



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Original Article

Managing patients with obesity in the post COVID-19 world: Time to sharpen the saw

Marvin Wei Jie Chua

Department of General Medicine, Sengkang General Hospital, 110 Sengkang East Way, Singapore 544886, Singapore



ARTICLE INFO

Article history:

Received 5 November 2020

Received in revised form

18 November 2020

Accepted 29 November 2020

Keywords:

Obesity

COVID-19

ABSTRACT

The clash of the dual pandemics – COVID-19 and obesity (Chua et al., 2020) [1], threatens to exponentially increase the rates of obesity, which is a risk factor for severe COVID-19 and death (Garg et al., 2020; Peng et al., 2020; Wu et al., 2020; Kass et al., 2020) [2–5]. We need to urgently find solutions to halt this vicious circle. Where do we begin?

Our patients – who are often our best teachers. In my clinical practice, I have observed disparate responses among my patients in response to the pandemic. This highlighted the importance of understanding the factors underlying motivation and provided important clues on what clinicians can do to help our patients create a virtuous circle towards positive health outcomes.

© 2020 Asia Oceania Association for the Study of Obesity. Published by Elsevier Ltd. All rights reserved.

There is probably no single medical condition which leads to more complications and is associated with greater morbidity and mortality than obesity. Obesity is linked to a multitude of comorbidities including but not limited to cardiovascular disease, diabetes mellitus, obstructive sleep apnea and non-alcoholic fatty liver disease [6]. With the huge numbers of people with obesity worldwide and its progressively increasing incidence, it is hardly surprising that obesity has been termed a “pandemic” [1,7].

From early this year when the COVID-19 pandemic struck, it became clear that we were facing the “clash of the dual pandemics” [1]. Obesity increases the risk of severe COVID-19 and death, including in young patients [2–5,8,9]. As pandemics go, above and beyond its direct effect as evidenced by massive infection rates and fatalities, COVID-19 stands out in its profound and far-reaching impact – how it has changed the way we live for good. The various measures implemented to curb viral transmission, collectively termed “lockdown” (or “circuit breaker” in Singapore), threaten to lead to sky-rocketing rates of obesity and its associated complications through two main mechanisms [10]. Firstly, COVID-19 has led to a socio-economic crisis which increases the risk of obesity, contributed by the preferential reliance on processed, energy-rich food [10]. Secondly, there is an observed significant deterioration of mental health – it is with good reason that the United Nations had called the pandemic “a major mental health crisis” [10]. To begin with, patients with obesity have increased psycho-social distress

[11]. The pandemic stokes this fire through disruption of lifestyles and livelihoods, increased anxiety which is often fuelled by misinformation and fake news [11], as well as home confinement which might increase feelings of abandonment and isolation [11]. These factors often lead to depression, anxiety and eating disorders such as binge eating, all of which culminate in weight gain [12,13]. It is clear that COVID-19 and obesity reinforce each other in a vicious circle which needs to be urgently nipped in the bud.

As an Endocrinologist managing patients with obesity, I felt a sense of personal responsibility to take action to stop this vicious circle from reaching a point of no return. The “new normal” is here to stay, and it is evident that strategies with a lasting effect are required if we were to have any chance of successfully coping with the impending avalanche of obesity and its associated complications.

What can be done? Weight management and bariatric surgery services should resume with immediate effect – we need to be prepared for a surge in patient numbers due to the “back-log” contributed by postponement of clinic appointments and surgeries to conserve resources and reduce risk of viral transmission at the height of the pandemic [14], coupled with the growing rates of obesity. The common pathogenic mechanisms in obesity and COVID-19, both of which are pro-inflammatory states in which there is increased production of cytokines such as tumour necrosis factor (TNF) α and IL-6 [15,16], lends to the potential role of immunotherapy. For example, monoclonal antibodies directed to IL-6, which is elevated in both COVID-19 and obesity, can alleviate cytokine-related symptoms in severe COVID-19 [15].

E-mail address: marvin.chua.w.j@singhealth.com.sg

As important as they are, these are system-level or future interventions respectively, which may not be directly or immediately applicable to the patient sitting before us in the clinic. As physicians managing patients in this current climate, how can we make an immediate difference in our own capacity? While pondering about this question, I made an interesting observation: the polarising effects of the COVID-19 pandemic on my patients with obesity. This turned out to be an important clue which set me on a quest to not only uncover the reasons for this observation, but also how we can “sharpen the saw”. In this journey, I looked beyond the medical field to complementary disciplines which offered invaluable wisdom.

