The finding in relation to the body-food congruence subscale, which was the only IES-2 subscale individually associated with better glycaemic control, invites some thought. Body-food congruence was not part of the initial IES, but was recognised as a distinct dimension of intuitive eating and incorporated into the IES-2 ⁽⁶⁾. In this context, the finding for body-food congruence is interesting because this dimension of intuitive eating is associated with the selecting of foods to eat based on body needs, e.g., energy levels or activity ⁽⁶⁾.

In the context of T2D self-management, we could hypothesise that body-food congruence may translate to self-selecting foods which may be more beneficial – or at least less detrimental – to glycaemic control. This is the construct that body-food congruence represents: given a choice between a ‘healthy’ or ‘unhealthy’ food, those who score high on body-food congruence may select the former because it will provide nourishment to their body ⁽⁶⁾.

Interestingly, in the validation of the IES-2, it was noted that the other dimension of “unconditional permission to eat” was inversely correlated with body-food congruence, i.e., those who score highly on body-food congruence do not also give themselves *ad libitum* permission to eat anything they may be craving ⁽⁶⁾. Thus, it could be that this particular dimension of intuitive eating translates to dietary habits that have a positive effect on glycaemic control in individuals living with T2D. Again, this is all inference because the cross-sectional design of the study precludes any such conclusions. It is a ball for someone else to pick up and run with.

Relevance

This is, of course, where the rubber hits the road for T2D, because categorically we know that the only dietary intervention approach that achieves remission is the antithesis of a weight-neutral/non-diet approach: a very-low-calorie liquid diet aiming for a 15kg weight loss ^(8–10).

However, attempting weight loss of this magnitude is not easy, which the DiRECT study itself showed ⁽¹¹⁾. And weight loss is not a benign intervention: like any intervention, it comes with benefit-risk considerations ⁽¹²⁾. The reality is that for a condition like T2D, there is always scope for adjuvant strategies to support management of the condition.

Of those adjuvant strategies, non-diet/weight-neutral approaches currently lack strong evidence. In a case-control study of adolescents with type-1 diabetes paired with age-matched healthy controls, higher intuitive eating scores was associated with better glycaemic control in those with T1D ⁽¹³⁾. In this study, interestingly, eating for physical rather than emotional reasons was associated with 11% lower HbA1c levels ⁽¹³⁾. This study was conducted before the development of the IES-2, and so body-food congruence was not a specific dimension ⁽¹³⁾.

Nevertheless, the eating for physical rather than emotional reasons sits within the body-food congruence dimension, and thus this may be considered a similar finding to the present study. Previously, a mindful eating intervention was shown to improve glycaemic control and lead to a reduction in dietary glycaemic load ⁽¹⁴⁾. This body of research, which includes qualitative research, suggests that emotional eating and related stigma may be associated with worsened glycaemic control ^(13–15).

Ultimately, we are left with a pool of case-control, cross-sectional, qualitative, and pilot study research on intuitive eating and glycaemic control ^(13–15). Until more longitudinal research, i.e., both prospective cohort and intervention studies, are forthcoming, we will be left to speculate about the associations between intuitive eating and glycaemic control, and whether the chicken or egg comes first.

Application to Practice

At both a practical and moral level, there is much to support about non-diet/weight-neutral approaches. At the level of evidence, this is dependent on the specific context in which it is being applied. To date, most of the research is oriented toward disordered eating and eating disorders, rather than cardio-metabolic conditions. But in the duality of our current paradigm of healthcare, does an emphasis necessarily have to be *either/or* for the psychological and the physiological?

For eating behaviour, which is driven by both external environmental factors and internal neurobiological factors, dichotomising the psychological and physiological is short-sighted. With regard to intuitive eating, the one area where the evidence is stronger and includes both prospective cohorts and intervention trials is in relation to the psychological aspects, in turn associated with better diet quality ^(5,16,17).

Could these improved psychological components translate to better metabolic health? The small body of observational research suggests that eating for physical reasons, i.e., body-food congruence, may be associated with better blood glucose regulation. Conversely, it may be that emotional eating is associated with worse glycaemic control. Again, the direction of effect here remains to be determined. However, in the lone intervention – a small pilot study – on this topic, mindful eating was associated with a 0.83% decrease in HbA1c over 12-months in adults with T2D ⁽¹⁴⁾.

