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SAÚDE**



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**CARACTERÍSTICAS PSICOLÓGICAS
POSITIVAS NA SÍNDROME METABÓLICA:
ASSOCIAÇÃO COM A DIETA E COM FATORES
ANTROPOMÉTRICOS**

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Características Psicológicas Positivas na Síndrome Metabólica: Associação com a Dieta e com Fatores antropométricos

Tese submetida ao Programa de Pós-Graduação em Ciências da Saúde da Fundação Universidade Federal de Ciências da Saúde de Porto Alegre como requisito para a obtenção do grau de Doutora.

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“Se nos limitarmos a estudar a média, permaneceremos meramente medianos”.

Shawn Achor

Resumo

A prevalência de Síndrome Metabólica (SM) está aumentando em todo o mundo e a dietoterapia é parte fundamental no tratamento dessa doença. Visto que grande parte dos pacientes apresenta dificuldade na adesão às intervenções nutricionais, a investigação sobre a relação entre características psicológicas positivas, engajamento em comportamentos saudáveis e melhor saúde física é de relevância à área. O presente estudo objetivou avaliar bem-estar subjetivo, otimismo, esperança, autoestima e fatores de personalidade e a relação destes contrutos com mudanças constatadas na qualidade da dieta e em parâmetros antropométricos de indivíduos com SM submetidos a uma orientação nutricional. Foram avaliados 63 indivíduos (idade 55,3; DP $\pm$ 14,1), pacientes de um ambulatório hospitalar nutricional. Os dados de parâmetros antropométricos e recordatório alimentar de 24 horas, para posterior avaliação do Índice de Qualidade da Dieta Revisado (IQD-R), foram coletados na primeira consulta e no retorno da mesma, em média cinco meses depois. Os dados psicológicos positivos foram coletados na consulta inicial, e os de personalidade, avaliados por meio do Modelo dos Cinco Grande Fatores (CGF), na consulta de retorno, por meio de escalas validadas e normatizadas. Os resultados foram ajustados em relação aos escores de depressão dos pacientes, avaliados por meio do Inventário Beck de Depressão II (BDI-II). Foram avaliadas mudanças no IQD-R e nos fatores antropométricos, associando-os com os atributos psicológicos investigados. Os resultados indicaram que afetos positivos e esperança foram associados à melhora no IQD-R ($d=0,65$ e $d=0,58$, respectivamente). Também foi observada uma associação significativa entre otimismo e redução na circunferência abdominal ($d=0,56$). As associações mantiveram-se significativas mesmo após ajuste para o BDI-II ($p=0,022$, $p=0,037$ e $p=0,05$, respectivamente). Para os demais atributos avaliados, não foram observadas associações estatisticamente significativas. Com relação aos CGF de personalidade, embora tenham apresentado associações significativas com os indicadores de bem-estar subjetivo, não apresentaram associação significativa com a melhora no IQD-R ou com os parâmetros antropométricos avaliados. O estudo sugere que alguns atributos psicológicos podem apresentar maior influência no tratamento nutricional da SM, sendo de relevância a consideração destes na elaboração de futuras proposta de intervenções multidisciplinares que visem ao tratamento da síndrome metabólica.

Palavras-chave: Síndrome metabólica, Dieta, Bem-estar subjetivo, Otimismo, Esperança, Psicologia Positiva, Personalidade.

Abstract

The prevalence of Metabolic Syndrome (MetS) is increasing worldwide and diet therapy is a key part of treating this disease. Since most patients have difficulty in adhering to nutritional interventions, research on the relationship between positive psychological characteristics, engagement in healthy behaviors and better physical health is of relevance to the area. The objective of this study was to evaluate the associations between the attributes of Positive Psychology (optimism, hope, selfesteem, positive and negative affect and life satisfaction), personality traits and changes in diet quality and anthropometric parameters of individuals with MetS submitted to nutritional guidance. A total of 63 subjects (age 55.3, SD $\pm$ 14.1), patients from a nutritional hospital outpatient clinic were evaluated. The data of anthropometric parameters and food recall of 24 hours, for evaluation of the Brazilian Healthy Eating Index Revised (BHEI-R), were collected at the first visit and at the same time. Positive psychological data were collected at the initial consultation, and personality data were evaluated using the model of the Big Five Factors (BFF), in the return visit, using validated and standardized scales. The results were adjusted in relation to the patients' depression scores, evaluated using the Beck Inventory of Depression II (BDI-II). Changes in the diet quality, by the BHEI-R, and anthropometric factors were evaluated, associating them with the psychological attributes investigated. The results indicated that positive affect and hope were associated with improvement in the BHEI-R ($d = 0.65$ and $d = 0.58$, respectively). There was also a significant association between optimism and reduction in abdominal circumference ($d = 0.56$). Associations remained significant even after adjustment for BDI-II ($p = 0.022$, $p = 0.037$ and $p = 0.05$, respectively). For the other evaluated attributes, no statistically significant associations were observed. Regarding personality CGF, although they showed significant associations with subjective well-being indicators, they were not significantly associated with improvement in the BHEI-R or with the anthropometric parameters evaluated. The study suggests that some psychological attributes may present major influence in the nutritional treatment of MetS, therefore, it is of relevance the consideration of these in the elaboration of future proposals of multidisciplinary interventions that aim at the treatment of the metabolic syndrome.

Keywords: Metabolic syndrome, Diet, Subjective well-being, Optimism, Hope, Positive Psychology, Personality.

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1 CONTEXTUALIZAÇÃO DO ESTUDO

A Síndrome Metabólica (SM) é um conjunto de fatores inter-relacionados que levam à doença cardiovascular e ao Diabetes, sendo um importante problema clínico e de saúde pública. Esses fatores incluem dislipidemia, aumento da pressão arterial, níveis de triglicérides elevados, níveis de lipoproteína de alta densidade baixos e obesidade, principalmente com adiposidade central (ALBERTI et al., 2009). De acordo com a Organização Mundial de Saúde, um pequeno conjunto de fatores de risco, que responde pela maioria das mortes por doenças crônicas não transmissíveis, inclui o tabagismo, o consumo excessivo de bebidas alcoólicas, a inatividade física e também o consumo alimentar inadequado (WHO, 2014). Especificamente na SM, os dois principais fatores de risco são o sobrepeso e a obesidade, uma vez que ambos parecem preceder ao surgimento dos demais fatores de risco para a síndrome (O'NEILL; O'DRISCOLL, 2014).

Dados publicados na última Pesquisa de Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico - Vigitel Brasil (BRASIL, 2017) mostraram que o excesso de peso vem aumentando em adultos continuamente desde meados da década de 1970, e, atualmente, é encontrado em 53,8% dos brasileiros. O padrão da disponibilidade domiciliar de alimentos, apresentado anteriormente pela Pesquisa de Orçamento Familiar - POF 2008-2009, já mostrava que havia excesso de açúcares e gorduras, principalmente as saturadas, e presença insuficiente de frutas, legumes e verduras na dieta do brasileiro. Este padrão apresentado, e a comparação com dados da POF anterior, são consistentes com a importante e crescente participação das doenças crônicas não transmissíveis no perfil de morbi-mortalidade da população brasileira e com a elevada e crescente prevalência de excesso de peso e obesidade no país, o que confere alta prioridade para a promoção da alimentação saudável na agenda atual (LEVY et al., 2012).

Considerando essas questões, estudos vêm avaliando como e qual seria a dieta mais apropriada para auxiliar na redução desse quadro (BIANCHI et al., 2008; SHAB-BIDAR et al., 2018). No Brasil, com o intuito de contribuir para a prevenção de mortes prematuras decorrentes de doenças cardíacas e de outras doenças crônicas não transmissíveis, tais como diabetes, hipertensão e obesidade, o Ministério da Saúde publicou o Guia Alimentar para a População Brasileira. Esse guia reúne as primeiras diretrizes alimentares oficiais para a população, orientando uma alimentação saudável, dentro do padrão e dos hábitos alimentares comuns aos brasileiros (BRASIL, 2006). Especificamente para a SM, a Sociedade Brasileira de Hipertensão empenhou-se na estruturação e publicação da I Diretriz Brasileira de

Diagnóstico e Tratamento da Síndrome Metabólica, contando com o apoio e a participação efetiva de quatro outras Sociedades médicas de abrangência nacional: Sociedade Brasileira de Cardiologia, Sociedade Brasileira de Endocrinologia e Metabologia, Sociedade Brasileira de Diabetes e Associação Brasileira para Estudos da Obesidade. O objetivo dessa diretriz foi definir critérios para o diagnóstico e o tratamento da síndrome metabólica, adaptados à realidade brasileira (SBC, 2005).

Sabe-se que o tratamento e a prevenção da SM e da obesidade seguem padrões semelhantes e são considerados um importante desafio clínico e de saúde pública em todo o mundo (KAUR, 2014). Frente a esse contexto, a qualidade da dieta possui um papel fundamental na prevenção da SM e de seus componentes individuais (KASTORINI et al., 2011), e os cuidados voltados para o tratamento podem levar a um bom prognóstico e a uma alta qualidade de vida. Porém, estudos documentam uma considerável resistência por parte dos pacientes para aderir a uma ou mais das recomendações de autogestão de tratamento, que são: uso de medicamentos, atividade física ou alimentação saudável (HUFFMAN et al., 2015; SANTA-HELENA; NEMES; NETO, 2010).

Neste sentido, observa-se que fatores psicológicos podem desempenhar um papel fundamental na adesão (ou não) ao tratamento. A literatura apresenta diversas evidências de que sintomas depressivos e ansiedade têm sido associados à não adesão à dieta, à atividade física, à medicação e a outras medidas de prevenção secundária da SM (HUFFMAN et al., 2014; STRANGES et al., 2014). Porém, recentemente a ciência psicológica tem investigado também indicadores de saúde mental positiva como preditores de saúde geral e de longevidade, dentre os quais estão o bem-estar subjetivo, o otimismo e a autoestima, entre outros atributos (STRANGES et al. 2014).

Investigações nessa vertente vinculam-se ao movimento denominado Psicologia Positiva (PP), que visa a ampliar o foco dos estudos psicológicos, tradicionalmente voltados para os fatores de risco às doenças físicas e mentais (SELIGMAN; CSIKSZENTMIHALYI, 2000). Iniciado no ano 2000, esse movimento vem apresentando um expressivo crescimento nas últimas duas décadas em diversos países (REPPOLD, GURGEL, SCHIAVON, 2015), em especial no contexto da avaliação da saúde. Seligman (2008), um dos principais pesquisadores da PP, em uma publicação intitulada “Saúde Positiva”, propôs especificamente que os estudos sobre saúde física adotassem a perspectiva de uma visão positiva, investigando atributos pessoais e sociais que levassem a resultados positivos em prol dos indicadores de saúde, bem-estar, engajamento em situações de promoção de saúde e prevenção de doenças.

Não obstante esse estímulo e o incremento a investigações no campo da saúde a partir dessa perspectiva, ressalta-se que estudos referentes à interferência de aspectos psicológicos positivos no contexto da Síndrome Metabólica ainda são escassos e relativamente negligenciados na literatura. São encontrados alguns estudos referentes a doenças relacionadas a SM, mas não à síndrome em si. Revisões e meta-análises recentes demonstram, por exemplo, que o bem-estar subjetivo (BES) é um fator protetor para doenças crônicas e mortalidade (STEPTOE; DEATON; STONE, 2015; GANA et al., 2016; MARTÍN-MARIA et al., 2017). Nessa linha, Diener (2017) ressalta, com base em diversos estudos clínicos, que o BES tem grande impacto sobre a saúde física e que seus mecanismos de ação envolvem alterações tanto em comportamentos de saúde, quanto no funcionamento dos sistemas imunológico e cardiovascular.

O BES é uma medida descritiva do que os sujeitos pensam sobre suas condições de vida e o que sentem em relação a isso (GIACOMONI, 2004). Envolve a avaliação da satisfação de vida, o componente cognitivo do BES, e dos afetos positivos e negativos, ambas medidas ortogonais e componentes emocionais do construto (RYFF; KEYES, 1995; NUNES; HUTZ; GIACOMINI, 2009). Com o desenvolvimento da pesquisa sobre BES, diversas linhas de investigação têm demonstrado ser essa variável relacionada a fatores extrínsecos, como características sociodemográficas, culturais e eventos de vida, e intrínsecos, como características genéticas, estilos cognitivos, estratégias de *coping* e outros atributos psicológicos (WOYCIEKOSKI; NATIVIDADE; HUTZ, 2014).

Nessa perspectiva, a personalidade é compreendida por alguns autores como o principal determinante do BES, sendo responsável, em alguns estudos estruturados sob o modelo dos Cinco Grandes Fatores (CGF), por até 50% da variância do BES (LUCAS; DIENER, 2008). O modelo explicativo dos CGF para personalidade, proposto por Costa e McCrae (1992), e também conhecido como *Big Five*, tem sido amplamente utilizado nos estudos que avaliam a relação entre traços e BES. Versão moderna da Teoria dos Traços, o modelo é considerado internacionalmente como o mais parcimonioso e completo para descrever características de personalidade de forma consistente e replicável (NUNES; HUTZ; GIACOMINI, 2009). Dentre os CGF, os traços neuroticismo e extroversão aparecem nesses estudos como os mais fortes preditores de BES (GARCIA; ERLANDSSON, 2011; WOYCIEKOSKI; NATIVIDADE; HUTZ, 2014).

O modelo dos CGF postula que a personalidade pode ser compreendida a partir de cinco dimensões, as quais são avaliadas no Brasil pela Bateria Fatorial de Personalidade - BFP (NUNES; HUTZ; NUNES, 2010). Os fatores ou dimensões avaliados por meio desse

instrumento são a *Extroversão* – tendência a buscar estimulação na interação com outros, a ser ativo e comunicativo; a *Socialização* – tendência a demonstrar empatia, altruísmo e comportamento pró-social; a *Realização* – tendência ao autocontrole na realização de tarefas que conduzem a um objetivo, a ser disciplinado e organizado; o *Neuroticismo* - tendência a demonstrar instabilidade emocional, a experimentar emoções negativas, ansiedade, depressão e a *Abertura* – tendência a experimentar coisas novas, a demonstrar curiosidade e complexidade intelectual (NATIVIDADE; HUTZ, 2015; NUNES; HUTZ; NUNES, 2010).

Aplicados à área da avaliação da saúde física e nutricional, os estudos que abordam a relação entre BES e personalidade também têm apresentado resultados consistentes, embora ainda sejam necessárias mais investigações abrangendo o mecanismo envolvidos na aquisição/manutenção de comportamentos de saúde e nos desfechos relativos à saúde física. Um estudo recente ilustrativo é a metassíntese desenvolvida por Strickhouser, Zell & Krizan (2017) com base em trinta e seis meta-análises que avaliavam a relação entre os Cinco Grandes Fatores (CGF) de personalidade e variáveis de saúde e bem-estar. Um modelo não ponderado foi usado para agregar dados através de meta-análises. Quando inseridos simultaneamente, os CGF foram moderadamente associados à saúde geral (múltiplos $\bar{R} = 0,35$). Conforme esperado, as relações entre personalidade e saúde foram relativamente fortes quando se examinaram os resultados de saúde mental ($\bar{R} = 0,43$), relativamente fracas quando se examinaram os resultados de saúde física ($\bar{R} = 0,06$) e intermediárias no exame de comportamentos de saúde ($\bar{R} = 0,18$).

Além do BES, outros atributos psicológicos positivos, como o otimismo, a esperança e a autoestima também têm sido considerados variáveis teoricamente importantes na proteção contra doenças crônicas, embora sejam menos estudadas no contexto da saúde física (SCHIAVON et al., 2016; LUNDGREN et al., 2015). Esses atributos estão associados, em pesquisas empíricas, a um maior engajamento em comportamentos de saúde adequados, como, por exemplo, adoção de uma alimentação saudável (KELLONIEMI; LAITINEN, 2005; BOEHM; KUBZANSKY, 2012).

