Food addiction associations with psychological distress among people with type 2 diabetes

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A R T I C L E   I N F O

A B S T R A C T

Aims: To assess the relationship between a food addiction (FA) model and psychological distress among a type 2 diabetes (t2d) sample.

Methods: A cross-sectional study of 334 participants with t2d diagnoses were invited to complete a web-based questionnaire. We measured variables of psychological distress implementing the Depression Anxiety and Stress Scale (DASS-21), the Yale Food Addiction Scale (YFAS), and other factors associated with t2d.

Results: In our study a novel finding highlighted people with t2d meeting the FA criterion had significantly higher depression, anxiety, and stress scores as compared to participants who did not meet the FA criterion. Moreover, FA symptomology explained 35% of the unique variance in depression scores, 34% of the unique variance in anxiety scores, and 34% of the unique variance in stress scores, while surprisingly, BMI explained less than 1% of the unique variance in scores.

Conclusion: We identified that psychological distress among people with t2d was associated with the FA model, apparently more so than BMI, thereby indicating further research being necessary lending support for future research in this realm. Moreover the FA model may be beneficial when addressing treatment approaches for psychological distress among people with t2d.

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1. Introduction

Type 2 diabetes is a major international health crisis with its associated high morbidity and mortality rates. Reflecting an increase in awareness that people with t2d are confronted with a range of biopsychosocial challenges, recent research has documented strong associations between t2d and poor mental health (Bener, Al-Hamaq, & Dafeeah, 2011; Mezuk, Eaton, Albrecht, & Golden, 2008). While the direction of a causal relationship between having t2d and experiencing poor mental health, such as depression, is still somewhat contentious, it is likely to be a bidirectional relationship. Higher levels of depression, anxiety, and stress associated with t2d not only present in themselves as poor health, but may also increase the risk of potential diabetes complications. Such potential complications may include increased insulin resistance (Sinha & Jastreboff, 2013) or increased risk of cognitive decline and Alzheimer's disease (Feinkohl, Price, Strachan, & Frier, 2015). Additional complications of t2d with depression stem from the reported higher incidences of unhealthy behaviours, such as smoking, physical inactivity, unhealthy diet, and

poor glycaemic management compliance (Lin et al., 2004). Indeed, dating back to 1864 Thomas Willis – a British Physician, implied that diabetes ensued from 'sadness or long sorrow and other depressions and disorders' (Willis, 1971).

While increased psychological distress appears to be associated with t2d, current empirically evidenced understandings of why people with t2d have such poor psychological well-being is somewhat limited (Rubin & Peyrot, 2002). Much of the previous research in this area has focused on biological and obesity related explanations of poor mental health (e.g., variations in glycaemic levels, neurological alterations in metabolism of serotonin and norepinephrine, trophic agent changes, biochemical changes associated with increased dyslipidemia, and stigmatisation of obesity) (Lustman et al., 2000; Miller, Maletic, & Raison, 2009; Sutin & Terracciano, 2013; Valabhji & Elkeles, 2003). Indeed, research continues to demonstrate that obesity is one of the strongest predictors of depression in t2d samples, as well as non-type 2 diabetes populations, with risk of depression being 20% to 50% higher among obese individuals than normal weight individuals (Mather, Cox, Enns, & Sareen, 2009; Simon et al., 2006; Svenningsson, Björkelund, Marklund, & Gedda, 2012). Furthermore, these risks are reported to be even higher for extremely obese individuals. (Abilés et al., 2010; Petry, Barry, Pietrzak, & Wagner, 2008).

Despite the gains that such biological and obesity orientated research have made to the understanding of psychological distress in populations with t2d, we are still presented with large variances in

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psychological distress that remain unaccounted for. This gap in our knowledge compromises the design of evidence based interventions to provide effective care to ameliorate psychological distress associated with t2d. This highlights the need to consider new approaches to the understanding of psychological well-being in persons with t2d.

1.1. Food addiction model

One such approach to explaining the high levels of depression, anxiety, and stress in people with 2td is to consider an addiction model, or, more specifically, a 'food addiction' (FA) model (Corwin & Grigson, 2009). The concept of FA parallels that of substance abuse in terms of mechanism and associated negative consequences characterised by the classic symptoms of addiction: tolerance and withdrawal (Ifland et al., 2009). Food addiction behaviours associated with highly processed and hyperpalatable foods (typically refined carbohydrates, sweeteners, fats, and processed foods) have been shown to mimic the DSM–IV–TR, (American Psychiatric Association, 2000, 4th ed., text rev.) criteria for substance use disorders (Corsica & Pelchat, 2010; Gearhardt, Davis, Kuschner, & Brownell, 2011). It should also be noted that there has been reported overlap between FA and other ways of conceptualizing disordered eating; especially binge eating disorder where strong relationships between binge eating and FA as well as parallel relationships between these constructs and distress, poor weight loss, have been observed (Burmeister, Hinman, Koball, Hoffman, & Carels, 2013).