References

1. Hawks S, Madanat H, Hawks J, Harris A. The Relationship between Intuitive Eating and Health Indicators among College Women. *American Journal of Health Education*. 2005 Dec 25;36(6):331–6.
2. Mach F, Baigent C, Catapano AL, Koskinas KC, Casula M, Badimon L, et al. 2019 ESC/EAS Guidelines for the management of dyslipidaemias: Lipid modification to reduce cardiovascular risk. *European Heart Journal*. 2020;41(1):111–88.
3. Puhl RM, Heuer CA. Obesity Stigma: Important Considerations for Public Health. *American Journal of Public Health*. 2010 Jun;100(6):1019–28.
4. Schaefer JT, Magnuson AB. A review of interventions that promote eating by internal cues. *Journal of the Academy of Nutrition and Dietetics*. 2014;114(5):734–60.
5. Hazzard VM, Telke SE, Simone M, Anderson LM, Larson NI, Neumark-Sztainer D. Intuitive eating longitudinally predicts better psychological health and lower use of disordered eating behaviors: findings from EAT 2010–2018. *Eating and Weight Disorders - Studies on Anorexia, Bulimia and Obesity*. 2021 Feb 31;26(1):287–94.
6. Tylka TL, Kroon Van Diest AM. The Intuitive Eating Scale–2: Item refinement and psychometric evaluation with college women and men. *Journal of Counseling Psychology*. 2013;60(1):137–53.
7. Penney TL, Kirk SFL. The Health at Every Size Paradigm and Obesity: Missing Empirical Evidence May Help Push the Reframing Obesity Debate Forward. *American Journal of Public Health*. 2015 May;105(5):e38–42.
8. Lim EL, Hollingsworth KG, Aribisala BS, Chen MJ, Mathers JC, Taylor R. Reversal of type 2 diabetes: Normalisation of beta cell function in association with decreased pancreas and liver triacylglycerol. *Diabetologia*. 2011;54(10):2506–14.
9. Xin Y, Davies A, Briggs A, McCombie L, Messow CM, Grieve E, et al. Type 2 diabetes remission: 2 year within-trial and lifetime-horizon cost-effectiveness of the Diabetes Remission Clinical Trial (DiRECT) / Counterweight-Plus weight management programme. *Diabetologia*. 2020 Oct;63(10):2112–2122.
10. Taylor R, Al-Mrabeh A, Zhyzhneuskaya S, Peters C, Barnes AC, Aribisala BS, et al. Remission of Human Type 2 Diabetes Requires Decrease in Liver and Pancreas Fat Content but Is Dependent upon Capacity for β Cell Recovery. *Cell Metabolism*. 2018;28(4):547–556.e3.
11. Lean MEJ, Leslie WS, Barnes AC, Brosnahan N, Thom G, McCombie L, et al. Primary care-led weight management for remission of type 2 diabetes (DiRECT): an open-label, cluster-randomised trial. *The Lancet*. 2018;391(10120):541–51.
12. Tylka TL, Annunziato RA, Burgard D, Daniélsdóttir S, Shuman E, Davis C, et al. The Weight-Inclusive versus Weight-Normative Approach to Health: Evaluating the Evidence for Prioritizing Well-Being over Weight Loss. *Journal of Obesity*. 2014;2014:983495.
13. Wheeler BJ, Lawrence J, Chae M, Paterson H, Gray AR, Healey D, et al. Intuitive eating is associated with glycaemic control in adolescents with type 1 diabetes mellitus. *Appetite*. 2016 Jan;96:160–5.
14. Miller CK, Kristeller JL, Headings A, Nagaraja H, Miser WF. Comparative Effectiveness of a Mindful Eating Intervention to a Diabetes Self-Management Intervention among Adults with Type 2 Diabetes: A Pilot Study. *J Acad Nutr Diet*. 2012 Nov;112(11):1835–42.

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17. Willig AL, Richardson BS, Agne A, Cherrington A. Intuitive Eating Practices among African-American Women Living with Type 2 Diabetes: A Qualitative Study. *J Acad Nutr Diet*. 2014 Jun;114(6):889–96.
 18. Christoph M, Järvelä-Reijonen E, Hooper L, Larson N, Mason SM, Neumark-Sztainer D. Longitudinal associations between intuitive eating and weight-related behaviors in a population-based sample of young adults. *Appetite*. 2021 May;160:105093.
 19. Mensinger JL, Calogero RM, Stranges S, Tylka TL. A weight-neutral versus weight-loss approach for health promotion in women with high BMI: A randomized-controlled trial. *Appetite*. 2016 Oct;105:364–74.