Considerando os dados expostos, ressalta-se a importância do estudo sobre atributos psicológicos positivos no contexto da SM, sobretudo no que se refere ao impacto desses atributos no tratamento nutricional da síndrome. Nesta perspectiva, a presente tese objetivou avaliar a associação entre indicadores pessoais positivos e a resposta ao tratamento nutricional de pacientes com Síndrome Metabólica. Em específico, investigou-se a relação entre atributos estudados pela Psicologia Positiva (Afetos Positivos e Negativos, Satisfação com a Vida, Otimismo, Esperança e Autoestima) e melhora na qualidade da dieta e nos parâmetros

antropométricos de indivíduos brasileiros com SM submetidos à orientação nutricional em um ambulatório hospitalar. A avaliação da qualidade da dieta foi realizada por meio do Índice de Qualidade da Dieta Revisado (IQD-R), instrumento que propicia mensurar variados fatores de riscos dietéticos para doenças crônicas, permitindo, simultaneamente, avaliar e monitorar a dieta em nível individual ou populacional (PREVIDELLI et al., 2011). Em consonância com evidências anteriores dos artigos já citados, foi testada a hipótese segundo a qual indivíduos que apresentassem melhores indicadores nos construtos próprios da Psicologia Positiva, apresentariam melhora na qualidade da dieta e nos fatores antropométricos no retorno à consulta com profissional nutricionista, após orientação nutricional prévia individualizada. Esta tese buscou ainda investigar como a relação entre BES e os fatores de personalidade podem interferir na melhora da qualidade da dieta e de parâmetros antropométricos de indivíduos com SM.

Produção Científica Derivada da Tese

A produção científica derivada do estudo realizado para a presente tese apresenta, até o momento, quatro artigos científicos que integram a tese. O primeiro deles, intitulado “*Optimism and Hope in Chronic Disease: A Systematic Review*” foi publicado em 04 de janeiro de 2017 no periódico *Frontiers in Psychology*, revista de Psicologia Multidisciplinar mais citada no mundo, segundo dados disponíveis no site da revista, e que apresenta fator de impacto 2,089. O segundo artigo, sob o título “*Positive psychological characteristics in metabolic syndrome associated with prospect changes in diet and anthropometric factors*” foi submetido para a revista *Plos One*. Definida como a primeira revista multidisciplinar de acesso aberto do mundo, esse periódico apresenta amplo escopo, incluindo estudos interdisciplinares e de replicação, bem como resultados negativos, igualmente importantes para avanço das linhas de pesquisa na área da saúde. Seus critérios de publicação são baseados em altos padrões éticos e no rigor da metodologia e das conclusões relatadas. Dados sobre fator de impacto não são divulgados, e, de acordo com informações divulgadas no seu site, a PLoS One apoia a Declaração de San Francisco sobre Avaliação de Pesquisa e não promove os Fatores de Impacto da revista. Contudo, no qualis na área de Medicina II (na qual se insere o PPG ao qual essa tese está vinculada), a revista é classificada como A2.

O terceiro artigo que integra a tese, intitulado “*Relationship Between Diet Quality, Subjective Well-being, and Personality in Metabolic Syndrome*” foi submetido para o *Journal of Human Nutrition and Dietetics*. Uma revista com fator de impacto de 2,681, internacional e multidisciplinar, com publicação de artigos nas áreas diversas áreas da Nutrição. O escopo da

revista reconhece a natureza diversa da nutrição e pesquisa dietética e considera material de todas as facetas empregando uma gama de metodologias, como epidemiologia da saúde pública, avaliação dietética, intervenções dietéticas, prática dietética, bioquímica nutricional, entre outros.

Por fim, o último artigo que integra a tese, intitulado “Aspects of subjective well-being and its measuring instruments in obesity: A systematic review”, foi submetido para a revista *Eating and Weight Disorders*. Uma revista científica cujo objetivo principal é criar um fórum internacional dedicado aos diversos setores de transtornos alimentares e obesidade e as relações significativas entre eles, apresentando fator de impacto 2,154.

Tendo em vista os resultados gerados pelo estudo desta tese, outros artigos científicos serão desenvolvidos futuramente. Todavia, para além da produção científica, considera-se que as ponderações formuladas a partir das especificidades metodológicas do estudo e dos resultados obtidos contribuiu para uma fomentar a proposta de uma compreensão mais interdisciplinarizada da SM e especificamente, da influência de atributos psicológicos na melhora da qualidade da dieta de pacientes com SM.

2 OBJETIVOS

Objetivo Geral

Avaliar, em uma amostra de indivíduos com síndrome metabólica, atributos psicológicos positivos, traços de personalidade e a relação dessas variáveis com mudanças constatadas na qualidade da dieta e em parâmetros antropométricos após orientação nutricional.

Objetivos Específicos

- Analisar a relação entre bem-estar subjetivo (BES), otimismo, esperança e autoestima, e a mudança na qualidade da dieta de pacientes com síndrome metabólica após orientação nutricional.
- Analisar a relação entre BES, otimismo, esperança e autoestima e a mudança nos fatores antropométricos (índice de massa corporal (IMC), peso corporal e circunferência abdominal) de pacientes com síndrome metabólica após orientação nutricional.
- Avaliar a relação entre personalidade, com base no modelo dos Cinco Grandes Fatores, e BES de pacientes com síndrome metabólica.
- Avaliar a relação entre personalidade, com base no modelo dos Cinco Grandes Fatores, e a mudança na qualidade da dieta e nos fatores antropométricos de pacientes com síndrome metabólica após orientação nutricional.

3 REVISÃO DE LITERATURA

3.1 Síndrome Metabólica

As doenças crônicas não transmissíveis (DCNT) compreendem um vasto grupo de condições que têm em comum o fato de possuírem origem multifatorial, com forte influência de fatores de risco comportamental, alguns modificáveis, outros não. As DCNT são um desafio crescente em todo o mundo, sendo que o Brasil acompanha tal tendência mundial. Estima-se que nos próximos 20 anos ocorra a duplicação da população idosa no Brasil, de 8 para 15% (GOULART, 2011). O impacto mais óbvio desse incremento é o aumento da incidência e prevalência de DCNT, que respondem a parcela principal dos óbitos e das despesas com assistência hospitalar no país, chegando a mais de 75% das mesmas, segundo Goulart (2011), no documento intitulado “Doenças crônicas não transmissíveis: estratégias de controle e desafios para os sistemas de saúde”, da Organização Pan-Americana de Saúde.

As epidemias globais de DCNT como diabetes tipo 2 e obesidade chamaram a atenção para um conjunto de desequilíbrios metabólicos predispostos pelo desequilíbrio no metabolismo de gordura (POTENZA; JEFFREY; MECHANICK, 2009). Este desequilíbrio ficou conhecido como Síndrome Metabólica (SM), um conjunto de fatores de risco para doenças cardiovasculares e Diabetes Mellitus Tipo 2, que ocorrem juntos com mais frequência do que apenas por acaso. Estes fatores incluem dislipidemia, aumento da pressão arterial, níveis de triglicérides elevados, níveis de lipoproteína de alta densidade baixos e obesidade, principalmente com adiposidade central (ALBERTI et al., 2009).

A primeira definição formalizada da SM foi elaborada pela Organização Mundial de Saúde em 1998 (ALBERTI et al., 1998). No entanto, o conceito de tal estado de doença existe há muitas décadas, sendo referido inicialmente por outras denominações, como “síndrome X”, “síndrome da resistência a insulina” e ainda “o quarteto mortal” (POTENZA; JEFFREY; MECHANICK, 2009). Após a definição da OMS, várias organizações propuseram critérios diagnósticos para a SM; entre elas, o Grupo Europeu para o Estudo da Resistência à Insulina, o Programa Nacional de Educação sobre o Colesterol - Terceiro Painel de Tratamento de Adultos (NCEP: ATPIII), a Associação Americana de Endocrinologia Clínica e a Federação Internacional de Diabetes (IDF). A multiplicidade de critérios propostos para diagnósticos de SM, no entanto, configurou-se como um fato que dificultou a padronização em informações para elaboração de novos estudos, bem como a orientação de diferentes profissionais da saúde (PARIKH; MOHAN, 2012). Em decorrência dessas divergências, foi publicado em 2009 um

artigo apresentando o resultado do consenso obtido em uma reunião entre várias organizações científicas de referência sobre o tema, na tentativa de unificar critérios. Nessas diretrizes, houve o consenso de que não deveria haver um componente obrigatório nas avaliações, mas que a medição da cintura continuaria a ser uma ferramenta útil de triagem preliminar. Três achados anormais, entre os cinco “marcadores”, qualificariam uma pessoa para a síndrome metabólica. Sendo assim, um único conjunto de pontos de corte ficou definido para todos os componentes, exceto a circunferência da cintura, para a qual concluíram que ainda seria necessários trabalhos adicionais (ALBERT et al, 2009).

À luz da discussão sobre parâmetros de avaliação, observa-se que a prevalência de SM está aumentando em todo o mundo, com variação percentual de 13,6% a 46%, dependendo do critério de diagnóstico aplicado e da população avaliada (SALAROLI et al., 2013). No Brasil, uma revisão sistemática sobre a prevalência da SM no país indicou uma média ponderada de 29,6% (intervalo: 14,9% - 65,3%) entre dez estudos transversais selecionados (VIDIGAL et al., 2013). De fato, a SM é considerada um dos maiores desafios para a saúde pública em todo mundo, visto que aumenta a mortalidade geral em 1,5 vezes, e a mortalidade cardiovascular em 2,5 vezes (SBC, 2005). Os principais fatores de risco para desenvolvimento da SM são o sobrepeso e a obesidade, uma vez que parecem preceder o surgimento dos demais fatores de risco para a síndrome (O’NEILL; O’DRISCOLL, 2014). Gordura visceral anormal se acumula em resposta a inatividade física e ao excesso de calorias em indivíduos geneticamente suscetíveis, sendo que o aumento da massa de adipócitos atua como um órgão endócrino e se comunica com outros sistemas orgânicos por meio de aumentos nas citocinas inflamatórias (POTENZA; JEFFREY; MECHANICK, 2009).

Sabe-se que a inatividade física e a dieta rica em gorduras e carboidratos simples são fatores presentes na população ocidental e que contribuem para atingir a obesidade central e a resistência à insulina (DEEDWANIA; GUPTA, 2006). Assim, a prevenção e o tratamento da SM e da obesidade se assemelham em muitos aspectos, sendo considerados um grande desafio clínico e de saúde pública em todo o mundo (KAUR, 2014). Nesse contexto, a qualidade da dieta tem um papel fundamental na prevenção da SM e de seus componentes individuais (KASTORINI et al., 2011) e os cuidados voltados para o tratamento podem levar a um bom prognóstico e a uma maior qualidade de vida.

Considerando as diferentes definições para a SM disponíveis na literatura, conforme já referido, e suas variações nos pontos de corte clínico que definem o risco, no estudo da presente tese foram utilizados os pontos de corte da *National Cholesterol Education Program's Adult Treatment Panel III* (ATP III), visto ser a ATP III aquela mais comumente

utilizada para estudos de fatores psicológicos e síndrome metabólica (BOYLAN; RYFF, 2015). Segundo essa definição, ao menos três dos seguintes fatores de risco devem estar presentes para confirmação diagnóstica da SM: obesidade central (CC > 102 cm para homens ou > 88 cm para mulheres), triglicerídeos ≥ 150 mg/dL, colesterol HDL < 40 mg/dL em homens ou < 50 mg/dL em mulheres, pressão arterial ≥ 130 mm Hg sistólica ou ≥ 85 mm Hg diastólica e glicose de jejum ≥ 100 mg/dL.

3.2 Tratamento Nutricional da Síndrome Metabólica

A prevenção e o tratamento das doenças cuja prevalência vem aumentando nos últimos anos junto às diferentes populações constituem-se como um desafio tanto para os governos e entidades, quanto para os profissionais de saúde de diversas áreas. No Brasil, com o intuito de contribuir para a prevenção de mortes prematuras decorrentes de doenças cardíacas e de outras doenças crônicas não transmissíveis, tais como diabetes, hipertensão e obesidade, o Ministério da Saúde publicou o Guia Alimentar para a População Brasileira. Esse Guia reúne as primeiras diretrizes alimentares oficiais para a população, orientando uma alimentação saudável, dentro do padrão e dos hábitos alimentares do brasileiro (BRASIL, 2006). Além dessa iniciativa, outras ações, como o incentivo ao aleitamento materno e à alimentação complementar saudável, a regulamentação da rotulagem dos alimentos, os acordos estabelecidos com a indústria para a redução do teor das gorduras trans e ainda os acordos voluntários de metas de redução de sal em 10% ao ano em alimentos industrializados são citados como políticas de controle de DCNT relacionadas com a alimentação no Brasil (BRASIL, 2011).

Especificamente para a SM, a Sociedade Brasileira de Hipertensão estruturou e publicou, em 2005, a I Diretriz Brasileira de Diagnóstico e Tratamento da Síndrome Metabólica, com o apoio e a participação efetiva de quatro outras Sociedades médicas de abrangência nacional: Sociedade Brasileira de Cardiologia, Sociedade Brasileira de Endocrinologia e Metabologia, Sociedade Brasileira de Diabetes e Associação Brasileira para Estudos da Obesidade. O objetivo dessa Diretriz foi definir critérios para o diagnóstico e o tratamento da síndrome metabólica, adaptados à realidade brasileira (SBC, 2005).

Segundo a Diretriz (SBC, 2005), a adoção de um plano alimentar saudável é fundamental no tratamento da síndrome metabólica. Ele deve ser individualizado e prever uma redução de peso sustentável, variando de 5% a 10% do peso corporal inicial. O primeiro passo para o delineamento desse plano é estabelecer as necessidades do indivíduo a partir da avaliação nutricional, incluindo a determinação do índice de massa corporal, da circunferência abdominal, e, quando possível, da composição corporal. Além disso, a determinação do perfil metabólico é muito importante na terapia nutricional da síndrome metabólica. O plano alimentar deve fornecer um valor calórico total (VCT) compatível com a obtenção e/ou a manutenção do peso corporal desejável. Para obesos, a dieta deve ser hipocalórica, com uma redução de 500kcal a 1000kcal do gasto energético total (GET) diário previsto ou da anamnese alimentar, com o objetivo de promover perdas ponderais de 0,5kg a 1,0kg/semana. O Quadro 1 descreve a distribuição da dieta sugerida pela I Diretriz Brasileira de Diagnóstico e Tratamento da Síndrome Metabólica (SBC, 2005).

Quadro 1. Composição de dieta recomendada para síndrome metabólica segundo a I Diretriz Brasileira de Diagnóstico e Tratamento da Síndrome Metabólica

MACRONUTRIENTES	INGESTÃO RECOMENDADA
Carboidratos	50%-60% das calorias totais
Fibras	20g-30g/dia
Gordura total	25-35% das calorias totais
Ácidos graxos saturados	< 10% das calorias totais
Ácidos Graxos polinsaturados	Até 10% das calorias totais
Ácidos graxos monoinsaturados	Até 20% das calorias totais
Colesterol	< 300mg/dia
Proteína	0,8 a 1,0 g/kg peso atual/dia ou 15%

Fonte: I Diretriz Brasileira de Diagnóstico e Tratamento da Síndrome Metabólica (SBC, 2005).

Não obstante os avanços representados pela publicação da Diretriz acima citada, não existe consenso sobre a estratégia nutricional mais adequada para tratar a SM, de tal forma que ocorra redução do risco cardiovascular. Considerando esse fato, uma revisão sistemática de Leão et al. (2011) buscou avaliar a força de evidência dos benefícios de diferentes intervenções nutricionais na remissão da SM. Foram identificados 131 artigos, os quais, após critérios de elegibilidade resultaram em 15 estudos. Estes foram separados em quatro grupos: dieta normocalórica associada a exercícios; dieta normocalórica isolada; dieta hipocalórica associada a exercícios; e dieta hipocalórica isolada. Os ensaios com dieta hipocalórica associada à prática de exercícios apresentaram valores mais elevados de eficácia, colaborando para ressaltar os aspectos globais da mudança do estilo de vida no tratamento da SM, no qual a alimentação saudável e reduzida em calorias deve ser complementada com a prática de atividade física. Além disso, o estudo expressou a escassez da literatura relativa ao assunto e ilustrou a necessidade de mais estudos sobre o tema (LEÃO et al., 2011).