Let us begin by looking at two of my clinic patients. Patient A is a 33-year-old male who had undergone sleeve gastrectomy two years ago. Following surgery, he maintained strict dietary restrictions and a daily exercise regime, and had achieved excellent weight loss which was sustained till Feb 2020. However, during his last clinic review in June 2020, he had a sudden weight gain (4% of body weight) which was cause for concern, given that he had till then been one of my “best performing” patients. During my consult with him, he revealed that his carefully curated routine over the past two years had been upset by the circumstances forced upon him during the COVID-19 pandemic. Whereas he would previously meet his family members only at the end of the day, since the start of the “circuit breaker”, there was a steep increase in contact and consequently increased friction, due to the patient and his family members all working from home. A major subject of disagreement was food. Previously, the patient would carefully prepare his own meals and bring them to work. However, with everybody consuming meals together “under one roof”, the patient often felt what was on the table was too oily, salty or sweet. Voicing out his objections and refusal to have the same meals was met with antagonism. He felt a sense of “loss of freedom” and “isolation”, despite in the apparent company of many others. The resultant mental turmoil led him to paradoxically resort to “comfort” food and snacks.

We now turn our attention to Patient B, a 28-year-old female with obesity and type 2 diabetes mellitus (DM) on insulin. During follow-up over the last one year, she did not lose any weight and glycaemic control remained poor (HbA1c 10–12%). She often gave the reason that she worked 14–16 hours every day and thus had inadequate time for any form of exercise or even sleep. When I saw her again after 6 months in Jul 2020, she was a changed person! She had lost 6% of her body weight and experienced significant improvement in glycaemic control (HbA1c 8.4%). Most importantly, she appeared more self-confident and self-assured than I had ever seen her. What was her success story like? Patient B shared that when the pandemic struck, she found herself retrenched and felt distraught in the initial weeks. However, with encouragement from family and friends, she made a resolution to turn the crisis into an opportunity and changed her lifestyle. She did daily brisk walking for up to 2 hours, which was supplemented by online Zumba classes. She eschewed her previous “staples” of takeaways and fast food, and started preparing healthy meals.

These two patients which I have illustrated were by no means the only patients whose health outcomes took on vastly different trajectories during the COVID-19 pandemic. What could account for such disparate effects? If clinicians are able to uncover the underlying factors that influence patients’ daily decisions and actions, we could stop this looming vicious circle from snowballing and help to nurture a healthier community, in spite of the COVID-19 pandemic. Conversely, if we are unable to do so, we would likely find ourselves struggling to cope with the influx of patients with obesity in the very near future, and witness a new generation of individuals with worsening health outcomes.

The self-determination theory (SDT) offers a useful framework to explain the underlying motivational factors which could account

for these observed disparate effects [17,18]. This theory posits that motivation can be divided into autonomous or intrinsic motivation, which is the extent to which actions are self-endorsed and performed with free choice; and controlled or extrinsic motivation, which is the extent to which external pressure influences behaviour [19]. Motivation is in turn determined by three basic needs: autonomy, competence and relatedness [17,18]. Autonomy refers to a sense of ownership in one’s actions, which is supported by experiences of interest and value and undermined by being externally controlled [17]. Competence refers to the sense of personal mastery, which is supported by optimal challenges, positive feedback and opportunities for growth [17]. Relatedness refers to a sense of belonging and connection, which is supported by a nurturing and caring environment [17]. Thwarting any of these three basic needs undermines motivation [17].

Applying this to the cases described above, Patient A experienced a loss of autonomy due to a sense of “loss of freedom” with regard to preparation and choice of his meals. At the same time, there was a loss of relatedness due to frequent conflicts with his family members. The resultant decrease in motivation led to the adoption of unhealthy lifestyle habits and consequently, weight gain. In contrast, while Patient B initially suffered from a “set-back”, she actually enjoyed increased autonomy during the pandemic with new-found time with which she could choose her activities, whereas previously she had little time for herself due to work commitments. Patient B also benefited from increase in relatedness with support from her friends and family. As can be seen, the contrasting effects on autonomy and relatedness, and therefore motivation, led to a marked difference in the outcome of weight. Increased autonomous motivation is associated with long-lasting behavioural changes such as increased duration and intensity of exercise and improved weight loss at up to 3 years [20–22]. It is my firm belief that SDT and its principles have significant potential to combat obesity in this post COVID-19 world which we are living in and is here to stay.