While the FA model has been a contentious topic (Ziauddeen, Farooqi, & Fletcher, 2012), evidence suggests it has many similarities in the neurochemical mechanisms and behavioural symptomology underlying other substances of abuse (Gearhardt, White, Masheb, & Grilo, 2013; Volkow, Wang, Tomasi, & Baler, 2013). Of key importance to t2d and a FA model, substance abuse has been linked to psychological distress and obesity (Martins & Gorelick, 2011; Tolliver & Anton, 2015), both of which separately and together have been linked to t2d (Furuya, Hayashino, Tsujii, Ishii, & Fukuhara, 2013; Kaur, Tee, Ariaratnam, Krishnapillai, & China, 2013; Svenningsson et al., 2012).

Previously measuring a person's FA symptomology or eating related problems has been challenging. Issues have been encountered such as appraising whether an addictive element applies to disordered eating (Schulte, Joyner, Potenza, Grilo, & Gearhardt, 2015). Currently, the most generally accepted measure for assessing FA is the Yale Food Addiction Scale (YFAS; Gearhardt, Corbin, & Brownell, 2009). The YFAS was introduced as a valid and reliable self-report measurement for the assessment of FA symptomology paralleling the DSM-IV-TR Substance Disorder criteria (Gearhardt et al., 2009; Muele & Gearhardt, 2014). Pedram et al. (2013) utilised the YFAS investigating the degree that the FA framework contributed to obesity among a general populous. Results demonstrated that FA was a key player; over 80% of food addicted people were overweight/obese suggesting the FA phenomenon is significantly contributing to the fast-growing obesogenic climate.

1.2. Substance abuse, psychological distress, and type 2 diabetes

Earlier research has shown a relationship between various forms of substance use disorders and psychological distress (Martins & Gorelick, 2011; Pettinati, O'Brien, & Dundon, 2013; Tolliver & Anton, 2015). Results from the large scale National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), covering the co-morbidity of DSM-IV substance use disorders and nine separate mood and anxiety disorders ($n = 43,093$), found that 60 percent of the participants seeking treatment for any drug use disorder in the past year had a mood disorder and 43 percent presented with at least one anxiety disorder (Grant et al., 2004). Additionally, a recent literature

review demonstrated over one-third of alcohol dependence was associated with other mental illnesses (Klimkiewicz, Klimkiewicz, Jakubczyk, Kieres-Salomoński, & Wojnar, 2015). Martins and Gorelick (2011) highlighted substance use over the lifespan was higher in participants with psychiatric illness than in participants without a disorder.

Specifically, nicotine dependence and active smoking have been recognised among people with t2d (Pan, Wang, Talaei, Hu, & Wu, 2015; Willi, Bodenman, Ghali, Faris, & Cornuz, 2007) and mood disorders including depression was shown to be of greater intensity amongst nicotine addicts than non-smokers (Pietras, Witusik, Panek, Szemraj, & Górski, 2011). Furthermore, recent research indicates that people with t2d and with a diagnosed substance abuse disorder are twice as likely to have a psychiatric mood disorder (Wu et al., 2015). While Wu et al. (2015) research didn't consider FA, their conclusions do provide further evidence that people with t2d and FA symptomology are likely to have an increased risk of psychological distress.

Taken together previous research evidences high associations between psychological distress and substance abuse. Although research has examined the relationship between alcohol, tobacco, and drug substance abuse with psychological distress among people with t2d, no research has considered the association between psychological distress and a FA model in this population. This is despite recent research demonstrating that over 70% of people with t2d met a FA criteria (Raymond & Lovell, 2015). Hence the current study aimed to assess the relationship between a FA model and psychological distress among a t2d sample. Specifically, two research objectives were approached: firstly, whether depression, anxiety, and stress scores significantly differed between participants who met a FA criterion and those that did not. Secondly, to compare the cross-sectional predictive contributions to depression, anxiety, and stress scores made by FA and body mass index (BMI), while controlling for covariation between the assessed variables. Positive findings to support such hypotheses would have substantial implications for the design of interventions to provide care for people with t2d and the enhancement of their psychological well-being.

2. Methods

This study was approved by the University of the Sunshine Coast Ethics committee.

2.1. Participants

An online survey set on the SurveyMonkey platform recruited 381 participants. Twenty-four participants withdrew immediately after the informed consent section, 15 participants withdrew during the survey, nine participants did not confirm that they had a current t2d diagnosis, leaving a total of 334 participants. The final sample included 221 females (65.6%) and 110 males (32.9%; five participants did not indicate their gender). Ages ranged from 27 to 81 years ($M = 58.0$, $SD = 9.5$). Data from this sample have been published previously which demonstrated over 70% of people with t2d met the YFAS criteria for FA, and highlighted the FA classification group had significantly higher BMI scores. Furthermore FA and impulsivity (non-planning) were significant predictors of BMI (Raymond & Lovell, 2015).

The majority of participants were recruited from Australia (47%), with the remaining 53% participants from: USA (25.1%), UK (23.1%), New Zealand (1.8%), Germany (0.6%), Ireland (0.3%), Malaysia (0.6%), Norway (0.3%), and Spain (0.3%), with 0.6% not reporting their domicile. Participants' weight ranged from 46 – 184 kg, $M_{weight} = 106.88$ kg, $SD_{weight} = 23.59$ kg; Height ranged from 147 – 194 cm, $M_{height} = 168.66$ cm, $SD_{height} = 9.06$ cm; BMI ranged from 18.9 – 58.6 kg/m^2, $M_{BMI} = 37.6$ kg/m^2, $SD_{BMI} = 7.99$. Seven percent of the participants were in the normal BMI category