Recentemente, um estudo transversal de base populacional, através de Recordatórios de 24h, avaliou a ligação entre padrão alimentar e SM com dados do Inquérito Nacional de Saúde e Nutrição (NHANES) dos Estados Unidos (MAZIDI; PENNATHUR; AFSHINNIA, 2017). No total 23.157 indivíduos, dos quais 6.561 com SM, foram incluídos na análise final. Os autores concluíram que houve associação entre dieta rica em ácidos graxos saturados e maior risco de SM, enquanto um padrão de dieta caracterizado por alto consumo de vitaminas foi associado com menor risco para SM, corroborando com os estudos acima descritos.

Dieta reduzida em ácidos graxos saturados e com consumo variado de vitaminas é uma característica do padrão de dieta mediterrânea, o qual tem se destacado em estudos da SM, conforme Kastorini et al. (2011) descreveram em uma meta-análise sobre os efeitos da dieta mediterrânea e seus componentes na SM. A dieta mediterrânea é caracterizada pelo elevado consumo de ácidos graxos monoinsaturados, tendo como principal fonte o azeite de oliva, e pelo incentivo ao consumo de frutas, legumes, cereais integrais, laticínios com baixo teor de gordura, nozes, peixes, aves, baixo consumo de carne vermelha e um moderado consumo de álcool. Nessa meta-análise, os autores concluíram haver evidências de que a adesão ao padrão da dieta mediterrânea é associada a menor prevalência da síndrome e de sua progressão.

3.3 Índice de Qualidade da Dieta e sua aplicação em pacientes com Síndrome Metabólica

Considerando a complexidade da dieta humana, novos métodos que envolvem um sistema de escores têm sido testados com o intuito de avaliar a qualidade da dieta e, assim, fazer inferências sobre a relação da alimentação com diversos fatores. Nessa perspectiva, em 1995, o *United States Department of Agriculture* (USDA) desenvolveu o *Healthy Eating Index* (HEI) para verificar a adequação da dieta, segundo o Guia Alimentar norte-americano (KENNEDY et al., 1995). O HEI foi inicialmente composto por 10 itens, dos quais cinco são pertencentes ao Guia da Pirâmide Alimentar: frutas, vegetais, grãos, leite e carne; quatro são nutrientes (gorduras totais, gordura saturada, colesterol e sódio) para consumo moderado e o décimo item – variedade – é referente à diversidade e à composição da dieta. Cada componente apresenta pontuação de 0 a 10, totalizando um máximo de 100 pontos. Após sua criação, o HEI foi sendo atualizado, objetivando adequação às mudanças relativas ao Guia Alimentar.

Devido às diferenças nos hábitos alimentares em diferentes regiões, é recomendado que instrumentos de avaliação da qualidade da dieta sejam adaptados ao grupo de estudo, a fim de se aproximar ao máximo da realidade de cada local (MORAIS et al., 2017). Tomando em conta essa premissa, no Brasil, Fisberg et al. (2004) adaptaram e validaram para a população brasileira o *Healthy Eating Index* (HEI), originando o Índice de Qualidade da Dieta (IQD). A publicação do Guia Alimentar para a População Brasileira, em 2006, doravante chamado Guia Alimentar 2006, levou à necessidade de revisão do IQD, o que foi feito por Previdelli et al. (2011), resultando no instrumento Índice de Qualidade da Dieta Revisado (IQD-R).

Conforme detalhado no Quadro 2 abaixo, O IQD-R possui 12 componentes, sendo nove dos grupos alimentares, dois de nutrientes e o último a soma do valor energético advindo da ingestão de gordura sólida, álcool e açúcar de adição (componente Gord_AA). Os componentes dos grupos de alimentos tiveram a definição dos pontos de corte referentes às pontuações máximas, intermediárias e mínimas baseadas nas recomendações do Guia Alimentar 2006 da Organização Mundial de Saúde (OMS), do *Institute of Medicine*, da Sociedade Brasileira de Cardiologia (SBC), como também do *Healthy Eating Index* 2005 (HEI-2005). Para definição do número de porções diárias recomendadas dos grupos de alimentos para 1.000 kcal, utilizaram-se aquelas preconizadas pelo Guia Alimentar 2006. A ingestão maior ou igual às porções recomendadas dos grupos de alimentos, por 1.000 kcal, determina pontuação máxima, cinco ou 10 pontos dependendo do item avaliado, sendo zero

para ausência do consumo. Como os componentes “Fruta Integral”, “Vegetais Verdes Escuros e Alaranjados e Leguminosas” e “Cereais Integrais” do HEI-2005 não possuem recomendações correspondentes no Guia Alimentar 2006, os números de porções foram calculados proporcionalmente aos componentes “Fruta Total”, “Vegetais Totais” e “Cereais, Raízes e Tubérculos”, respectivamente. Na composição do IQD-R, o consumo das três porções recomendadas no Guia Alimentar de “Cereais, Raízes e Tubérculos”, foram distribuídas em duas porções no componente “Cereais, Raízes e Tubérculos” e uma porção no componente “Cereais Integrais”. Ressalte-se que o componente “Cereais, Raízes e Tubérculos” refere-se também ao consumo de alimentos ricos em carboidratos, que são considerados a base energética do consumo alimentar da população brasileira. Para as leguminosas, o IQD-R incluiu a metodologia do HEI-2005: a pontuação do componente “Carnes, Ovos e Leguminosas” foi determinada pela soma do valor energético do grupo “Carnes e Ovos”. Em seguida, adicionou-se o valor calórico das leguminosas até completar a pontuação máxima do componente “Carnes, Ovos e Leguminosas” (190 kcal = 1 porção = 10 pontos). Caso ainda houvesse excedentes, o valor energético seria computado nos grupos “Vegetais Verdes Escuros e Alaranjados e Leguminosas” e “Vegetais Totais” (PREVIDELLI et al., 2011).

Para pontuação de “Sódio” ficou estipulado como: valor máximo para o consumo 0,75 g/1.000 kcal, calculado a partir dos pontos de corte de sódio com base no consumo energético de 2.000 kcal, segundo o Guia Alimentar 2006; valor intermediário para consumo de 1,0 g/1.000 kcal, baseado no valor máximo estipulado pelo Guia Alimentar 2006 (2,0 g/2.000 kcal), e mínimo para consumo 2,0 g/1.000 kcal, definido como sendo o dobro do consumo recomendado pelo Guia Alimentar 2006. Para a pontuação mínima de “Gordura Saturada”, foram utilizados valores maiores ou iguais a 15% do valor energético total da dieta (VET) e para a pontuação máxima valores menores que 7% do VET, sendo que o ponto de corte intermediário de 10% do VET seguiu as recomendações da OMS. O componente “Óleo, Oleaginosas e Gordura de peixe” foi baseado no grupo “Óleos, Gorduras e Sementes Oleaginosas” do Guia Alimentar 2006, recebendo pontuação máxima para 0,5 porção/1.000 kcal. Como no Brasil não existem recomendações para valores energéticos advindos da ingestão de gordura sólida, saturada e trans, álcool e açúcar de adição (Gord_AA), utilizou-se pontos mínimo para consumo maior ou igual a 35% do VET e máximo para ingestão menor ou igual a 10% do VET (PREVIDELLI et al., 2011).

Quadro 2 – Componentes, pontuação e critérios de pontuação do Índice de Qualidade da Dieta Revisado (IQD-R).

Componente	Pontuação		Critério de pontuação
	Mínima	Máxima	
Frutas totais ^a	0	5	0: não consumo 5: 1,0 porção/1.000kcal
Frutas integrais ^b	0	5	0: não consumo 5: 0,5 porção/1.000kcal
Vegetais totais ^c	0	5	0: não consumo 1,0 porção/1.000kcal
VeveaL ¹	0	5	0: não consumo 5: 0,5 porção/1.000kcal
Cereais totais ^d	0	5	0: não consumo 5: 2,0 porções/1.000kcal
Cereais integrais	0	5	0: não consumo 5: 1,0 porção/1.000kcal
Leite e derivados ^e	0	10	0: não consumo 10: 1,5 porção/1.000kcal
Carnes, ovos e leguminosas	0	10	0: não consumo 10: 1,0 porção/1.000kcal
Óleos ^f	0	10	0: não consumo 10: 0,5 porção/1.000kcal
Gordura saturada	0	10	0: $\geq 15\%$ do VET ³ 10: $\leq 7\%$ do VET ³
Sódio	0	10	0: $\geq 2,0\text{g}/1.000 \text{ kcal}$ 10: $\leq 0,75\text{g}/1.000 \text{ kcal}$
Gord_AA ²	0	20	0: $\geq 35\%$ do VET ³ 20: $\leq 10\%$ do VET ³
Pontuação total	0	100	0: pior qualidade da dieta 100: melhor qualidade da dieta

Fonte: Elaborado por Sheyla de Lis (2015), baseado em Previdelli et al. (2011).

¹VeveaL: vegetais verde-escuros, alaranjados e leguminosas, sendo as leguminosas incluídas apenas depois que a pontuação máxima de carnes, ovos e leguminosas for atingida; ²Gord_AA: quilocalorias provenientes da gordura sólida, álcool e açúcar de adição; ³VET: valor energético total. ^aInclui frutas e sucos de frutas naturais; ^bExclui sucos de frutas; ^cInclui leguminosas apenas depois que a pontuação máxima de carnes, ovos e leguminosas for atingida; ^dRepresenta o grupo dos cereais, raízes e tubérculos; ^eInclui leite e derivados e bebidas a base de soja; ^fInclui as gorduras mono e poli-insaturadas, oleaginosas e gordura de peixe.

O método de avaliação da dieta através do Índice de Qualidade da Dieta é recente no Brasil e estudos com SM ainda são escassos. A revisão sistemática realizada por Moraes et al. (2017) sobre metodologias de estudos brasileiros que utilizam índices para avaliação da qualidade da dieta encontrou apenas dois estudos com amostras com SM (Silva, Prata, Cunha, 2011; Piovesan et al., 2014).

O primeiro estudo avaliou 246 indivíduos no nordeste brasileiro, sendo a SM caracterizada de acordo com os critérios do *Adult Treatment Panel* (ATP III) e a dieta avaliada pelo *Healthy Eating Index* (HEI), ainda não adaptado para o Brasil. A SM foi diagnosticada em 15,4% dos casos, sendo que o grupo SM apresentou menores notas, sendo a

menores pontuações para a ingestão de gordura total e variedade de alimentos ingeridos. O estudo mais recente, de Piovesan et al. (2014), teve como objetivo avaliar o efeito do aconselhamento nutricional de curto prazo sobre a qualidade da dieta e o valor energético total (VET) em indivíduos com SM. Oitenta indivíduos (homens e mulheres) com idade entre 30 e 60 anos com síndrome metabólica foram acompanhados durante três meses. O instrumento *Healthy Eating Index*, adaptado à população brasileira, foi utilizado para avaliação da qualidade da dieta. O resultado obtido indicou que o escore médio da qualidade da dieta da população estudada aumentou significativamente de 53,02 para 61,65 após a intervenção. A quantidade de indivíduos classificados como *Dieta Inapropriada* diminuiu significativamente seis vezes, a quantidade de indivíduos classificados como *Dieta Saudável* aumentou quatro vezes, e o percentual de dietas classificadas como *Dieta que Precisa de Alteração* diminuiu em 25% quando comparado ao início do estudo. A ingestão adequada de vegetais foi inversamente associada à circunferência abdominal, bem como à ingestão adequada de sódio e insulina sérica em jejum. Assim, o aconselhamento nutricional de curto prazo mostrou-se eficiente para melhorar a qualidade da dieta e os resultados destacaram a importância da intervenção nutricional em indivíduos com síndrome metabólica.

3.4 Atributos psicológicos positivos na Síndrome Metabólica e na dieta

Estudos sobre transtornos mentais, principalmente depressão, associados a SM são frequentes na literatura e, de acordo com a meta-análise desenvolvida por Pan et al. (2012), há uma associação bidirecional entre SM e depressão. Depressão e comorbidades inter-relacionadas parecem compartilhar alguns mecanismos fisiopatológicos comuns, como ativação do eixo hipotálamo-hipófise-adrenal (HPA), atividade serotoninérgica reduzida e desregulação do sistema imune caracterizada por altos níveis circulantes de citocinas e quimiocinas pró-inflamatórias (por exemplo, TNF- α , IL-6, etc.) (HALARIS, 2013).

No entanto, investigações sobre relações entre atributos psicológicos positivos e SM são escassas, embora se observe um aumento no número de estudos sobre estes atributos associados a doenças crônicas nos últimos anos (SCHIAVON et al., 2015; DIENER et al., 2017; CAPPELLEN et al., 2017; IRONSON et al., 2018). Pesquisas a respeito de atributos psicológicos positivos têm se multiplicado nas últimas duas décadas, fundamentadas no movimento intitulado Psicologia Positiva (PP) (REPPOLD; GURGEL; SCHIAVON, 2015). Em artigo intitulado “*Positive Psychology: An Introduction*,” Seligman e Csikszentmihalyi (2000) sugerem que o foco da Psicologia, até o fim dos anos 1990 considerava principalmente

problemas de cura e reparação de danos, e que atributos psicológicos positivos vinham sendo ignorados por profissionais e pesquisadores da área. Apontando esta lacuna, esses autores encorajaram o desenvolvimento de pesquisas sobre atributos psicológicos positivos, como bem-estar subjetivo, otimismo, esperança, autoestima, considerando seus efeitos em prol de uma vida mais feliz e engajada.

No contexto da saúde, após quase uma década de pesquisas em PP, o tema emergente no movimento é o que Seligman (2008) define como "Saúde Positiva". Neste artigo, o autor estimula pesquisadores a estudarem a relação da Psicologia com a saúde física. Diversos estudos foram desenvolvidos desde então, sendo que o bem-estar subjetivo (BES), atributo bastante estudado pela PP, aparece, em resultados de pesquisas empíricas, como um fator protetor para doenças crônicas e mortalidade (Steptoe et al., 2015; Gana et al., 2016; Martín-Maria et al., 2017). Especificamente na SM, Boylan e Ryff (2015) avaliaram associações transversais e longitudinais entre bem-estar e a síndrome em uma amostra de meia-idade nos EUA (MIDUS; N = 1.205) e concluíram que recursos psicossociais, incluindo o afeto positivo, a satisfação com a vida e o crescimento pessoal, previram redução do risco para SM, tanto transversal, como longitudinalmente.

O BES é definido como uma estrutura tripartite. Uma delas concerne ao julgamento cognitivo sobre a satisfação de vida. As outras duas correspondem aos componentes afetivos: afetos positivos (AP) e negativos (AN) (Diener et al., 2017). Ong et al. (2011) analisaram várias maneiras pelas quais o BES pode influenciar a saúde e a mortalidade e concluíram que os comportamentos de saúde (por exemplo, dieta saudável, exercício regular e sono adequado) são os principais mediadores dessa influência. O estudo longitudinal de Blanchflower et al. (2012) também corrobora a importância da alimentação no BES. Os autores investigaram se o bem-estar psicológico, avaliado de diversas formas, estaria conectado com o consumo de frutas e vegetais. O estudo forneceu evidências da relação entre o consumo destes alimentos e alto bem-estar: nos estudos transversais, o BES aumentou como dose-resposta com o número de porções diárias de frutas e vegetais, sendo que aproximadamente sete porções por dia seria o ideal. Os dados foram avaliados em 80.000 indivíduos britânicos selecionados aleatoriamente. Ao discutir os resultados, os autores criticaram a falta de pesquisas na moderna literatura de bem-estar com relação às consequências das escolhas alimentares das pessoas e apresentaram dados que evidenciam a baixa produção acadêmica neste sentido (BLANCHFLOWER et al., 2012).