It would be appropriate at this juncture to consider the trans-theoretical model (TTM). In contrast to the emphasis on the quality of motivation in SDT, the TTM focuses on the quantitative aspect of motivation, and is therefore complementary to SDT [23]. According to the TTM, change is a process that progresses through five stages: precontemplation, contemplation, preparation, action and maintenance [23]. The key clinical value in this model is to recognize that patients are all at various stages of change, and to tailor specific interventions according to their respective stage so as to be most effective [24,25]. For example, patients in the precontemplation stage require strategies to increase motivation and awareness, while action-based strategies such as stimulus control and reinforcement management may be more suitable for patients in the preparation and action stages [24]. This model recognizes that a “one size fits all” model of clinical practice may be counter-productive: imposing action on a patient who is in the precontemplation stage and clearly not ready for behavioural change risks early termination.

How then, do we apply the SDT and TTM theories in clinical practice to help our patients?

Motivational interviewing (MI) is a patient-centred, directive counselling approach focused on exploring and resolving ambivalence towards change [26,27]. Ambivalence refers to the gap between knowledge and behaviour [27]. As an example, most of our patients with obesity know that they should change their lifestyle, but when faced with various barriers such as conflicting pressures and perception that the change is too big, the personal or financial costs of change are too high and so on, behavioural change does not occur [27]. In MI, patients are guided to find their own solutions to barriers which are preventing change. At the same time, the individual has every right to make no change – the healthcare worker

embraces rather than combats the ambivalence [28]. By giving patients the freedom to change on their own terms while providing constant support in their journey, MI supports both autonomy and relatedness and increases autonomous motivation [28]. Thus, it is hardly surprising that MI has significant overlap with SDT, and has in fact been seen as a practical application of the theory [28]. SDT and MI share the same basic assumption that humans are naturally oriented towards health and growth, and that the individual must want to change of his/her own accord [28,29]. By closing the gap between knowledge and behaviour, it is evident that MI also has an overlap with TTM and is useful in the precontemplation and contemplation stages to “nudge” patients towards action [29].

MI was a key component of the lifestyle interventions used in the diabetes prevention program and the LOOK AHEAD trial, both of which had a goal of 7% weight loss [30,31]. MI has been shown to lead to sustained lifestyle changes and weight loss in patients with obesity, whether performed in an individual or group setting [26–28]. A TTM-based motivational interviewing method has been shown to improve the health behaviour stages and metabolic control of patients with Type 2 DM [32].

How is MI performed? The four main principles of MI can be summarized as “RULE”: “R” for resisting the righting reflex, which is the natural tendency of healthcare professionals to “fix” whatever is wrong, “U” for understanding the patient’s motivations, “L” for listening to the patient empathically and “E” for empowering the patient [28]. Some questions which might be relevant in a dialogue with a patient with obesity include “Would it be all right to talk about your weight today?” (agenda setting), “Tell me about your concerns related to exercising more” (open-ended questions), “Is there any behaviour that you are currently doing which may get in the way of these goals?” (developing discrepancy between actual and desired behaviour) and “Could you share with me a previous experience in which you tried to lose weight and succeeded?” (supporting self-efficacy) [29]. Although a detailed review of the technique of MI is beyond the scope of this report, we propose that physicians and healthcare workers, including nurses and dietitians, learn this invaluable skill. In the same vein, is there any other skill which we should equip ourselves with?

Mindfulness – which can be defined as “paying attention in a particular way, on purpose, in the present moment, and non-judgementally” [33]. Our thoughts, emotions and actions are closely linked: our thoughts and emotions influence our actions, often in a subconscious manner [34,35]. Mindfulness helps us to be more aware of our thoughts and emotions and how they influence our behaviour.

Why is mindfulness worthy of specific mention? Mindfulness, through decreasing stress, anxiety and depression while increasing resilience [35,36], is an invaluable tool in battling this major mental health crisis. Mindfulness has been demonstrated to be effective in weight reduction and improving obesity-related eating behaviours, including emotional, impulsive and binge eating [34,37,38]. It would be apt to describe a study in which the first group of subjects were given soup in special bowls which, unknown to them, self-refilled as their contents were consumed; while the second group was given soup in normal bowls [39]. The subjects in the first group ate 73% more than the second group; however, they did not believe they had consumed more, nor did they report increased satiety [39]. This study clearly illustrates the importance of mindfulness and the perils of “mindlessness”.

