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## **Can lifestyle interventions improve Canadian men's mental health? Outcomes from the HAT TRICK program**

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## **ABSTRACT**

Engaging men in mental health promotion can be difficult because of reticence about help-seeking, especially for gender neutral programs. Developments in men's health research has pointed to the success of gender-sensitised programs to increase men's engagement in healthy lifestyle interventions targeting physical activity and healthy eating; however, less is known about the impact of these interventions on men's mental health. This study explored changes to men's depression risk and health-related quality of life at post-intervention (12 weeks) and 9-month follow-up, after participating in HAT TRICK, a gender-sensitised lifestyle intervention for overweight men. Participants completed validated self-report measures of mental health at baseline, post-intervention (12 weeks), and 9-month follow-up. Men's scores on the Male Depression Risk Scale (MDRS) and the SF-12 questionnaire, including physical health (PH12) and mental health (MH12) composite scores, were analysed using mixed linear models to assess linear trends. At baseline, men (N=62) had a mean age of 50.98 (SD = 10.09) years and BMI of 35.87 (SD = 5.51) kg/m<sup>2</sup>. Results show that both the MDRS and the MH12 showed improvements in participants' mental health, with significant linear trends ( $p = .003$ ;  $p = .003$ ) qualified with significant quadratic trends over time ( $p = .02$ ;  $p = .03$ ). There were no significant changes in the PH12 over time. Gender-sensitised programs for overweight men, such as HAT TRICK, are a promising approach to positively influence components of men's mental health, with the potential for sustained improvements over the long-term.

## INTRODUCTION

Poor mental health among men, including depression and anxiety, is a leading contributor to men's burden of disease globally (Baker *et al.*, 2014). It is reported that almost 10% of Canadian men will experience significant mental health challenges during their life, with approximately one million Canadian men suffering from major depression each year (Statistics Canada, 2018, Gravel *et al.*, 2005). Confounding men's poor health outcomes is the bidirectional relationship between excess body weight and poor mental health outcomes (Pan *et al.*, 2012). For instance, overweight and obesity is associated with decreased mental health and well-being and recursively, stress, anxiety, and depression may lead to unhealthy behaviours (e.g., poor diet, physical inactivity, social isolation) and weight gain (Errisuriz *et al.*, 2016, Mouchacca *et al.*, 2013).

Men's mental health promotion is challenged by gender-related barriers. For example, traditional masculine values of stoicism and independence can contribute to men's reticence towards help-seeking behaviours and formal psychological support (Seidler *et al.*, 2016, Wang *et al.*, 2013). As a result, men may avoid taking action altogether or engage in alternative strategies including substance use to manage their mental health. Proudfoot *et al.* (Proudfoot *et al.*, 2015) found that two of the most commonly reported strategies used by men for preventing and managing mental health symptoms were physical activity and healthy eating. There is convincing evidence that engaging in regular physical activity and healthy eating may help to prevent and manage stress, anxiety, and depression, and increase self-esteem and overall health-related quality of life (Balchin *et al.*, 2016, Cooney *et al.*, 2013, Jayakody *et al.*, 2014, Stonerock *et al.*, 2015, Vuillemin *et al.*, 2005, Wijndaele *et al.*, 2007). Thus, engaging men in healthy lifestyle change may provide unique opportunities to improve men's mental health while avoiding gender-related barriers for seeking help.

Interest in men's health has led to the development of health promotion strategies targeted at engaging men in healthy lifestyle programs. Utilising a gender-sensitised approach, with consideration to men's values, preferences, and interests, has been found to support men with making health behaviour changes (Bottorff *et al.*, 2015, Oliffe *et al.*, 2019, Sharp *et al.*, 2020b). For instance, gender-sensitised engagement strategies such as using a male-only group-based format and encouraging humour, banter, and friendly competition during these sessions have been identified as important elements to program uptake and sustainability (Bottorff, *et al.*, 2015, Hunt *et al.*, 2020, Hunt *et al.*, 2013). There is also the potential for programs to be gender-transformative whereby improving health and changing negative gender norms at the same time (Greaves *et al.*, 2014). The importance of the gendered-social space offered within these programs, providing a sense of social connection, belonging, and camaraderie, has proven to be crucial to men's engagement (Oliffe, *et al.*, 2019). To date, results from intervention studies have focused on physical health and behavioural outcomes, demonstrating improvements in weight-related outcomes, physical activity, and diet (Gray *et al.*, 2013, Petrella *et al.*, 2017, Wyke *et al.*, 2015). However, little is known about how such programs impact men's mental health. A recent systematic review examining the impact of lifestyle interventions on men's mental health found only nine studies for inclusion in the review (Drew *et al.*, 2020). In addition to a limited number of eligible studies, only 26% reported significant mental health outcomes and the authors noted a lack of longitudinal follow-up for mental health outcomes.