Por sua vez, estudos demonstrando associações entre dieta e doença mental são bastante frequentes na literatura, principalmente com relação à depressão e à ansiedade

(MASANA et al., 2018; GIBSON-SMITH et al., 2018). Uma meta-análise recente avaliou a relação entre padrões alimentares e o risco de depressão. Baseado em 21 estudos de dez países, verificou-se que um padrão alimentar caracterizado por uma alta ingestão de frutas, legumes, grãos integrais, peixe, azeite, laticínios com baixo teor de gordura e antioxidantes e baixa ingestão de alimentos de origem animal foi aparentemente associado a um menor risco de depressão. Já um padrão alimentar caracterizado por um alto consumo de carne vermelha e/ou processada, grãos refinados, doces, produtos lácteos com alto teor de gordura, manteiga, batatas e molho de gordura e baixa ingestão de frutas e vegetais está associado a um risco aumentado de depressão (LI et al., 2017).

Enquanto há carência de estudos especificamente sobre a dieta e BES, um número maior de estudos pode ser observado em relação à obesidade e BES (BLANCHFLOWER et al., 2012). Investigações realizadas apenas com indivíduos obesos têm mostrado uma associação negativa entre bem-estar subjetivo e obesidade, sendo que essa relação parece ser mediada por habilidades sociais, apoio social e comportamentos de saúde (DIERK et al., 2006; MAGALLARES et al., 2014, VILHENA et al., 2014). Pesquisas feitas com indivíduos obesos, com sobrepeso, peso normal e baixo peso, também apresentam dados de associação negativa entre obesidade e bem-estar (ROBERTS et al., 2002; STUTZER et al., 2007; WEGENER et al., 2008; SALOUMI; PLOURDE, 2010; VELTEN et al., 2014; JACKSON et al., 2015).

A consideração a essas questões evidencia a importância de se estudar diversos atributos psicológicos positivos nos contextos da saúde e da nutrição. Além do bem-estar subjetivo, outros construtos psicológicos positivos, como o otimismo, a esperança e a autoestima, são tidos cada vez mais como elementos importantes na proteção contra doenças crônicas em geral (SCHIAVON et al., 2016; LUNDGREN et al., 2015). Esses atributos parecem estar associados a um maior engajamento em comportamentos adequados, como, por exemplo, a adoção de uma alimentação saudável (KELLONIEMI; LAITINEN, 2005; BOEHM; KUBZANSKY, 2012).

Dentre os atributos psicológicos positivos, o otimismo é citado na literatura como aquele mais fortemente associado a um risco reduzido de eventos cardiovasculares. A revisão sistemática realizada por Schiavon et al. (2016), que avaliou otimismo e esperança em doenças crônicas, indica várias evidências empíricas nesse sentido, sendo que um dos fatores mediadores dessa associação são os hábitos alimentares saudáveis (Kelloniemi; Laitine, 2007). Boehm & Kubzansky (2012), em investigação a respeito da associação entre construtos positivos e doença cardiovascular, reportam-se a diversos estudos indicativos de

que o otimismo e o bem-estar estão relacionados ao consumo de alimentos mais saudáveis. Os autores ponderam, contudo, que, como quase todos os estudos revisados são desenvolvidos sob método transversal, a direção causal dos achados não pode ser determinada.

Além do BES e do otimismo, a esperança também é descrita na literatura como um construto importante por seu efeito sobre a saúde física (SCHIAVON et al., 2016). Cabe ressaltar que, embora otimismo e esperança sejam positivamente relacionados, são conceitos distintos. Alarcon, Bowling e Khazon (2013), em uma meta-análise, examinaram ambos os construtos e, de forma simplificada, definiram: o sujeito otimista acredita que, de alguma forma - seja pela sorte, pelas ações dos outros ou pelas próprias ações - o futuro dele será bem sucedido e satisfatório. O indivíduo esperançoso, por outro lado, acredita especificamente em sua própria capacidade de assegurar um futuro bem sucedido e satisfatório. No mesmo sentido, Snyder e Lopes (2005) propuseram que esperança é o pensamento voltado para objetivos, composto por rotas e agenciamento. As rotas se referem à capacidade de gerar caminhos adequados para a obtenção do objetivo desejado, enquanto o agenciamento diz respeito ao componente motivador que impulsiona a busca pelo objetivo, utilizando as rotas. Dito de outro modo, o agenciamento se refere à crença na própria habilidade em usar os caminhos e alcançar os objetivos propostos (PACICO et al., 2013; SNYDER; LOPES, 2005).

À luz desses pressupostos, Snyder (2002), no artigo intitulado “*Hope Theory: Rainbows in the Mind*” referiu que pessoas com pontuações altas na escala de esperança poderiam usar informações sobre doenças físicas como um caminho para os esforços de prevenção, visto que a esperança é definida como a capacidade percebida de encontrar caminhos para os objetivos desejados (rotas) e motivar-se através do pensamento para usar esses caminhos. Desta forma, pode-se inferir que tal motivação, inerente ao construto, pode contribuir para melhores hábitos, como uma alimentação adequada. Nothwehr et al. (2013), por sua vez, exploraram o conceito de esperança e sua associação com a dieta, avaliando o uso de estratégias comportamentais como o controle de porções ou o planejamento de refeições adotadas por 178 pacientes de uma clínica para tratamento primário de saúde, com IMC maior que 25. As análises demonstraram uma associação significativa ($p < 0,05$) entre o escore total de esperança e todas as medidas de estratégia comportamental, levando os autores a concluir que as medidas de esperança devem ser exploradas no contexto de uma intervenção de perda de peso, visto sua associação preditiva quanto ao uso de estratégias comportamentais nessa direção.

Mais recentemente, Scioli et al. (2016) investigaram as contribuições positivas do traço de esperança para manter e restaurar a saúde e concluíram que maior esperança foi

associada a um maior comprometimento com uma dieta mais saudável. No estudo, a alimentação foi avaliada perguntando aos participantes se eles estavam comendo pelo menos quatro porções de frutas e/ou vegetais por dia; se sim, há quanto tempo; se não, se pretendiam fazer essa mudança e quando planejavam mudar. Os autores não avaliaram a dieta especificamente, mas utilizaram um questionário estruturado baseado no modelo transteórico (MTT). Dentro do MTT, presume-se que as transformações comportamentais positivas progridem através de cinco estágios de mudança: pré-contemplação, contemplação, preparação, ação e manutenção. Os autores concluíram que indivíduos com maiores escores de esperança estavam mais propensos a estar em contemplação vs. pré-contemplação, sugerindo que a esperança pode ser um fator para que os indivíduos direcionem seus pensamentos em prol de uma dieta mais saudável.

Por fim, outro recurso psicológico com possível efeito protetor frente a doenças crônicas, a autoestima também vem sendo estudada (LUNDGREN et al., 2014). A autoestima é definida como um conjunto de sentimentos e pensamentos do indivíduo sobre seu próprio valor, competência e adequação, que se reflete em uma atitude positiva ou negativa em relação a si mesmo (ROSENBERG, 1965). Coopersmith (1989) ressalta que o ponto fundamental da autoestima é o aspecto valorativo, influenciador na forma como o indivíduo elege suas metas, aceita a si mesmo, valoriza o outro e projeta suas expectativas para o futuro. Assim compreendida, quando em altos escores, a autoestima aparece na literatura como mediador em estratégias de *coping* para doenças físicas. A baixa autoestima, por outro lado, pode levar a comportamentos alimentares inadequados, na tentativa de auto-regular as emoções negativas (CANETTI et al., 2009). De fato, no estudo de Bonsaksen e colaboradores (2015), a baixa autoestima foi associada a pouca redução de peso em pessoas obesas após orientação nutricional. No entanto, ainda há uma lacuna importante na literatura com relação a este construto, e mais estudos são necessários para avaliar sua importância no contexto da saúde física.

Em consonância com evidências anteriores, um estudo pioneiro na abordagem da relação de diferentes atributos psicológicos positivos em uma amostra com SM, avaliando a sua associação com a qualidade da dieta e com fatores antropométricos, foi realizado na presente tese. A hipótese testada no principal estudo da tese (Artigo 2), uma pesquisa longitudinal, foi que indivíduos que apresentassem melhores indicadores em construtos típicos da Psicologia Positiva apresentariam melhora na qualidade da dieta e em fatores antropométricos após consulta com profissional nutricionista. A tese também investigou (Artigo 3) como a relação entre BES e personalidade pode interferir na melhora da qualidade

da dieta e de parâmetros antropométricos de indivíduos com SM a relação entre BES e personalidade na melhora da qualidade da dieta e de parâmetros antropométricos de indivíduos com SM. Em específico, o estudo investigou a relação entre Afetos Positivos e Negativos e Satisfação com a Vida e a melhora na qualidade da dieta e nos parâmetros antropométricos de indivíduos brasileiros com SM submetidos à orientação nutricional em um ambulatório hospitalar e, ainda, se os fatores de personalidade apresentavam associação tanto com o BES como com o IQD-R e com os fatores antropométricos. Os textos a seguir apresentam os produtos derivados da tese, incluindo os artigos que descrevem as pesquisas desenvolvidas e os achados encontrados.

REFERÊNCIAS

- ALARCON, G.M.; BOWLING, N.A., KHAZON, S. Great expectations: a meta-analytic examination of optimism and hope. *Pers. Individ. Differ.*, 54, 821–827, 2013. doi:10.1016/j.paid.2012.12.004
- ALBERTI, K.G. et al. Harmonizing the metabolic syndrome: a joint interim statement of the International Diabetes Federation Task Force on Epidemiology and Prevention; National Heart, Lung, and Blood Institute; American Heart Association; World Heart Federation; International Atherosclerosis Society; and International Association for the Study of Obesity. *Circulation*, v.120, n. 16, p. 1640-5, 2009.
- ALBERTI, K.G.; ZIMMET, P.Z. Definition, diagnosis and classification of diabetes mellitus and its complications, part 1: diagnosis and classification of diabetes mellitus provisional report of a WHO consultation. *Diabet Med.*, 15:539 –553, 1998.
- ANDRADE, S.C. et al. Validação do Índice de Qualidade da Dieta Revisado - IQD-R Nutrire, 36, Suplemento, 326-326, 2011.
- BIANCHI, C. et al. Optimizing management of metabolic syndrome to reduce risk: focus on life-style. *Intern Emerg Med.*, v. 3, p. 87–98, 2008.
- BOCKERMAN, P. et al. The negative association of obesity with subjective well-being: is it all about health?. *Journal of Happiness Studies* 15; 857-867, 2014.
- BLANCHFLOWER, D.G.; OSWALD, A.J.; STEWART-BROWN, S. Is Psychological Well-Being Linked to the Consumption of Fruit and Vegetables? *Soc Indic Res* (ONLINE), OUT, 2012. doi: 10.1007/s11205-012-0173-y

- BOEHM, J.K.; KUBZANSKY, L.D. The Heart's Content: The Association Between Positive Psychological Well-Being and Cardiovascular Health. *Psychological Bulletin*, Vol. 138, No. 4, 655–691, 2012. doi: 10.1037/a0027448
- BONSAKSEN, T.; FAGERMOEN, M.S.; LERDAL, A. Factors associated with self-esteem in persons with morbid obesity and in persons with chronic obstructive pulmonary disease: a cross-sectional study. *Psychol Health Med.*, 20(4):431–442, 2015. doi:10.1080/13548506.2014.959529
- BOYLAN, J.M.; RYFF, C.D. Psychological Well-being and Metabolic Syndrome: Findings from the MIDUS National Sample. *Psychosom Med.*, June; 77(5): 548–558, 2015. doi:10.1097/PSY.0000000000000192.
- BRASIL. Instituto Brasileiro de Geografia e Estatística. Pesquisa de Orçamentos Familiares 2008-2009. Antropometria e Estado Nutricional de Crianças, Adolescentes e Adultos no Brasil. Rio de Janeiro: Ministério de Planejamento, Orçamento e Gestão. 130p., 2010a.
- BRASIL. Instituto Brasileiro de Geografia e Estatística. Pesquisa de Orçamentos Familiares 2008-2009. Aquisição alimentar domiciliar per capita. Rio de Janeiro: Ministério de Planejamento, Orçamento e Gestão. 130p., 2010b.
- BRASIL. Ministério da Saúde. Secretaria de Atenção à Saúde. Guia alimentar para a população brasileira: promovendo a alimentação saudável. Ministério da Saúde, Secretaria de Atenção à Saúde. Departamento De atenção básica – Brasília: Ministério da Saúde. 210 p., 2006.
- BRASIL. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de Vigilância de Doenças e Agravos não Transmissíveis e Promoção da Saúde. Vigitel Brasil 2016: vigilância de fatores de risco e proteção para doenças crônicas por

inquérito telefônico: estimativas sobre frequência e distribuição sociodemográfica de fatores de risco e proteção para doenças crônicas nas capitais dos 26 estados brasileiros e no Distrito Federal em 2016/Ministério da Saúde, Secretaria de Vigilância em Saúde, Departamento de Vigilância de Doenças e Agravos não Transmissíveis e Promoção da Saúde. – Brasília: Ministério da Saúde. 160 p.:i, 2017.

BRASIL. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de Análise de Situação de Saúde. Plano de ações estratégicas para o enfrentamento das doenças crônicas não transmissíveis (DCNT) no Brasil 2011-2022 / Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de Análise de Situação de Saúde. – Brasília : Ministério da Saúde. 160 p. : il., 2011 – (Série B. Textos Básicos de Saúde)

CANETTI, L.; BERRY, E.M.; ELIZUR, Y. Psychosocial predictors of weight loss and psychological adjustment following bariatric surgery and a weight-loss program: the mediating role of emotional eating. *International Journal of Eating Disorders*. 42, 109–117, 2009. doi:10.1002/eat.20592.

CAPPELLEN, P.V.; RICE, E.L.; CATALINO, L.I.; FREDRICKSON, B.L. Positive affective processes underlie positive health behaviour change, *Psychology & Health*, 2017. DOI: 10.1080/08870446.2017.1320798

COSTA, P.T.; MCCRAE, R. Revised NEO Personality Inventory (NEO-PI-R) and NEO Five Factor Model (NEO-FFI) Professional manual. Odesa, FL; Psychological Assessment Center. 1992.

COOPERSMITH, S. Coopersmith Self-esteem Inventory. Palo Alto: Consulting Psychologists Press. 1989.

DEEDWANIA, P.C.; GUPTA R. Management issues in the metabolic syndrome. *J Assoc Physicians India*; 54: 797–810, 2006.