As with MI, an overlap exists between mindfulness and SDT. Ryan and Deci had previously proposed that mindfulness is an important factor which supports autonomous engagement in activities and decreases susceptibility to controlled motives [40]. This was supported by a meta-analysis, which found that mindfulness is positively associated with autonomous motivation and negatively associated with controlled motivation [41]. Thus, mind-

fulness could have a key role in fostering autonomous motivation and promoting lasting behavioural changes, while decreasing the likelihood of being motivated by extrinsic rewards or subtle forms of coercion such as social pressure [41].

How does the physician apply mindfulness to clinical practice? I believe that the first step is for the physician to undergo mindfulness training, which is delivered in programs such as the Mindfulness-Based Stress Reduction (MBSR) and Mindfulness-Based Cognitive Therapy (MBCT), following which the principles of mindfulness can be incorporated into the clinic consultation. For example, when addressing the issue of food cravings and bingeing, the physician could review the patient’s thoughts, stimuli and emotions, followed by a discussion of the alternative choices of actions. The common “pathway” of action of both mindfulness and MI – increasing autonomous motivation, raises the possibility of a synergistic effect when both are used together. Indeed, mindfulness training benefits not just the patient but also the physician [34,35], by increasing empathy and reducing the risk of burnout and medical errors [35,42].

Of particular relevance in today’s world, telehealth and telemedicine are useful tools which transcend physical boundaries and increase access to care while maintaining social distancing [43]. MI delivered via telephone has been found to be effective for weight loss [44], while MI delivered via text messaging is another promising option [45]. Although mindfulness-based interventions delivered via telemedicine have been shown to reduce psychological distress [46], their application in weight loss remains to be studied.

Conclusion

As Winston Churchill said, “never let a good crisis go to waste” – so we physicians should recognize that our environment has changed, learn from our experiences during the pandemic and think about how we could rebuild our clinical pathways for the future to manage the post COVID-19 fallout. The “new normal” makes these lessons all the more important. In our armamentarium lies two tools which are somewhat related to each other, neither of which are novel but nonetheless deserving of specific attention: MI and mindfulness. As Viktor E. Frankl said, “Between stimulus and response there is a space. In that space is our power to choose our response. In our response lies our growth and our freedom” – so it is our duty to help influence this response.

Ethical statement

I have read and have abided by the statement of ethical standards for this manuscript which is submitted to the Obesity Research & Clinical Practice.

Conflict of interest

The author declares that there is no conflict of interest.

CRediT authorship contribution statement

Marvin Wei Jie Chua: Conceptualization, Writing - original draft, Writing - review & editing.

References

- [1] Chua MWJ, Zheng S. Obesity and COVID-19: the clash of two pandemics. *Obes Res Clin Pract* 2020, <http://dx.doi.org/10.1016/j.orcp.2020.06.003>.
- [2] Garg S, Kim L, Whitaker M, O’Halloran A, Cummings C, Holstein R. Hospitalization Rates and Characteristics of Patients Hospitalized with Laboratory-Confirmed Coronavirus Disease 2019 – COVID-NET, 14 States, March 1–30, 2020. *MMWR Morb Mortal Wkly Rep* 2020;69:458–64.