Building on the success of gender-sensitised lifestyle interventions, the HAT TRICK program was developed to engage overweight, inactive men in physical activity, healthy eating and social connectedness. The program was delivered in collaboration with a major junior ice hockey team in the Canadian Hockey League. Primary outcomes, including changes to men's physical activity, diet, and social connectedness, from participating in HAT

TRICK are reported elsewhere (Caperchione *et al.*, 2020). Here, we explore secondary outcomes related to changes in mental health, including risk of depression and health-related quality of life among HAT TRICK participants.

## **METHODS**

### **Study Design**

This exploratory study utilised a pre-post, quasi-experimental design. The overarching aim of this pragmatic trial was to assess feasibility and explore an estimate of effectiveness; thus, in alignment with common practice for feasibility and pilot studies, a power calculation was not conducted (Billingham *et al.*, 2013, Bell *et al.*, 2018). A recruitment target of 60 participants (20 participants  $\times$  three consecutive intervention deliveries) was chosen and three cohorts of men completed HAT TRICK between December 2016 and January 2018. Recruitment methods included two media releases (i.e., newsprint and radio), a project-specific website, social media (e.g., Facebook posts shared on local pages, community event forums), advertising during ice hockey games and word of mouth. Interested individuals were encouraged to contact a member of the research team by email or telephone to confirm eligibility and enrol. Measures were taken on all men at baseline, post-intervention (12 week) and 9-month follow-up. Further details on HAT TRICK's recruitment and methodological protocol are detailed elsewhere (Caperchione *et al.*, 2017, Sharp *et al.*, 2020a). All participants provided informed consent prior to baseline assessments. Ethical approval was obtained from the University of British Columbia Okanagan Behavioral Research Ethics Committee (#H1600736) and this trial is registered with [clinicaltrials.gov](https://clinicaltrials.gov) (NCT03059199) and the International Clinical Trials Registry Platform (ISRCTN43361357).

### **Sample**

To be eligible, men had to be over the age of 35 years; self-report less than 150 minutes of physical activity per week and have a body mass index (BMI) of over 25kg/m<sup>2</sup>

with a pant waist size of 38” or greater. All participants were screened using the Physical Activity Readiness Questionnaire (PAR-Q+) and required to seek medical clearance from a physician if any underlying concerns were identified (Canadian Society for Exercise Physiology, 2012).

### **HAT TRICK Intervention**

HAT TRICK is a 12-week intervention focused on three specific components including physical activity, diet, and social connectedness. Content was gender-sensitised, drawing on constructs of Social Cognitive Theory (Bandura, 1986) and Self-Determination Theory (Teixeira *et al.*, 2012), and incorporated gender-based approaches such as humour, positive banter, and strength-based messaging (Bottorff, *et al.*, 2015). Throughout the program there was an emphasis on promoting social connectedness by fostering a sense of teamwork and camaraderie among the men during group-based activities and friendly competition. Small group activities were designed to encourage participants to share their experiences and challenges with making healthy changes as well as provide feedback and support to their peers. Components of the HAT TRICK intervention have been detailed elsewhere (Caperchione, *et al.*, 2017) and are summarised here:

- Weekly 90-minute, group-based sessions including targeted health education regarding physical activity, healthy eating, and behaviour change techniques (i.e., goal setting, self-monitoring).
- Progressive physical activity (i.e., increasing in duration and intensity on a weekly basis) inclusive of a variety of ‘men-friendly’ activities (e.g., walking, resistance training, ball hockey).
- Weekly challenges, including physical activity (e.g., increase weekly steps by 500/day) and healthy eating goals (e.g., choose water instead of sugary drinks on at least 3 days of the week).