- DEFRONZO, R.A.; FERRANNINI, E. Insulin resistance. A multifaceted syndrome responsible for NIDDM, obesity, hypertension, dyslipidemia, and atherosclerotic cardiovascular disease. *Diabetes Care*.14:173-194, 1991.
- DIENER W. et al. If, Why, and When Subjective Well-Being Influences Health, and Future Needed Research. *Appl. Psychol. Health Wellbeing*. 9(2), 133–167, 2017. <https://doi.org/10.1111/aphw.12090>
- DIERK, J. et al. What determines well-being in obesity? Associations with BMI, social skills, and social support. *Journal Of Psychosomatic Research* 60. 219-227, 2006.
- FISBERG, R.M. et al. Healthy Eating Index: Evaluation of adapted version and its applicability. *Rev Nutr.*, v. 17, n. 3, p.301-18, 2004.
- IRONSON, G.; BANERJEE, N.; FITCH, C.; KRAUSE, N. Positive emotional well-being, health Behaviors, and inflammation measured by C-Reactive protein. *Social Science & Medicine*, 197, 235–243, 2018. doi:10.1016/j.socscimed.2017.06.020
- GANNA, K. et al. Subjective well-being and longevity: Findings from a 22-year cohort study. *Journal of Psychosomatic Research*. 85, 28–34, 2016. doi:10.1016/j.jpsychores.2016.04.004.
- GARCIA, D.; ERLANDSSON, A. The relationship between personality and subjective well-being: different association patterns when measuring the affective component frequency and intensity. *J Happiness Stud*. 12:1023–1034, 2011.
- GIACOMONI, C.H. Bem-estar subjetivo: Em busca da qualidade de vida. *Temas Psicol*. 12(1): 43-50, 2004. Brazilian

- GIBSON-SMITH , D.; BOT , M.; BROUWER , I.; VISSER, M.; PENNINX, B.W.J.H. Diet quality in subjects with and without depressive and anxiety disorders. *Proceedings of the Nutrition Society*, v. 77, n. E39, 2018. doi:10.1017/S0029665118000332
- GOULART, F.A.A. Doenças crônicas não transmissíveis: estratégias de controle e desafios e para os sistemas de saúde. Brasília (DF): Organização Pan-Americana de Saúde, 2011.
- HUFFMAN, J.C. et al. Feasibility and utility of positive psychology exercises for suicidal inpatients. *Gen Hosp Psychiatry*. 36(1):88–94, 2014. doi:10.1016/j.genhosppsy.2013.10.006
- HALARIS, A. Inflammation, heart disease, and depression. *Curr. Psychiatry Rep.* 15 (10), 400, 2013. doi: <http://dx.doi.org/10.1007/s11920-013-0400-5>.
- JACKSON, S.E. et al. Perceived weight discrimination in England: a population-based study of adults aged ≥ 50 years. *Int J Obes* 39. 858–864, 2015.
- KASTORINI, C.M. et al. The Effect of Mediterranean Diet on Metabolic Syndrome and its Components: A Meta-Analysis of 50 Studies and 53 4,906 Individuals. *Journal of the American College of Cardiology*, v. 57, n. 11, 2011.
- KAUR J. *Cardiology Research and Practice*. Volume 2014, Article ID 943162, 21 pages. 2014. doi:10.1155/2014/943162
- KAPLAN, N.M. The deadly quartet. Upper-body obesity, glucose intolerance, hypertriglyceridemia, and hypertension. *Arch Intern Med*. 149:1514-1520, 1989.
- KELLONIEMI, H., EK, E.; LAITINEN, J. Optimism, dietary habits, body mass index and smoking among young Finnish adults. *Appetite*. ;45:169–76, 2005. doi:10.1016/j.appet.2005.05.001

- KENNEDY, E.T. et al. The Healthy Eating Index: Design and Applications. *Journal of the American Dietetic Association*, v. 95, n. 10, p.1103-1109, 1995.
- LEAO, L.S. et al. Nutritional Interventions in Metabolic Syndrome: a Systematic Review. *Arq Bras Cardiol.* 97(3) : 260-265, 2011.
- LI, Y. et al. Dietary patterns and depression risk: A meta-analysis. *Psychiatry Research* 253. 373–382, 2017.
- LEVY, R.B. et al. Distribuição regional e socioeconômica da disponibilidade domiciliar de alimentos no Brasil em 2008-2009. *Rev Saúde Pública.*, v. 46, n. 1, p. 6-15, 2012.
- LIZ, S. Qualidade da dieta de mulheres em tratamento adjuvante para o câncer de mama submetidas a um programa de intervenção nutricional educativa. Dissertação (mestrado) UFSC, Florianópolis, 2015.
- LUCAS, R.E., DIENER, E. Personality and subjective well-being. In John OP, Robins RW, Pervin LA (Eds.) *Handbook of personality-theory and research*. New York: The Guilford Press. 795-814, 2008.
- LUNDGREN, O. et al. Psychological Resources are Associated with Reduced Incidence of Coronary Heart Disease. An 8-Year Follow-up of a Community-Based Swedish Sample. *Int.J. Behav. Med.* 22, 77–84, 2015. doi:10.1007/s12529-014-9387-5.
- MAGALLARES, A. et al. Overt and subtle discrimination, subjective well-being and physical health-related quality of life in an obese sample. *Span J Psychol.* 17, 2014.
- MARTIN-MARIA, N. et al. The impact of subjective well-being on mortality: A meta-analysis of longitudinal studies in the general population. *Psychosomatic Medicine.* 79 (5), 565-575, 2017.. doi: 10.1097/PSY.0000000000000444

- MASANA, M.F. et al., Mediterranean diet and depression among older individuals: The multinational MEDIS study. *Experimental Gerontology* 110, 67–72, 2018.
- MAZIDI, M.; PENNATHUR, S.; AFSHINNIA, F. Link of dietary patterns with metabolic syndrome: analysis of the National Health and Nutrition Examination Survey. *Nutrition & Diabetes*. 7, e255, 2017. doi:10.1038/nutd.2017.11
- MORAIS, D.C. et al. Aspectos metodológicos da avaliação da qualidade da dieta no Brasil: revisão sistemática. *Ciência & Saúde Coletiva*, 22(8):2671-2680, 2017.
- NGAMABA, K.H.; PANAGIOTI, M; ARMITAGE, C.J. How strongly related are health status and subjective well-being? Systematic review and meta-analysis. *Eur J Public Health*. Oct 1;27(5):879-885, 2017. doi: 10.1093/eurpub/ckx081.
- NATIVIDADE, J.C.; HUTZ, C.S. Escala Reduzida de Descritores dos Cinco Grandes Fatores de Personalidade: Prós e Contras. *Psico. Brazilian*. 46(1): 79-89, 2015.
- NOTHWEHR, F; CLARK D.O.; PERKINS, A. Hope and the use of behavioral strategies related to diet and physical activity. *Journal of Human Nutrition and Dietetics: The Official Journal of the British Dietetic Association*, 26(Suppl. 1): 159–163. 2013 doi: 10.1111/jhn.12057
- NUNES, C.H.; HUTZ, C.S., GIACOMONI, C.H. Associação entre bem estar subjetivo e personalidade no modelo dos cinco grandes fatores. *Aval Psicol. Brazilian*. 8(1): 99-108, 2009.
- NUNES, C.H., HUTZ, C.S., NUNES, M.F. *Bateria Fatorial de Personalidade*. São Paulo: Casa do Psicólogo. 2010.

- O'NEILL, S.; O'DRISCOLL, L. Etiology and Pathophysiology/Obesity Comorbidities
Metabolic syndrome: a closer look at the growing epidemic and its associated
pathologies. *Obesity Reviews*, 16, 1–12, 2015. doi:10.1111/obr.12229
- O'NEILL, S.; O'DRISCOLL, L. Metabolic syndrome: a closer look at the growing epidemic
and its associated pathologies. *Obes Rev.* 2014 16, 1–12. doi: 10.1111/obr.12229
- ONG, A.D.; MROCZEK, D.K.; RIFFIN, C. The Health Significance of Positive Emotions in
Adulthood and Later Life, *Soc Personal Psychol Compass*. August 1; 5(8): 538–551,
2011. doi:10.1111/j.1751-9004.2011.00370.x.
- PACICO, J.C. et al. Adaptation and Validation of the Brazilian Version of the Hope Index.
International Journal of Testing. v. 13, p. 193–200, 2013.
doi:10.1080/15305058.2012.664833
- PAN, A. et al. Bidirectional association between depression and metabolic syndrome: a
systematic review and meta-analysis of epidemiological studies. *Diabetes Care* 35 (5),
1171–1180, 2012. <http://dx.doi.org/10.2337/dc11-2055>.
- PARIKH, R.M., MOHAN, V. Changing definitions of metabolic syndrome. *Indian J Endocr
Metab*;16:7-12, 2012.
- PIOVESAN, C.H. et al.. Dietary quality improvement after a short-term nutritional
counseling program in individuals with metabolic syndrome. *Arch Latinoam Nutr*;
64(2):91-98, 2014.
- POTENZA, M.V.; MECHANICK, J.I. The Metabolic Syndrome: Definition, Global Impact,
and Pathophysiology. *Nutrition in Clinical Practice*, v. 24, n. 5, 2009.
- PREVIDELLI, A.N. et al. Índice de Qualidade da Dieta Revisado para população brasileira.
Rev Saúde Pública. 45(4),794-8, 2011. doi:10.1590/S0034-89102011005000035

- REAVEN, P. et al. Cardiovascular disease insulin risk in Mexican-American and Anglo-American children and mothers. *Pediatrics*; 101:E12., 1998.
- REPPOLD, C. T.; GURGEL, L. G. ; SCHIAVON, C. C. Pesquisas em Psicologia Positiva: uma revisão sistemática da literatura. *Psico-USF (Impresso)*, v. 20, p. 275-285, 2015.
- ROBERTS, R.E. et al. Are the fat more jolly? *Ann Behav Med.* 24, 169-80, 2002.
- ROSENBERG, M.. Society and the adolescent self-image. Princeton: Princeton University Press. 1965.
- RYFF, C.D.; KEYES, C.L. The structure of psychological well-being revisited. *J Pers Soc Psychol.* Oct 69(4):719-27, 1995.
- SALAROLI, L. B. et al. Prevalence of metabolic syndrome and related factors in bank employees according to different defining criteria, Vitória/ES, Brazil. *Clinics*, v. 68, n. 1, p. 69-74, 2013.
- SALOUMI, C.; PLOURDE, H. Differences in psychological correlates of excess weight between adolescents and young adults in Canada. *Psychol Health Med* 15, 314–325, 2010.
- SANTA-HELENA, E.T.; NEMES, M.I.; ELUF, N.J. Fatores associados à não-adesão ao tratamento com anti-hipertensivos em pessoas atendidas em unidades de saúde da família. *Cad. Saúde Pública* [online]. Brazilian. 26(12): 2389-2398, 2010 <http://dx.doi.org/10.1590/S0102-311X2010001200017>.
- SCIOLI A. et al. The positive contributions of hope to maintaining and restoring health: An integrative, mixed-method approach, *The Journal of Positive Psychology.* 11:2, 135-148, 2016. doi: 10.1080/17439760.2015.1037858.

- SCHIAVON, C.C. et al. Optimism and Hope in Chronic Disease: A Systematic Review. *Frontiers in Psychology*, v. 7, 2017.
- SCHNETTLER, B. et al. Analyzing Food-Related Life Satisfaction and other Predictors of Life Satisfaction in Central Chile. *The Spanish Journal of Psychology*, 18, E38. 2015. doi:10.1017/sjp.2015.32
- SCHNETTLER, B. et al. Eating habits and subjective well-being. A typology of students in Chilean state universities, *Appetite*, 2015. doi: 10.1016/j.appet.2015.02.008
- SELIGMAN, M.E.; CSIKSZENTMIHALYI, M. Positive Psychology: An Introduction. *American Psychologist*, 55, 1, 5-14, 2000.
- SELIGMAN, M.E.P. Positive Health. *Applied Psychology: An International Review* v. 57, p.3–18, 2008.
- SHAB-BIDAR, S.; GOLZARAND, M.; HAJIMOHAMMADI, M.; MANSOURI, S. A posteriori dietary patterns and metabolic syndrome in adults: a systematic review and meta-analysis of observational studies. *Public Health Nutrition*, v. 21, n. 09, p. 1681–1692, 2018.
- SILVA, K. F.; PRATA, A.; CUNHA, D. F. Frequência de síndrome metabólica e padrão de ingestão alimentar de adultos vivendo em uma área rural do Brasil. *Rev. Soc. Bras. Med. Trop.* v.44, n.4, p. 425-429, 2011.
- SNYDER, C.R. TARGET ARTICLE: Hope Theory: Rainbows in the Mind, *Psychological Inquiry: An International Journal for the Advancement of Psychological Theory*. 13:4, 249-275, 2002. doi: 10.1207/S15327965PLI1304_01.

- SNYDER, C.; LOPEZ, S. Positive psychology: A declaration of independence. In C. Snyder & S. Lopez (Eds.), *Handbook of positive psychology* (pp. 751-767). Oxford: Oxford University Press. 2005
- Sociedade Brasileira de Cardiologia (SBC). I Diretriz Brasileira de Diagnóstico e Tratamento da Síndrome Metabólica, *Arquivos Brasileiros De Cardiologia*, v.84, Suplemento I, Abril, 2005.
- STEPTOE, A.; DEATON, A., STONE, A.A. Psychological wellbeing, health and ageing. *Lancet*. 14; 640–648, 2015. doi:10.1016/S0140-6736(13)61489-0.
- STRANGES, S. et al. Major health-related behaviours and mental well-being in the general population: the Health Survey for England. *BMJ Open*, 4:e005878, 2014. doi:10.1136/bmjopen-2014-005878.
- STRICKHOUSER, J.E.; ZELL, E.; KRIZAN, Z. Does personality predict health and well-being? A metasynthesis. *Health Psychol.* 36(8):797-810. 2017. doi:<http://psycnet.apa.org/doiLanding?doi=10.1037/hea0000475>
- STUTZER, A.N. Meier. Limited self-control, obesity and the loss of happiness. *Health Econ.* 25. 1409-1424, 2016.
- VIDIGAL, F. C. et al. Prevalence of metabolic syndrome in Brazilian adults: a systematic review. *BMC Public Health*, 13:1198, 2013. doi:10.1186/1471-2458-13-1198
- VELTEN, K.L et al. Margraf. Lifestyle choices and mental health: a representative population survey. *BMC psychology* 2. 1-11, 2014.
- VILHENA, E. et al. Predictors of quality of life in Portuguese obese patients: A structural equation modeling application. *Journal of Obesity*. 1-10, 2014.

- WEGENER, A. et al. Evidence for attenuated affective processing in obesity. *Psychological Reports*, 103, 35-47, 2008.
- World Health Organization (WHO). *Noncommunicable diseases country profiles 2014*. Geneva, 2014.
- World Health Organization (WHO). *Preventing chronic diseases? A vital investment* Geneva; the organization, 2005.
- WOYCIEKOSKI, C., NATIVIDADE, J.C., HUTZ, C.S. As Contribuições da Personalidade e dos Eventos de Vida para o Bem-Estar. *Psic Teor e Pesq. Brazilian*. 30 (4): 401-409, 2014.

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Optimism and Hope in Chronic Disease: A Systematic Review

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There is a growing recognition that positive psychological functioning (which includes constructs such as optimism and hope) influences health. However, the understanding of these underlying mechanisms in relation to health is limited. Therefore, this review sought to identify what the scientific literature says about the influence of optimism and hope on chronic disease treatment. A search was conducted in the PsycINFO, Scopus, Pubmed, and Web of Science databases using the indexing terms *optimism*, *hope*, *chronic diseases*, *randomized controlled trial*, and *treatment* between 1998 and 2015. In the articles, we identified the most studied diseases in context, the assessment instruments used, the participant characteristics investigated, the results found, and the publication dates. From our analysis of the articles that met our inclusion criteria, it appears that the study of these constructs is recent and there is evidence that individuals with greater optimism and hope seek to engage in healthier behaviors, regardless of their clinical status, and that this contributes to chronic disease treatment. More research is needed so that targeted interventions can be carried out effectively in chronic disease treatment.

Keywords: optimism, hope, chronic disease, randomized controlled trial, therapy

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INTRODUCTION

The study of hope and optimism has grown in recent decades with the emergence of Positive Psychology. In an article entitled "Positive Psychology: An Introduction," Seligman and Csikszentmihalyi (2000) suggest that the field of psychology up to the end of the 1990s primarily considered the issues of healing and damage repair and pointed out that attributes such as hope, wisdom, creativity, courage, spirituality, responsibility, and perseverance were being ignored by professionals and researchers in the field. Citing this gap in knowledge, these authors suggested that researchers also consider the individual's strengths and virtues as the twenty-first century began. Thus, studies in Positive Psychology were initiated, evaluating the subjective experiences of individuals regarding the past (well-being contentment and satisfaction), the present (flow and happiness), and the future (hope and optimism; Seligman and Csikszentmihalyi, 2000).

Currently, the overriding theme that has emerged after more than a decade of research in Positive Psychology is what Seligman (2008) calls "positive health." According to the author, mental health (which consists of positive emotions, engagement, purpose, relationships, and positive achievements) is something greater than the mere absence of mental illness. It is quantifiable and predictive and leads to greater achievement, lower depression levels, and better physical health. Such definition is in agreement with the World Health Organization (WHO), cited by Segre and Ferraz (1997), which defines health not only as the absence of disease, but as a condition of perfect

physical, mental, and social well-being. It therefore increases longevity, reduces healthcare costs, and leads to improvements in mental health in relation to aging and disease prognosis (Seligman, 2008).