- [3] Peng YD, Meng K, Guan HQ, Leng L, Zhu RR, Wang BY, et al. Clinical characteristics and outcomes of 112 cardiovascular disease patients infected by 2019-nCoV. *Zhonghua Xin Xue Guan Bing Za Zhi* 2020;48:E004.
- [4] Wu J, Li W, Shi X, Chen Z, Jiang B, Liu J. Early antiviral treatment contributes to alleviate the severity and improve the prognosis of patients with novel coronavirus disease (COVID-19). *J Intern Med* 2020;(March), <http://dx.doi.org/10.1111/joim.13063>.
- [5] Kass DA, Duggal P, Cingolani O. Obesity could shift severe COVID-19 disease to younger ages. *Lancet Lond Engl* 2020;395:1544–5.
- [6] Heymsfield SB, Wadden TA. Mechanisms, pathophysiology, and management of obesity. *N Engl J Med* 2017;376:254–66.
- [7] Ryan DH, Ravussin E, Heymsfield S. COVID 19 and the patient with obesity—the editors speak out. *Obes Silver Spring Md* 2020;28:847.
- [8] Lighter J, Phillips M, Hochman S, Sterling S, Johnson D, Francois F. Obesity in patients younger than 60 years is a risk factor for Covid-19 hospital admission. *Clin Infect Dis Off Publ Infect Dis Soc Am* 2020, <http://dx.doi.org/10.1093/cid/ciaa415>.
- [9] Simonnet A, Chetboun M, Poissy J, Raverdy V, Noulette J, Duhamel A, et al. High prevalence of obesity in severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) requiring invasive mechanical ventilation. *Obes Silver Spring Md* 2020, <http://dx.doi.org/10.1002/oby.22831>.
- [10] Clemmensen C, Petersen MB, Sorensen TIA. Will the COVID-19 pandemic worsen the obesity epidemic? *Nat Rev Endocrinol* 2020;16:469–70.
- [11] Le Brocq S, Clare K, Bryant M, Roberts K, Tahrani AA, writing group form Obesity UK, et al. Obesity and COVID-19: a call for action from people living with obesity. *Lancet Diabetes Endocrinol* 2020;8:652–4.
- [12] Phillipou A, Meyer D, Neill E, Tan EJ, Toh WL, Van Rheenen TE, et al. Eating and exercise behaviors in eating disorders and the general population during the COVID-19 pandemic in Australia: Initial results from the COLLATE project. *Int J Eat Disord* 2020;53:1158–65.
- [13] Rajkumar RP. COVID-19 and mental health: a review of the existing literature. *Asian J Psychiatry* 2020;52:102066.
- [14] Yeo C, Ahmed S, Oo AM, Koura A, Sanghvi K, Yeo D. COVID-19 and Obesity—the Management of Pre- and Post-bariatric Patients Amidst the COVID-19 Pandemic. *Obes Surg* 2020;30:3607–9.
- [15] Finelli C. Obesity, COVID-19 and immunotherapy: the complex relationship! *Immunotherapy* 2020;12:1105–9.
- [16] Li H, Liu L, Zhang D, Xu J, Dai H, Tang N, et al. SARS-CoV-2 and viral sepsis: observations and hypotheses. *Lancet Lond Engl* 2020;395:1517–20.
- [17] Ryan RM, Deci EL. Intrinsic and extrinsic motivation from a self-determination theory perspective: definitions, theory, practices, and future directions. *Contemp Educ Psychol* 2020.
- [18] Deci E, Ryan R. *Intrinsic motivation and self-determination in human behavior*. New York: Plenum; 1985.
- [19] Deci EL, Ryan RM. Facilitating optimal motivation and psychological wellbeing across life's domains. *Can Psychol* 2008;49:114–23.
- [20] Silva MN, Vieira PN, Coutinho SR, Minderico CS, Matos MG, Sardinha LB, et al. Using self-determination theory to promote physical activity and weight control: a randomized controlled trial in women. *J Behav Med* 2010;33:110–22.
- [21] Silva MN, Markland D, Carraça EV, Vieira PN, Coutinho SR, Minderico CS, et al. Exercise autonomous motivation predicts 3-yr weight loss in women. *Med Sci Sports Exerc* 2011;43:728–37.
- [22] Slovinec D'Angelo ME, Pelletier LG, Reid RD, Huta V. The roles of self-efficacy and motivation in the prediction of short- and long-term adherence to exercise among patients with coronary heart disease. *Health Psychol Off J Div Health Psychol Am Psychol Assoc* 2014;33:1344–53.
- [23] Prochaska JO, Velicer WF. The transtheoretical model of health behavior change. *Am J Health Promot AJHP* 1997;12:38–48.
- [24] Norcross JC, Krebs PM, Prochaska JO. Stages of change. *J Clin Psychol* 2011;67:143–54.