- HAT TRICK Playbook, a print-based informational resource booklet with tailored messaging concerning physical activity, healthy eating and behaviour change as techniques (e.g., goal setting, social support, self-monitoring) well as weekly physical activity and dietary tracking logs.
- FitBit Charge HR™, used to self-monitor daily steps, heart rate, and minutes of moderate-to-vigorous physical activity.

## **Measures**

### *Participant characteristics*

Age, ethnic background, level of education, marital status, main activity (i.e., full time or part time work, caring for household, retired), occupation and household income were self-reported. Weight and height were measured at baseline by a trained research assistant and used to calculate BMI to assess eligibility requirements.

### *Depression Risk*

Participant mental health was assessed using the Male Depression Risk Scale (MDRS) (Rice *et al.*, 2013). The MDRS is a valid and reliable 22-item, 7 point Likert scale questionnaire (0 (not at all) – 7 (almost always)). The total score of the MDRS is a summation of six subscales: emotional suppression, drug use, alcohol use, anger and aggression, somatic symptoms and risk-taking. Higher scores indicate a greater risk of depression.

### *Health-related Quality of Life*

Quality of life was assessed using the SF-12 (Ware Jr *et al.*, 1996), which contains two overarching components (physical health and mental health), and has been shown to be valid and reliable in a number of populations (Burdine *et al.*, 2000). The mental health component (MH12) is comprised of four components: vitality, social functioning, role-emotional and mental health. The physical health (PH12) component is also comprised of

four components: physical functioning role-physical, bodily pain and general health. Components are scored from 0 to 100, with higher scores indicating better health.

### **Data Analysis**

Demographic data were analysed descriptively. Dependent variable linear and quadratic trends were analysed across baseline, post-program and 9-month follow-up using multi-level modelling (MLM) (Casals *et al.*, 2014). Linear terms were used to assess change over time on the dependent variable and, to qualify these trends, quadratic terms were used to assess if the change accelerated or decelerated over time. Descriptive statistics were used to identify variables with outliers ( $\pm 3$  standard deviations from the mean). Initial modelling began with linear and quadratic components and a random effect for the intercept estimated on the linear term, to assess the shape of growth trajectories and to assess whether the means of the MDRS, MH12 and PH12 measures differed across time. Restricted maximum likelihood was used for the estimation method. Covariance estimates were assessed to determine if a random participant intercept was appropriate for the model. Models were re-run if covariance estimates suggested no between participant variability. Differing covariance structures were assessed in an attempt to define the best model as by the smallest Akaike's Information Criterion (AIC). Analyses were run using SPSS version 26.

## **RESULTS**

### **Descriptive Characteristics**

Sixty-two male participants with a mean age of 50.98 (SD = 10.09) years and BMI of 35.87 (SD = 5.51) kg/m<sup>2</sup> completed measures at baseline; 58 completed post program measures, of which 54 completed 9-month follow-up measures. Full descriptive characteristics are shown in Table 1. Means and standard deviations for dependent variables are shown seen in Table 2.

**Table 1. Descriptive Characteristics of Men at Baseline (n = 62)**

Measure		Frequency (n)	Percentage (%)
Highest Level of Education	Some high school or less	1	1.6
	High school diploma	13	20.9
	College or technical / University degree	48	77.4
Household Income Before Taxes	\$25,000 – \$49,999	6	9.7
	\$50,000 – \$99,999	26	41.9
	\$100,000 or more	30	48.4
Main Activity	Full time work	50	80.6
	Part time work	1	1.6
	Caring for family/managing household/retired	11	17.7
Marital Status	Married/domestic partnership	54	87.1
	Divorced/separated	5	8.1
	Single/never married/widowed	3	4.8
Ethnic Background	Caucasian	57	91.9
	Metis	1	1.6
	South Asian	1	1.6
	West Asian	1	1.6
	Other	2	3.2
MDRS	Low Risk	49	79.0
	Elevated Risk	12	19.4
	High Risk	1	1.6
	Extreme Risk	0	0.0
BMI Category	Overweight	5	8.1
	Obese Class 1	21	33.9
	Obese Class 2	25	40.3
	Obese Class 3	11	17.7