The impacts that the constructs optimism and hope can have on physical health have been discussed for some time and it is suggested that they can bring relevant results for health in general and for physical well-being (Snyder et al., 1991b). In this context, Snyder et al. (1991a) defined hope as a state of positive motivation based on three components: objectives (goals to be achieved), routes (planning to achieve these goals), and agency (motivation directed toward these objectives). More recently, Kortte et al. (2012) added that hope represents a patient's sense of determination to achieve his/her objectives (Snyder et al., 1991a,b; Kortte et al., 2012).

In regards to optimism, Scheier and Carver (1985) defined it as an overall tendency to believe that vivid experiences will lead to good results rather than bad ones. Carver et al. (2010) explained that to be optimistic is to maintain a generally favorable expectation about the future. Hart et al. (2008) added that overall positive expectations are considered one of the main determinants for knowing whether people will continue to pursue their life objectives in a condition of chronic disease (Scheier and Carver, 1985; Hart et al., 2008; Carver et al., 2010).

There is evidence that optimism motivates the individual to take proactive measures to protect his/her health, while pessimism is associated with behaviors that are adverse to health (Carver et al., 2010). On the other hand, studies such as those by Cohen et al. (1999) and Segerstrom (2005) have shown that when stressors are short-lived (i.e., less than a week) optimism appears to be protective against the effects of stress. However, this effect is reversed when the stressors are prolonged, as optimists are more immunologically vulnerable under such circumstances (Cohen et al., 1999; Segerstrom, 2005; Carver et al., 2010).

Evidence from the meta-analysis performed by Rasmussen et al. (2009) suggests that optimism is a significant predictor of positive results for physical health. Furthermore, a review by DuBois et al. (2012) reports that there is significant evidence of positive psychological attributes (especially optimism) being associated with better cardiac outcomes. However, differently from these articles, the present review aims to make a qualitative analysis, investigating the constructs optimism, and hope specifically, not as positive psychological attributes in general, focusing on multiple outcomes (Rasmussen et al., 2009; DuBois et al., 2012).

Given the above information, we aimed to conduct a literature review on the influence of optimism and hope on the prevention and treatment of chronic disease, identifying the most studied diseases, the assessment instruments used, the investigated participants' characteristics, the results, and the evolution of the research in this context.

METHODS

Search Strategy

We searched the Scopus, Pubmed, Web of Science, and PsycINFO databases. The search was conducted using the

following terms: "optimism," "hope," "chronic disease," "randomized controlled trial," and "therapeutics" (and their equivalents in Portuguese according to the DeCS structured and trilingual vocabulary—descriptors in the health sciences, except the term "optimism," which is not indexed). The standard search strategy was hope* OR optimis* AND "randomized controlled trial" AND "chronic disease" AND therap* and NOT review, including articles from 1998 (the year Martin Seligman began the Positive Psychology movement) to March 2015.

Study Eligibility

The present review included all studies whose participants had a chronic disease, regardless of age, and which were preferably randomized controlled trials and had optimism, hope, or both constructs as part of the study. Excluded were book chapters; studies not published in Portuguese, English, or Spanish; review studies and studies with animal models; summaries of scientific events; dissertations and theses; and unpublished studies.

According to Escosteguy (1999), studies with a randomized design are the best source of scientific evidence available and the best source for determining an intervention's efficacy. As such, they are considered the gold standard of scientific research. Nevertheless, even though the descriptor "randomized controlled trials" was used in the search strategy, we decided to include articles with other designs in order to include a greater number of publications, as this is a recent subject and publications in the field are scarce. To build the results, only studies with a randomized controlled design were evaluated for their quality (Escosteguy, 1999).

We initially analyzed the titles and abstracts of all the articles originating from the searches performed in the previously cited databases. All studies that met the inclusion criteria were selected for evaluation of their full text and for subsequent extraction of relevant data. For both, the article selection and the text analysis, two reviewers participated in collecting and assessing data from the complete articles, and made their selections according to the eligibility criteria. Standardized forms were used to extract relevant data from each study. These forms were prepared specifically for the present review.

Analysis of Study Quality

For the studies with a randomized controlled design, quality assessment was performed according to the following main aspects: secrecy of the allocation list; analysis by intention to treat; baseline comparability; blinding of the outcome assessment, and description of losses and exclusions. The absence of a description such as how the allocation list was generated was considered the absence of allocation secrecy. The quality analysis was also based on the GRADE approach, as recommended by the Cochrane Collaboration (Guyatt et al., 2008) for the analysis of study quality. The data analysis was descriptive of the studies' results. The methodological characteristics and principal evidence were reported according to the studies' main objectives (Guyatt et al., 2008).

RESULTS

The analysis enabled us to evaluate which diseases were studied more in terms of the constructs of optimism and hope, the most used scales, the most studied groups (sex and age of the assessed group), the year of the studies, and in which cases the results proved to be most effective. In the initial search, 2464 articles were found that could be potentially included and, after reading their titles and abstracts, repeated articles, those that did not address the proposed topic and those that did not meet the inclusion criteria were excluded. We believe that the large number of articles found in the initial search was due to the fact that the term “optimism” is not indexed in the DeCS and because the word “hope” has a wide range of meanings.

Only 40 studies were ultimately selected and, of these, eleven were excluded as five of them were reviews and six were found not to be related to the topic upon a closer reading. Of the 29 articles found, eight were selected from the PsycINFO database, eight from Scopus, and 13 from additional references found in the pre-selected articles (Figure 1). Although, the Pubmed and Web of Science databases did not yield results that met the inclusion criteria, the PsycINFO and Scopus searches yielded a wide range of articles. We found 1073 articles in PsycINFO and 1391 articles in Scopus. In regard to their designs, nine of the studies were randomized controlled trials (Table 1) and 20 had various other designs (Table 2). The specific characteristics of each study are shown in Tables 1, 2.

One can observe that most publications addressing the relationship between hope/optimism and chronic disease were published from 2005 onwards. In addition, the most researched diseases were: heart disease (six studies), cancer (five studies), respiratory tract diseases (three studies), spinal cord diseases (two studies), hypertension (two studies), stroke (two studies), and diabetes (two studies). Other researched diseases included multiple sclerosis, psoriasis, Crohn's disease, ulcerative colitis, and others (Tables 1, 2), which corroborated data from the PNAD (2002), cited by Almeida et al. (2002) on the most prevalent diseases in the population (Almeida et al., 2002).

The most used instruments in these studies to assess optimism were the Life Orientation Test (LOT; Scheier and Carver, 1985)—which was used to assess the construct in six of the 15 articles—and the Life Orientation Test–Revised (LOT-R; Scheier et al., 1994) which was also used in six of the 15 studies. Other scales used for this construct were: the Revised Optimism–Pessimism Scale (Kubzansky et al., 2001, 2002) and the Dutch Scale of Subjective Well-being for Older Persons (Giltay et al., 2004). The Hope Scale (Snyder et al., 1996) was the most used instrument to evaluate hope in the studies (six out of ten). Other evaluation methods were: the Emotion Scale (Richman et al., 2005), individual qualitative interviews (Halding and Heggdal, 2012), the Beck Hopelessness Scale (Johnson et al., 2001), and the Basic Hope Inventory (Hawro et al., 2014). As for the studies that addressed both constructs, the following instruments were used: the Hope Scale Optimism–Affective valence of future perspectives scale (Schöllgen et al., 2011); the Life Orientation Test, the Gottschalk Hope Scale (Scioli et al., 1997); and the Chinese version of the Life Orientation Test and

Hope Scale (Scheier and Carver, 1985; Scheier et al., 1994; Snyder et al., 1996; Scioli et al., 1997; Johnson et al., 2001; Kubzansky et al., 2001, 2002; Giltay et al., 2004; Richman et al., 2005; Hou et al., 2010; Schöllgen et al., 2011; Halding and Heggdal, 2012; Hawro et al., 2014).

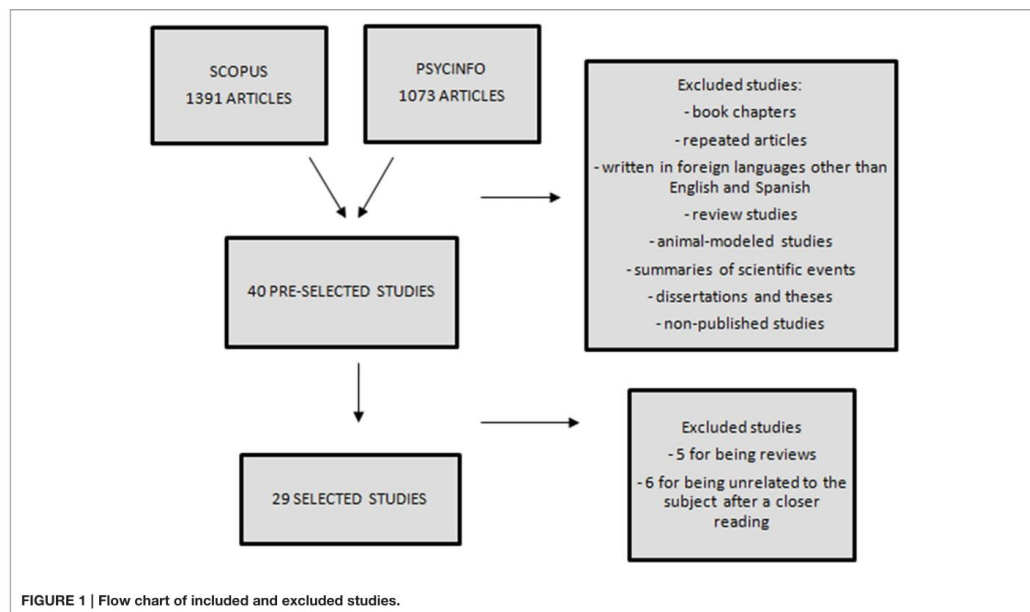
All of the research subjects evaluated in the articles were adults between the ages of 18 and 85. Fourteen of the 29 studies evaluated people who were receiving treatment for their conditions at a clinic or hospital while seven out of 19 articles about optimism and 3 from 14 articles about hope evaluated healthy individuals. Some association between higher hope/optimism levels and a healthier profile was observed in 27 of the 29 studies. In regard to the results perceived by the study participants after intervention, only two articles found no relationship between the constructs and relevant results.

In an extended analysis of the studies, it is clear that the people with heart disease had the most significant results for their physical health. As for the other diseases, the results were more subjective, as the outcome in many of the articles was suffering from fewer negative changes. In terms of analyzing the quality of the randomized controlled trials (Table 3), the main difficulty in most of the studies was related to allocation secrecy and blinding, but even though the studies conducted by randomized controlled trial design were under more rigorous standards, their results did not differ significantly from other studies' designs.

DISCUSSION

The present study's results show that there is still a small number of articles that relate optimism and hope with chronic disease, that many of the authors have focused on studying mainly heart disease and cancer and that in comparison with hope, optimism is used in a larger number of studies. However, the quantity of studies about both constructs has grown due to an increasing interest by researchers in studying human potential. Hart and Sasso (2011) mapped the contours of contemporary Positive Psychology and reported significant growth in the number of publications addressing this subject in the last decade. They confirmed that researchers in this area have focused most of their attention on two of the three “pillars” of Positive Psychology, number (1) and (2), as proposed by Seligman and Csikszentmihalyi (2000): (1) the study of positive subjective experience and (2) positive personal characteristics (3) the study of positive institutions (Seligman and Csikszentmihalyi, 2000; Hart et al., 2008).

The main instruments used to assess positive personal characteristics were the Life Orientation Test (LOT; Scheier and Carver, 1985)—which was used in eight of the 19 articles that evaluated the construct—and the Life Orientation Test–Revised (LOT-R; Scheier et al., 1994), which was used in six of the 19 articles. The LOT (Scheier and Carver, 1985) is a self-reporting questionnaire composed of 12 items that aim to measure the life orientation construct in terms of how people perceive their lives in a more optimistic or less optimistic way. The instrument was revised in 1994 and two items were removed that did not explicitly focus on future expectations, thus creating the Revised



Life Orientation Test (LOT-R) (Scheier and Carver, 1985; Scheier et al., 1994).

The studies about optimism had more similar outcomes than the hope studies due to the fact that they focused mainly on cancer and cardiac diseases, while hope studies mentioned a wider range of conditions. Studying the importance of positive psychological attributes on different diseases gives us a broad analysis of their effect in different situations but also does not have enough studies about each condition to bring us a reliable theoretical foundation that the construct is actually important to treatment.

In regards to optimism, most of the studies assessed the relationship between optimism and heart disease. The results showed that optimism was associated with greater success in heart conditions (Shepperd et al., 1996), less chances of being re-hospitalized for a wide range of aggregated problems (including myocardial infarction and coronary artery bypass surgery; Scheier et al., 1999), reduced risk of coronary disease in elderly people (Kubzansky et al., 2001), lower cardiovascular mortality in a sample of elderly people (Giltay et al., 2004), and less chances for women to experience carotid disease progression (Matthews et al., 2004; Shepperd et al., 1996; Scheier et al., 1999; Kubzansky et al., 2001; Giltay et al., 2004; Matthews et al., 2004).

Regarding cancer, it was found that optimism predicted a year of survival regardless of other socio-demographic and clinical variables in patients with head and neck cancer (Allison et al., 2003) and more abilities to manage stressors while less optimistic cancer patients experienced more negative psychological changes (Pinquart et al., 2007). Also, Allison et al. (2003) found that

individuals who had pessimistic attitudes had poorer physical health, were more likely to suffer from depression and had higher mortality rates. Evidence has suggested that individuals who possess an inner will to achieve personal goals and expect the best possible results are able to live longer, healthier lives—a conclusion also reached by Urcuyo et al. (2005) (Allison et al., 2003; Urcuyo et al., 2005; Pinquart et al., 2007).

As for other clinical conditions, optimism was found to lead to positive physical health outcomes in multiple sclerosis patients because they begin to seek opportunities to change their disease experiences and prosper in the midst of adverse conditions (Hart et al., 2008), lower perfectionism and emotional worry levels and lower non-adaptive attitudes toward chronic diseases in patients with Crohn's disease and ulcerative colitis (Flett et al., 2011). Also, it contributes to lower rates of decline in pulmonary function (Kubzansky et al., 2002) and lower pain classifications because people with a positive attitude toward life have better physiological results for dealing with pain than do pessimists (Bargiel-Matusiewicz and Krzyszkowska, 2009; Geers et al., 2010). In addition, Boehm et al. (2013) also reported that optimistic people are better prepared to face the challenges of adopting healthy behaviors and maintaining a normal Body Mass Index (BMI) (Kubzansky et al., 2002; Hart et al., 2008; Bargiel-Matusiewicz and Krzyszkowska, 2009; Geers et al., 2010; Flett et al., 2011; Boehm et al., 2013).

In regard to hope, the most used instrument (in eight of the 13 studies) was the Hope Scale (Snyder et al., 1996). This scale asks participants to assess each of 12 items on a scale of 1 (definitely

TABLE 1 | Randomized controlled trials.