- [25] Sutton K, Logue E, Jarjoura D, Baughman K, Smucker W, Capers C. Assessing dietary and exercise stage of change to optimize weight loss interventions. *Obes Res* 2003;11:641–52.
- [26] Armstrong MJ, Mottershead TA, Ronsley PE, Sigal RJ, Campbell TS, Hemmelgarn BR. Motivational interviewing to improve weight loss in overweight and/or obese patients: a systematic review and meta-analysis of randomized controlled trials. *Obes Rev Off J Int Assoc Study Obes* 2011;12:709–23.
- [27] Christie D, Channon S. The potential for motivational interviewing to improve outcomes in the management of diabetes and obesity in paediatric and adult populations: a clinical review. *Diabetes Obes Metab* 2014;16:381–7.
- [28] Patrick H, Williams GC. Self-determination theory: its application to health behavior and complementarity with motivational interviewing. *Int J Behav Nutr Phys Act* 2012;9:18.
- [29] Woo S, Park KH. Motivating children and adolescents in obesity treatment. *J Obes Metab Syndr* 2020, <http://dx.doi.org/10.7570/jomes20026>.
- [30] The diabetes prevention program (DPP). *Diabetes Care* 2002;25:2165–71.
- [31] Gregg EW, Chen H, Wagenknecht LE, Clark JM, Delahanty LM, Bantle J, et al. Association of an intensive lifestyle intervention with remission of type 2 diabetes. *JAMA* 2012;308:2489–96.
- [32] Selçuk-Tosun A, Zincir H. The effect of a transtheoretical model-based motivational interview on self-efficacy, metabolic control, and health behaviour in adults with type 2 diabetes mellitus: a randomized controlled trial. *Int J Nurs Pract* 2019;25:e12742.
- [33] Kabat-Zinn Jon. *Full Catastrophe Living*; 1991.
- [34] Ruffault A, Czernichow S, Hagger MS, Ferrand M, Erichot N, Carette C, et al. The effects of mindfulness training on weight-loss and health-related behaviours in adults with overweight and obesity: A systematic review and meta-analysis. *Obes Res Clin Pract* 2017;11:90–111.
- [35] Ludwig DS, Kabat-Zinn J. Mindfulness in medicine. *JAMA* 2008;300:1350–2.
- [36] Chin B, Lindsay EK, Greco CM, Brown KW, Smyth JM, Wright AGC, et al. Psychological mechanisms driving stress resilience in mindfulness training: A randomized controlled trial. *Health Psychol Off J Div Health Psychol Am Psychol Assoc* 2019;38:759–68.
- [37] Mantzios M, Wilson JC. Mindfulness, eating behaviours, and obesity: a review and reflection on current findings. *Curr Obes Rep* 2015;4:141–6.
- [38] Carrière K, Khoury B, Günak MM, Knäuper B. Mindfulness-based interventions for weight loss: a systematic review and meta-analysis. *Obes Rev Off J Int Assoc Study Obes* 2018;19:164–77.
- [39] Wansink B, Painter JE, North J. Bottomless bowls: why visual cues of portion size may influence intake. *Obes Res* 2005;13:93–100.
- [40] Ryan RM, Deci EL. *Self-determination theory: basic psychological needs in motivation, development, and wellness*; 2017.
- [41] Donald JN, Bradshaw EL, Ryan RM, Basarkod G, Ciarrochi J, Duineveld JJ, et al. Mindfulness and Its Association With Varied Types of Motivation: A Systematic Review and Meta-Analysis Using Self-Determination Theory. *Pers Soc Psychol Bull* 2020;46:1121–38.
- [42] Gazelle G, Liebschutz JM, Riess H. Physician burnout: coaching a way out. *J Gen Intern Med* 2015;30:508–13.
- [43] O'Hara VM, Johnston SV, Browne NT. The paediatric weight management office visit via telemedicine: pre- to post-COVID-19 pandemic. *Pediatr Obes* 2020;15:e12694.
- [44] Patel ML, Wakayama LN, Bass MB, Breland JY. Motivational interviewing in eHealth and telehealth interventions for weight loss: a systematic review. *Prev Med* 2019;126:105738.
- [45] Armstrong S, Mendelsohn A, Bennett G, Taveras EM, Kimberg A, Kemper AR. Texting Motivational Interviewing: A Randomized Controlled Trial of Motivational Interviewing Text Messages Designed to Augment Childhood Obesity Treatment. *Child Obes Print* 2018;14:4–10.
- [46] Kwon C-Y, Kwak H-Y, Kim JW. Using mind-body modalities via telemedicine during the COVID-19 crisis: cases in the Republic of Korea. *Int J Environ Res Public Health* 2020;17.