**Table 2. Means, Standard Deviations and Effect Sizes of Dependent Variables**

Measure	Baseline	12-weeks	9-month Follow-up	Cohen's d
	Mean (SD) (n = 62)	Mean (SD) (n = 57)	Mean (SD) (n = 54)	Baseline vs (12 weeks – 9 month)
MDRS <sup>L,Q</sup>	<b>21.48 (13.6)</b>	<b>16.67 (13.12)</b>	<b>17.31 (13.64)</b>	<b>(0.35 - 0.30)</b>
PH12	48.31 (6.73)	49.12 (7.04)	49.98 (6.21)	(0.11 - 0.26)
MH12 <sup>L,Q</sup>	<b>52.56 (6.00)</b>	<b>54.34 (5.65)</b>	<b>54.6 (5.00)</b>	<b>(0.31 - 0.29)</b>

<sup>L</sup> – Significant linear trend

<sup>Q</sup> – Significant quadratic trend

### Depression Risk

After the removal of outliers, initial multilevel modelling showed total MDRS had significant linear decreasing trend over time ( $p = .003$ ), qualified with significant quadratic trend ( $p = .02$ ). See Table 3.

### Health Related Quality of Life

The MH12 showed significant linear growth over time ( $p = .003$ ), qualified with significant quadratic trend ( $p = .03$ ). The PH12 showed no significant linear growth over time. See Table 3.

**Table 3. Linear and Quadratic Trends of Dependent Variables**

Dependent Variable		<i>t</i> (df)	Estimates of Fixed Effects	
			Estimate (Std. Error)	95% CI
MDRS	Intercept	12.42 (91.40)	21.81 (1.76)	<b>18.33 to 25.30</b>
	Linear	-3.13 (73.07)	-7.37 (2.35)	<b>-12.20 to -2.68</b>
	Quadratic	2.47 (59.03)	2.74 (1.11)	<b>0.55 to 4.99</b>
PH12	Intercept	57.42 (124.71)	48.31 (0.84)	46.65 to 49.98
	Linear	0.59 (102.60)	0.78 (1.31)	-1.81 to 3.37
	Quadratic	0.05 (93.99)	0.03 (0.61)	-1.17 to 1.23
MH12	Intercept	74.55 (96.70)	52.56 (0.70)	<b>51.01 to 54.01</b>
	Linear	3.06 (105.56)	2.58 (0.84)	<b>0.84 to 4.59</b>
	Quadratic	-2.14 (98.48)	-0.83 (0.39)	<b>-1.83 to -0.03</b>

## DISCUSSION

HAT TRICK was designed as a gender-sensitised intervention aimed at attracting and engaging overweight, inactive men in healthy lifestyle change (i.e., physical activity, healthy eating, social connectedness). We show here that *mental health* improved after taking part in HAT TRICK, whereby participants' depression risk decreased and their mental health improved immediately post-intervention and improvements were maintained at 9-month follow-up. These findings contribute to emergent evidence that lifestyle interventions can help to improve mental health in men (Drew, *et al.*, 2020, Kelly *et al.*, 2019). Despite HAT TRICK not directly targeting mental health through education or intervention, these results are notable given the longstanding challenges for targeting men's mental health promotion. In particular, among a sample of overweight men, where mental health is challenged, efforts targeted at improving and maintaining mental health are highly relevant. In light of these findings, we provide suggestions and considerations for future work in this important and developing area.

Men's mental illness endures significant societal and self-stigma, and by extension programs naming an explicit focus on mental health promotion can be off putting for men (Oliffe *et al.*, 2016). A benefit of HAT TRICK and similar men-only, lifestyle group-based programs is that the emphasis on physical activity was familiar and congruent with many men's masculine values. Moreover, leading with the 'doing' of physical activity appealed to men and resonated with their experiences of team-based endeavours. These familiar 'masculine' milieus afforded the space and comradery to bolster mental health and reduce depression risk. We suggest that *not* forefronting mental health as a program goal was important to HAT TRICK's recruitment efforts; rather, building group rapport within the program may (eventually) afford opportunities to engage men in content and conversations about men's stresses and their strategies for addressing such challenges. In line with Oliffe et

al. (Olliffe, *et al.*, 2019), the language of HAT TRICK should work with participants' own literacy ('stress') rather than invoking medical constructs (mental health and illness). Of course, the timing for addressing men's mental health is important, and based on our process evaluation data (Sharp *et al.*, 2018) men's openness to discussing such matters was more evident in the latter half of the program (weeks 6-12). These findings respond, in part, to Drew et al.'s (Drew, *et al.*, 2020) call for research to better understand connections between lifestyle interventions and men's mental health and align with others who have begun to include mental health components (e.g., stress management workshops) within the later portion of intervention delivery (Carroll *et al.*, 2018). Future work might usefully explore the utility of these mental health literacy and timing insights as well as the acceptability of other program components, including sportsmen testimonials and vignettes (e.g., well-known hockey figures sharing personal experiences concerning their own mental health and wellbeing) to engage men with avenues for reaching out to other men who might be experiencing mental health challenges.