Author/Year	Disease	Design	Construct	Scale	Sample	Results
Giltay et al., 2004	Cardiovascular disease	Randomized controlled trials	Optimism	Dutch scale of subjective and well-being for older persons, with a subscale for optimism	(<i>n</i> = 999, 65–85 years old) Random sample (stratified by age and sex) of people who live in Arnhem, Netherlands	There is a relationship of graduated and independent protection between dispositional optimism and all causes of mortality in old age
Matthews et al., 2004	Carotid atherosclerosis	Randomized controlled trials	Optimism	Life Orientation Test (LOT; Scheier and Carver, 1985)	(<i>n</i> = 209, 42–50 years old) Healthy, middle-aged pre-menopausal women	Optimistic women are less likely to show progression of carotid artery disease in middle age than pessimistic women
Hart et al., 2008	Multiple sclerosis	Randomized controlled trials	Optimism	The Life Orientation Test-Revised (LOT-R; Scheier et al., 1994)	(<i>n</i> = 127, 18 years old or over) Multiple sclerosis patients who participated in another randomized clinical trial and were evaluated at the beginning, middle, and end and at 6 and 12 months after the therapy	Optimism helps people to achieve their life objectives, even in the face of difficulties. Increased optimism is a mechanism that appears to assist multiple sclerosis patients in increasing their benefits over time
Geers et al., 2010	Pain tolerance, vascular response, and pulse excitability	Randomized controlled trials	Optimism	The Life Orientation Test-Revised (LOT-R; Scheier et al., 1994)	(<i>n</i> = 116, 18–45 years old) Adults without histories related to chronic pain	Optimism was associated with lower pain classifications in the placebo condition
Saquist et al., 2011	Breast cancer	Randomized controlled trials	Optimism	The Life Orientation Test-Revised (LOT-R; Scheier et al., 1994)	(<i>n</i> = 2967, 18–70 years old) Women in the initial stage of breast cancer	Optimism is not associated with breast cancer or death from all causes in the multivariate analysis
Boehm et al., 2013	Hypertension, stroke, diabetes, and heart disease	Randomized controlled trials	Optimism	The Life Orientation Test (LOT; Scheier and Carver, 1985)	(<i>n</i> = 990, mean age of 55.1 years old) American people, mostly white	Optimism is associated with healthier lipid profiles (higher HDL levels and lower triglyceride levels)
Richman et al., 2005	Hypertension, diabetes mellitus, and respiratory tract infections	Randomized controlled trials	Hope	Emotion Scale (Ellsworth and Smith, 1988)	(<i>n</i> = 5500, 55–69 years old) Patients randomly selected based on data from a multi-disciplinary practice	Higher levels of hope are associated with a decline in probability of having or developing a disease
Warber et al., 2011	Coronary syndrome	Randomized controlled trials	Hope	Hope Scale (Snyder et al., 1996)	(<i>n</i> = 41, 25–75 years old) Men and women of any ethnic/racial group with a history of unstable angina or heart attack for 6–18 months before the intervention	Hope is inversely correlated to stress and depression. An association was also observed between hope and positive cardiovascular outcomes
Gelkopf et al., 2013	Chronic combat-related post-traumatic stress	Randomized controlled trials	Hope	Hope Scale (Snyder et al., 1991a)	(<i>n</i> = 22, 24–59 years old) War veterans with chronic combat-related post-traumatic stress who participated in the 1-year Nature Adventure Rehabilitation intervention	This study's results suggest that the 1-year NAR intervention leads to significant improvements in daily functioning and hope

false) to 8 (definitely true), with total scores varying from 8 to 64, where higher scores indicate higher levels of hope (Snyder et al., 1996).

There was no mutual condition in the articles about hope, so this construct was found to lower the likeliness of being diagnosed with respiratory tract infections (Richman et al., 2005) and protect individuals against pain and depression due to the fact that hopeful individuals believe that their current circumstances are temporary and can be transformed into better conditions (Hartley et al., 2008). Furthermore, through an analysis of a lung rehabilitation program, Halding and Heggdal (2012) found that well-being and hope for the future were strengthened during this process, which motivated people to transition to healthier life habits (Richman

et al., 2005; Hartley et al., 2008; Halding and Heggdal, 2012).

Other studies showed that hope contributed to increase life satisfaction in individuals with spinal cord injuries at the time they were admitted to acute rehabilitation services (Kortte et al., 2010) and lead to a consistency of positive effects on diseases that involve different physiological systems (e.g., cardiovascular, metabolic and respiratory; Richman et al., 2005). In addition, they suggest that these positive emotions may play a role in protecting against disease development (Richman et al., 2005; Kortte et al., 2010).

Other benefit findings were reported in the studies of Johnson et al. (2001), showing that social support for HIV-positive people is inversely related to depressive symptoms and a lack of hope;

TABLE 2 | Other designs.

Author/Year	Disease	Design	Construct	Scale	Sample	Results
Shepperd et al., 1996	Heart disease	Longitudinal study	Optimism	Life Orientation Test (LOT; Scheier and Carver, 1985)	(<i>n</i> = 22, 40–80 years old) Patients who participated in an 18-week cardiac rehabilitation program	Optimism measured at the beginning of the program was associated with greater success in achieving lower saturated fat, body fat, and overall coronary risk levels as well as greater success in increasing aerobic capacity by the end of the program
Scheier et al., 1999	Coronary artery bypass surgery	Prospective cohort study	Optimism	Life Orientation Test-Revised (LOT-R; Scheier et al., 1994)	(<i>n</i> = 309, mean age: 63 years old) Patients scheduled to undergo elective coronary artery bypass surgery in a hospital in Pittsburgh, PA	Optimistic people were significantly less likely to be hospitalized again for a wide range of aggregated problems
Kubzansky et al., 2001	Heart disease	Longitudinal cohort study	Optimism	Optimism–Pessimism Scale	(<i>n</i> = 162, 21–80 years old) Cases of incident coronary heart disease: 71 cases of non-fatal myocardial incidents, 31 cases of fatal coronary heart disease and 60 cases of angina pectoris	An optimistic outlook can protect against coronary heart disease risk in older men
Kubzansky et al., 2002	Chronic airway obstruction	Prospective cohort study	Optimism	Revised Optimism–Pessimism Scale (PSM–R; Malincho et al., 1995)	(<i>n</i> = 2280, 21–80 years old) Men residing in the Greater Boston region	Optimism is linked to higher pulmonary function levels and lower rates of pulmonary function decline in older men—a protective effect, regardless of smoking habits
Allison et al., 2003	Head and neck cancer	Prospective cohort study	Optimism	French version of the Life Orientation Test	(<i>n</i> = 101, mean age: 58.3 years old) Patients with cancer diagnosed between March 1, 1997 and August 31, 1998 at the Centre Hospitalier Universitaire, Clermont-Ferrand, France	Optimism provides 1 year of survival independent of other socio-demographic and clinical variables
Urcuyo et al., 2005	Breast cancer	Cross-sectional study	Optimism	Life Orientation Test-Revised (LOT-R; Scheier et al., 1994)	(<i>n</i> = 230, 27–87 years old) Patients in the initial breast cancer stage recruited through various medical practices in the Miami area and at the local American Cancer Society (ACS) office	Benefits to the condition were related to a disposition to be optimistic about life
Pinquart et al., 2007	Cancer	Cross-sectional study	Optimism	The Life Orientation Test (LOT; Scheier and Carver, 1985)	(<i>n</i> = 153, mean age: 57.7 years old) Participants recently diagnosed in two oncology wards of a German oncology and hematology clinic	Optimistic cancer patients may interpret their illness less negatively, put negative feelings aside, better manage stressors, focus on ways to deal with problems and may therefore suffer fewer negative changes
Bargiel-Matusiewicz and Krzyszkowska, 2009	Rheumatoid arthritis, back pain, or neuropathy	Cross-sectional study	Optimism	The Life Orientation Test-Revised (LOT-R; Scheier et al., 1994)	(<i>n</i> = 62, 24–65 years old) Patients at rehabilitation centers in the cities of Warsaw and Radomsk suffering from rheumatoid arthritis, back pain, or neuropathy	A highly optimistic life orientation was related positively with pain control variables and negatively with catastrophic attitudes
Flett et al., 2011	Crohn's Disease and ulcerative colitis	Cross-sectional study	Optimism	Life Orientation Test (Scheier and Carver, 1985)	(<i>n</i> = 51, mean age: 37.7 years old) Participants were recruited at St. Michael's Hospital in Toronto, Ontario, of which 27 had Crohn's Disease and 24 had ulcerative colitis	Higher levels of optimism were associated with lower levels of perfectionism. Thus, optimistic people generally did not use emotional worry or maladaptive attitudes in relation to chronic diseases
Johnson et al., 2001	HIV	Prospective longitudinal study	Hope	Beck Hope Scale (BHS; Beck et al., 1974)	(<i>n</i> = 103, mean age: 38 years old) HIV-positive men + homosexuals	In HIV-positive people, an increase in hopelessness predicted an increase in depression after controlling for social support

(Continued)

TABLE 2 | Continued

Author/Year	Disease	Design	Construct	Scale	Sample	Results
Hartley et al., 2008	Knee and hip replacement surgery	Longitudinal study	Hope	Hope Scale (Snyder et al., 1991a)	(<i>n</i> = 100, mean age: 64 years old) Older adults residing in an orthopedic clinical community	Hope is a significant predictor of pre-surgical depression but is not predictive of depression or functional ability after surgery
Kortte et al., 2010	Spinal cord injury	Prospective study	Hope	Hope Scale (Snyder et al., 1991a)	(<i>n</i> = 87, 18–85 years old) Adults who participated in an acute spinal cord rehabilitation program in two metropolitan hospitals	There was a link between hope and greater life satisfaction during the initial period of acute rehabilitation
Kortte et al., 2012	Spinal cord dysfunction, stroke, amputation or orthopedic surgery recovery	Longitudinal study	Hope	Hope Scale (Snyder et al., 1991a)	(<i>n</i> = 174, mean age: 57 years old) Adults who participated in a rehabilitation program for spinal cord dysfunction, stroke, amputation or orthopedic surgery recovery	Interventions aimed at increasing the hope of individuals can be useful for increasing participation in improved outcomes following an acute medical rehabilitation
Halding and Heggdal, 2012	Chronic obstructive pulmonary disease	Qualitative study	Hope	Thirty-six individual qualitative interviews	(<i>n</i> = 18, 52–81 years old) Patients recruited at pulmonary rehabilitation centers in Norway	During rehabilitation, knowledge of opportunities for health and well-being, engagement in self-management and hope for the future were strengthened, as well as healthy life transitions
Waynor et al., 2012	Mental illness	Cross-sectional study	Hope	The State Hope Scale (SHS; Snyder et al., 1996)	(<i>n</i> = 74, 23–63 years old) Individuals recruited from five "employment support" programs in a Northeastern Brazilian state	Hope and symptoms are inversely related
Hawro et al., 2014	Psoriasis	Cross-sectional study	Hope	Basic Hope Inventory (Trzebiński and Zięba, 2003)	(<i>n</i> = 60, mean age: 46.8 years old) Patients with psoriasis hospitalized in the Department of Dermatology, Pediatric Dermatology and Dermatologic Oncology at the Lodz Medical University	Higher levels of hope are correlated with better life quality
Scioli et al., 1997	Chronic disease, general health	Prospective cohort study	Optimism and hope	Life Orientation Test (LOT; Scheier and Carver, 1985) and (the Hope Scale; Gottschalk, 1974, 1985)	(<i>n</i> = 57, mean age: 19.5 years old) Students recruited from psychology courses at a small New England college	Less optimism is correlated to reports of more severe disease 10 weeks later. Less hope is correlated with a higher incidence of disease and reports of greater severity of total diseases
Hou et al., 2010	Cancer	Prospective cohort study	Optimism and hope	Chinese version of the Life Orientation Test and the Hope Scale	(<i>n</i> = 234, 29–82 years old) Chinese patients with colorectal cancer	Maintenance or adoption of optimistic personalities is associated with recovery from emotional anguish and preservation of resilience
Schöllgen et al., 2011	General chronic disease	Cross-sectional study	Optimism and hope	Hope Scale (Snyder et al., 1991a), Optimism–Affective valence of future perspectives scale (Brandstädter and Wentura, 1994)	(<i>n</i> = 2454, 40–85 years old). The data were extracted from the German Aging Survey	Psychological resources positively affected health in all groups
Lopez-Vargas et al., 2014	Chronic kidney disease	Focus group	Optimism and hope	Focus group	(<i>n</i> = 38, 18 years old or older) People with chronic kidney disease (stages 1–4). The sample is from three hospitals in Sydney, Australia	Optimism and a positive perspective on life and its circumstances enabled the patients to deal with their disease and take full advantage of their lives

Waynor et al. (2012), demonstrating that hope and symptoms are inversely related; Hawro et al. (2014) reporting that higher hope levels are correlated with better life quality; and Warber et al. (2011), concluding through a spiritual intervention that hope is inversely correlated with stress and depression and associated with positive cardiovascular outcomes. Using another

methodology, Gelkopf et al. (2013) conducted a study in which the rehabilitation team of the Israeli Defense Forces (IDF) ran a rehabilitation program through adventures in nature. The results suggest that there were great improvements in the daily functioning and in the hope levels of the veterans who had chronic combat-related post-traumatic stress disorder (Johnson

TABLE 3 | Methodological quality of the studies included with randomized clinical design.

	Randomization	Allocation secrecy	Analysis by treatment intention	Baseline Comparability	Blinding	Description of losses and inclusions
Gillay et al., 2004	A	I	I	A	I	A
Matthews et al., 2004	A	I	I	A	A	I
Hart et al., 2008	A	A	A	A	A	A
Geers et al., 2010	A	A	I	A	I	I
Saquiab et al., 2011	A	I	I	A	I	I
Boehm et al., 2013	A	I	I	I	I	A
Richman et al., 2005	A	I	I	I	I	A
Warber et al., 2011	A	A	A	A	I	I
Gelkopf et al., 2013	A	I	A	A	I	A

A - Adequate; I - Inadequate.

et al., 2001; Warber et al., 2011; Waynor et al., 2012; Gelkopf et al., 2013; Hawro et al., 2014).

In terms of the simultaneous study of optimism and hope, a study by Hou et al. (2010) indicates that the maintenance or improvement of optimism and hope is associated with recovery from mental anguish and the preservation of resilience. Schöllgen et al. (2011) showed that psychological resources such as self-esteem, hope, and optimism positively affect health. Lopez-Vargas et al. (2014) studied a focus group and reported that the patients diagnosed with chronic kidney disease believed that a positive and optimistic perspective on life enabled them to better deal with their diseases and that hope for a better future led them to feel more encouraged to implement changes in their lifestyles (Hou et al., 2010; Schöllgen et al., 2011; Lopez-Vargas et al., 2014).

Regarding the results perceived by participants after interventions, only two articles did not find a relationship between the constructs and relevant results. In a study by Saquiab et al. (2011), the multivariate analysis of social support, depression, insomnia, optimism, and hostility did not find a statistically significant association between optimism and additional breast cancer occurrences nor mortality from all causes. In addition, Hartley et al. (2008) did not observe any association between hope and functional abilities as hope only had beneficial effects at the beginning of the prosthesis placement study. This is due to the fact that the participants initially experienced discomfort as they awaited their surgeries and this discomfort subsequently diminished, rendering the effects of hope less perceptible (Hartley et al., 2008; Saquiab et al., 2011).

CONCLUSION

The results of the studies presented in this analysis suggest that there is a close relationship between the constructs of optimism and hope and a reduction in the effects of chronic disease. However, it is important to highlight that the association between optimism or hope and physical health differs depending on the context of the disease and the subjects. Besides, there is a need for further studies on this subject, mainly about hope, due to the lack of studies on the variety of diseases related

to this construct. Therefore, more studies are needed in order to describe the benefits that these attributes can bring to the health of individuals. Consequently, intervention studies have to be developed to guarantee the effective implementation of the findings.

Through a general analysis of these studies, one can observe that cardiac patients with higher levels of optimism attained better results in terms of their physical health. Results were more difficult to observe in cancer patients. However, it was reported that optimistic people suffered fewer negative changes in their condition. As for hope, the results were more subjective. People with higher levels of hope reported having higher life quality and satisfaction, but the only relevant physical results were positive physical outcomes reported by patients with cardiovascular disease.

For further research, it's suggested the development of more studies related to different diseases and more interventions in the context of optimism and hope. Additionally, it's recommended the development of children and adolescents interventions because there is a lack of research about these subjects in this field of study.

AUTHOR CONTRIBUTIONS

CS and EM contributions to the conception and design of the work, constant revision, approval of published version, agreement to be accountable for all aspects of the work. LG, FB, and CR analysis, or interpretation of data for the work, constant revision, approval of published version, agreement to be accountable for all aspects of the work.