While mean scores for mental health indicators were not at elevated risk at baseline, observed improvements in men's mental health over the course of this community-based program and were maintained at 9 month follow-up are noteworthy. Importantly, these results were obtained with a group of overweight men who are known to be at high risk for mental health issues. In addition, these findings suggest that tailored lifestyle programs like HAT TRICK provide a promising avenue for promotion of men's mental wellbeing that may prevent or mitigate depression and other mental health issues in the future. It is difficult to speculate on the causal mechanisms underpinning these improvements in men's mental health. Despite robust evidence of the positive effects of lifestyle interventions focusing on physical activity and diet on psychological health in both healthy populations and those experiencing mental health problems (Dale *et al.*, 2014), the causal mechanisms have not

been clearly established. Nevertheless, there are several possible factors that may explain improvements in men's mental health observed in this study. While physical activity is associated with several physiological mechanisms (e.g., neurotransmitter release, inflammation reduction) that may affect mental health (Kandola *et al.*, 2019, Teychenne *et al.*, 2020), it is also clear that other aspects of the physical activity experience may influence mental health outcomes (e.g., sense of belonging, social interactions)(Biddle *et al.*, 2007). The therapeutic value of peer support enabled through this gender-sensitised intervention has been observed in other community-based men's health promotion programs (Oliffe, *et al.*, 2019). It is also possible that increases in self-efficacy associated with simultaneous improvements in physical activity and diet may have extended to other life changes as well as the ability to use physical activity as a coping mechanism post intervention. As well, the use of a variety of behaviour change techniques (e.g., action planning, goal setting, self-monitoring) to promote maintenance of lifestyle changes may have contributed longer-term mental health benefits. Since HAT TRICK offers an important alternative that is acceptable to men who may be at risk for mental health issues, there is value in identifying essential intervention components associated with observed improvements in mental health in future research.

The study has a number of strengths. First, using validated instruments to measure mental health and with follow-up to 9 months, we have been able to show substantial potential mental health gains through participation in a 12-week group-based program designed to promote healthy lifestyle changes (including increased physical activity) and social connectedness with others (in particular men with a shared interest in ice hockey). Secondly, attrition between data collection points was low; 94% and 87% of those measure at baseline took part in the post-program and 9-month follow-up measurement. It is plausible

that the small minority who did not provide follow-up data did not experience improvements in their mental health.

The study also has limitations inherent in its pre/post study design. Here we report findings from an exploratory study of men attending the first deliveries of the program at one club. To fully test whether the HAT TRICK program has sustained benefits for the mental health of men who are overweight and inactive, a multi-site randomised controlled trial powered to detect a difference in a specific measure of mental health (as the primary outcome) would be required. This study suggests that there would be merit in undertaking such a trial. Further, participants in this study were predominately Caucasian, potentially limiting transferability. Thoughtful consideration should be given to recruiting a more diverse sample whose access to such programs may be inhibited by health inequities.

## **CONCLUSION**

It is widely acknowledged that it is difficult to engage men in many health-promoting programs, although there have been recent notable successes for programs which take a gender-sensitised approach to recruitment, and in content and style of delivery. Evidence suggests that men's reluctance to engage with treatment or health-promoting services is likely to be most pronounced for mental health issues. This program, with its 'male-friendly', action-focused approach, which fosters social connections, positive banter and shared enjoyment of program components and context, appears to have great potential. Without an explicit focus on mental health, it shows improvements which could have significant benefit at the individual and population level, whilst simultaneously shifting a culture of silence amongst men about mental health issues. Future research could explore the most crucial pathways in a logic model to better understand which components of the program's content

and delivery drive these positive changes, and whether there are further components which could or should be added to maximise mental health gains.

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