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REFERENCES

- *Allison, P. J., Guichard, C., Fung, K., and Gilain, L. (2003). Dispositional optimism predicts survival status 1 year after diagnosis in head and neck cancer patients. *J. Clin. Oncol.* 21, 543–548. doi: 10.1200/JCO.2003.10.092
- Almeida, M. F., Barata, R. B., Montero, C. V., and Silva, Z. P. (2002). Prevalência de doenças crônicas auto-referidas e utilização de serviços de saúde, PNAD/1998, Brasil. *Ciência Saúde Coletiva* 7, 743–756. doi: 10.1590/S1413-81232002000400011
- *Bargiel-Matusiewicz, K., and Krzyszkowska, A. (2009). Dispositional optimism and coping with pain. *Eur. J. Med. Res.* 14, 271–274. doi: 10.1186/2047-783X-14-S4-271
- Beck, A. T., Weissman, A., Lester, D., and Trexler, L. (1974). The measurement of pessimism: the hopelessness scale. *J. Consult. Clin. Psychol.* 42, 861–865. doi: 10.1037/h0037562
- *Boehm, J. K., Williams, D. R., Rimm, E. B., Ryff, C., and Kubansky, L. D. (2013). Relation between optimism and lipids in midlife. *Am. J. Cardiol.* 111, 1425–1431. doi: 10.1016/j.amjcard.2013.01.292
- Brandstädter, J., and Wentura, D. (1994). Veränderungen der Zeit- und Zukunftsperspektive im Übergang zum höheren Erwachsenenalter: Entwicklungspsychologische und differentielle Aspekte [Changes in time perspective and attitudes toward the future during the transition to later adulthood: developmental and differential aspects]. *Z. Entwicklungspsychol. Pädagog. Psychol.* 26, 2–21.
- Carver, C. S., Scheier, M. F., and Segerstrom, S. C. (2010). Optimism. *Clin. Psychol. Rev.* 30, 879–889. doi: 10.1016/j.cpr.2010.01.006
- Cohen, F., Kearney, K. A., Zegans, L. S., Kemeny, M. E., Neuhaus, J. M., and Stites, D. P. (1999). Differential immune system changes with acute and persistent stress for optimists vs. pessimists. *Brain Behav. Immun.* 13, 155–174. doi: 10.1006/brbi.1998.0531
- DuBois, C. M., Beach, S. R., Kashdan, T. B., Nyer, M. B., Park, E. R., Celano, C. M., et al. (2012). Positive psychological attributes and cardiac outcomes: associations, mechanisms, and interventions. *Psychosomatics* 53, 303–318. doi: 10.1016/j.psychm.2012.04.004
- Ellsworth, P. C., and Smith, C. A. (1988). Shades of joy: patterns of appraisal differentiating pleasant emotions. *Cogn. Emot.* 2, 301–331. doi: 10.1080/02699938808412702
- Escosteguy, C. C. (1999). Tópicos metodológicos e estatísticos em ensaios clínicos controlados randomizados. *Arq. Bras. Cardiol.* 72, 139–143.
- *Flett, G. L., Baricza, C., Gupta, A., Hewitt, P. L., and Endler, N. S. (2011). Perfectionism, psychosocial impact and coping with irritable bowel disease: a study of patients with Crohn's disease and ulcerative colitis. *J. Health Psychol.* 16, 561–571. doi: 10.1177/1359105310383601
- *Geers, A. L., Wellman, J. A., Fowler, S. L., Helfer, S. G., and France, C. R. (2010). Dispositional optimism predicts placebo analgesia. *J. Pain* 11, 1165–1171. doi: 10.1016/j.jpain.2010.02.014
- *Gelkopf, M., Ohayon, I. H., Bikman, M., and Kravetz, S. (2013). Nature adventurer habilitation for combat-related post traumatic chronic stress disorder: a randomized control trial. *Psychiatry Res.* 209, 485–493. doi: 10.1016/j.psychres.2013.01.026
- *Giltay, E. J., Geleijnse, J. M., Zitman, F. G., Hoekstra, T., and Schouten, E. G. (2004). Dispositional optimism and all-cause and cardiovascular mortality in a prospective cohort of elderly dutch men and women. *Arch. Gen. Psychiatry* 61, 1126–1135. doi: 10.1001/archpsyc.61.11.1126
- Gottschalk, L. A. (1974). A hope scale applicable to verbal samples. *Arch. Gen. Psychiatry* 30, 779–785. doi: 10.1001/archpsyc.1974.01760120041007
- Gottschalk, L. A. (1985). Hope and other deterrents to illness. *Am. J. Psychother.* 39, 515–525.
- Guyatt, G. H., Oxman, A. D., Vist, G. E., Kunz, R., Falck-Ytter, Y., Alonso-Coello, P., et al. (2008). GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. *BMJ* 336, 924–926. doi: 10.1136/bmj.39489.470347.AD
- *Halding, A. G., and Heggdal, K. (2012). Patients' experiences of health transitions in pulmonary rehabilitation. *Nurs. Inq.* 19, 345–356. doi: 10.1111/j.1440-1800.2011.00573.x
- Hart, K. E., and Sasso, T. (2011). Mapping the contours of contemporary positive psychology. *Can. Psychol.* 52, 82–92. doi: 10.1037/a0023118
- *Hart, S. L., Vella, L., and Mohr, D. C. (2008). Relationships among depressive symptoms, benefit-finding, optimism, and positive affect in multiple sclerosis patients after psychotherapy for depression. *Health Psychol.* 27, 230–238. doi: 10.1037/0278-6133.27.2.230
- *Hartley, S. M., Vance, D. E., Elliott, T. R., Cuckler, J. M., and Berry, J. W. (2008). Hope, self-efficacy, and functional recovery after knee and hip replacement surgery. *Rehabil. Psychol.* 53, 521–529. doi: 10.1037/a0013121
- *Hawro, T., Maurer, M., Hawro, M., Kaszuba, A., Cierpialkowska, L., Królikowska, M., et al. (2014). In psoriasis, levels of hope and quality of life are linked. *Arch. Dermatol. Res.* 306, 661–666. doi: 10.1007/s00403-014-1455-9
- *Hou, W. K., Law, C. C., Yin, J., and Fu, Y. T. (2010). Resource loss, resource gain, and psychological resilience and dysfunction following cancer diagnosis: a growth mixture modeling. *Health Psychol.* 29, 484–495. doi: 10.1037/a0020809
- *Johnson, J. G., Panzarella, C., Alloy, L. B., Metalsky, G. I., Rabkin, J. G., Williams, J. B. W., et al. (2001). Hopelessness as a mediator of the association between social support and depressive symptoms: findings of a study of men with HIV. *J. Consult. Clin. Psychol.* 69, 1036–1060. doi: 10.1037/0022-006x.69.6.1056
- *Kortte, K. B., Gilbert, M., Gorman, P., and Wegener, S. T. (2010). Positive psychological variables in the prediction of life satisfaction after spinal cord injury. *Rehabil. Psychol.* 55, 40–47. doi: 10.1037/a0018624
- *Kortte, K. B., Stevenson, J. E., Hosey, M. M., Castillo, R., and Wegener, S. T. (2012). Hope predicts positive functional role outcomes in acute rehabilitation populations. *Rehabil. Psychol.* 57, 248–255. doi: 10.1037/a0029004
- *Kubzansky, L. D., Sparrow, D., Vokonas, P., and Kawachi, I. (2001). Is the glass half empty or half full? A prospective study of optimism and coronary heart disease in the normative aging study. *Psychosom. Med.* 63, 910–916. doi: 10.1097/00006842-200111000-00009
- *Kubzansky, L. D., Wright, R. J., Cohen, S., Weiss, S., Rosner, B., and Sparrow, D. (2002). Breathing easy: a prospective study of optimism and pulmonary function in the normative aging study. *Ann. Behav. Med.* 24, 345–353. doi: 10.1207/S15324796ABM2404_11
- *Lopez-Vargas, P. A. L., Tong, A., Phoon, R. K. S., Chadban, S. J., Shen, Y., and Craig, J. C. (2014). Knowledge deficit of patients with stage 1–4 CKD: a focus group study. *Nephrology* 19, 234–243. doi: 10.1111/nep.12206
- Malinchoc, M., Offord, K. P., and Colligan, R. C. (1995). PSM-R: revised optimism-pessimism scale for the MMPI-2 and MMPI. *J. Clin. Psychol.* 51, 205–214. doi: 10.1002/1097-4679(199503)51:2<205::AID-JCLP2270510210>3.0.CO;2-2
- *Matthews, K. A., Räikkönen, K., Sutton-Tyrrell, K., and Kuller, L. H. (2004). Optimistic attitudes protect against progression of carotid atherosclerosis in healthy middle-aged women. *Psychosom. Med.* 66, 640–644. doi: 10.1097/01.psy.0000139999.99756.a5
- *Pinquart, M., Fröhlich, C., and Silbereisen, R. K. (2007). Cancer patients' perceptions of positive and negative illness-related changes. *J. Health Psychol.* 12, 907–921. doi: 10.1177/1359105307082454
- Rasmussen, H. N., Scheier, M. F., and Greenhouse, J. B. (2009). Optimism and physical health: a meta-analytic review. *Ann. Behav. Med.* 37, 239–256. doi: 10.1007/s12160-009-9111-x
- *Richman, L. S., Kubzansky, L., Maselko, J., Kawachi, I., Choo, P., and Bauer, M. (2005). Positive emotion and health: going beyond the negative. *Health Psychol.* 24, 422–429. doi: 10.1037/0278-6133.24.4.422
- *Saqib, N., Pierce, J. P., Saquib, J., Flatt, S. W., Natarajan, L., Bardwell, W. A., et al. (2011). Poor physical health predicts time to additional breast cancer events and mortality in breast cancer survivors. *Psychooncology* 20, 252–259. doi: 10.1002/pon.1742
- Scheier, M. F., and Carver, C. S. (1985). Optimism, coping, and health: assessment and implications of generalized outcome expectancies. *Health Psychol.* 4, 219–247. doi: 10.1037/0278-6133.4.3.219
- Scheier, M. F., Carver, C. S., and Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): a reevaluation of the Life Orientation Test. *J. Pers. Soc. Psychol.* 67, 1063–1078. doi: 10.1037/0022-3514.67.6.1063
- *Scheier, M. F., Matthews, K. A., Owens, J. F., Schulz, R., Bridges, M. W., Magovern, G. J., et al. (1999). Optimism and rehospitalization after coronary artery bypass graft surgery. *Arch. Intern. Med.* 159, 829–835. doi: 10.1001/archinte.159.8.829
- *Schöllgen, I., Huxhold, O., Schütz, B., and Tesch-Römer, C. (2011). Resources for health: differential effects of optimistic self-beliefs and social support according to socioeconomic status. *Health Psychol.* 30, 326–335. doi: 10.1037/a0022514

- *Scioli, A., Chamberlin, C. M., Samor, C. M., Lapointe, A. B., Campbell, T. L., Macleod, A. R., et al. (1997). A prospective study of hope, optimism, and health. *Psychol. Rep.* 81, 723–733. doi: 10.2466/pr0.1997.81.3.723
- Segerstrom, S. C. (2005). Optimism and immunity: do positive thoughts always lead to positive effects? *Brain Behav. Immun.* 19, 195–200. doi: 10.1016/j.bbi.2004.08.003
- Segre, M., and Ferraz, F. C. (1997). O conceito de saúde. *Rev. Saúde Públ.* 31, 538–542. doi: 10.1590/s0034-89101997000600016
- Seligman, M. E., and Csikszentmihalyi, M. (2000). Positive psychology. An introduction. *Am. Psychol.* 55, 5–14. doi: 10.1037/0003-066X.55.1.5
- Seligman, M. E. P. (2008). Positive health. *Appl. Psychol.* 57, 3–18. doi: 10.1111/j.1464-0597.2008.00351.x
- *Shepperd, J. A., Maroto, J. J., and Pbert, L. A. (1996). Dispositional optimism as a predictor of health changes among cardiac patients. *J. Res. Pers.* 30, 517–534. doi: 10.1006/jrpe.1996.0038
- Snyder, C. R., Harris, C., Anderson, J. R., Holleran, S. A., Irving, L. M., Sigmon, S. T., et al. (1991a). The will and the ways: development and validation of an individual-differences measure of hope. *J. Pers. Soc. Psychol.* 60, 570–585. doi: 10.1037/0022-3514.60.4.570
- Snyder, C. R., Irving, L. M., and Anderson, J. R. (1991b). *Handbook of Social and Clinical Psychology: The Health Perspective*. Pergamon General Psychology Series, 162. Richmond, VA: Pergamon.
- Snyder, C. R., Simpson, S. C., Ybasco, F. C., Borders, T. F., Babuak, M. A., and Higgins, R. L. (1996). Development and validations of the state of hope scale. *J. Pers. Soc. Psychol.* 70, 321–335. doi: 10.1037/0022-3514.70.2.321
- Trzebiński, J., and Zięba, M. (2003). *Basic Hope Inventory*. Warsaw: Pracownia Testów Psychologicznych PTP.
- *Urcuyo, K. R., Boyers, A. E., Carver, C. S., and Antoni, M. H. (2005). Finding benefit in breast cancer: relations with personality, coping, and concurrent well-being. *Psychol. Health* 20, 175–192. doi: 10.1080/08870440512331317634
- *Warber, S. L., Ingerman, S., Moura, V. L., Wunder, J., Northrop, A., Gillespie, B. W., et al. (2011). Healing the heart: a randomized pilot study of a spiritual retreat for depression in acute coronary syndrome patients. *Explore (NY)* 7, 222–233. doi: 10.1016/j.explore.2011.04.002
- *Waynor, W. R., Gao, N., Dolce, J. N., Haytas, L. A., and Reilly, A. (2012). The relationship between hope and symptoms. *Psychiatr. Rehabil. J.* 35, 345–348. doi: 10.2975/35.4.2012.345.348

Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Porto Alegre, 2019.

Dear, Joerg Heber

On behalf of all authors, I am submitting the manuscript entitled “Positive psychological characteristics in metabolic syndrome associated with prospect changes in diet and anthropometric factors” for your appreciation and also for editorial analysis by the *Plos One*, as to the possibility of its publication as a Research Article.

The prevalence of metabolic syndrome (MetS) is increasing worldwide and diet therapy plays a key role in treating this disease. Since most patients show difficulties in adhering to nutritional interventions, research on the association of positive psychological characteristics with greater engagement in healthy behaviors and better physical health is relevant to this field. Hence, the present study aimed to evaluate the association between positive psychology attributes (optimism, hope, self-esteem, positive/negative affect and life satisfaction) and changes in diet quality and anthropometric parameters of individuals with MetS who received nutritional counseling.

The study assessed 63 patients (age 55.3 ± 14.1) at a nutrition outpatient clinic. Anthropometric parameters and 24-hour food recall data (for evaluation of the Brazilian Healthy Eating Index - Revised – BHEI-R) were collected at the first visit and subsequent return visit, on average five months later. Psychological data were collected at the first visit using validated and standardized scales. The results were adjusted in relation to the depression scores of the patients, which were evaluated using the Beck Depression Inventory-II (BDI-II). Changes in anthropometric factors and in the BHEI-R were assessed, associating them with the psychological attributes investigated. The results indicated that positive affect and hope

were associated with improvement in BHEI-R scores. A significant association was also observed between optimism and a reduction in abdominal circumference. The study suggests that some attributes may have greater influence on the nutritional treatment of MetS.

None of the material in the manuscript is included in another manuscript, has been published previously, or is currently under consideration for publication elsewhere. Ethical guidelines were followed by the investigator in performing studies and each author has participated sufficiently in the work to take public responsibility for the content of the paper and also for approve of the manuscript final version approval.

If requested, the authors will provide the data or will cooperate fully in obtaining and providing the data on which the manuscript is based for examination by the editors or their assignees. It does not have conflict of interest. We agree to assign exclusive copyright to the Plos One, if and when the manuscript is accepted for publication.

Yours sincerely,



Cecilia Cesa Schiavon

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POSITIVE PSYCHOLOGICAL CHARACTERISTICS IN METABOLIC SYNDROME ASSOCIATED WITH PROSPECT CHANGES IN DIET AND ANTHROPOMETRIC FACTORS

ABSTRACT:

The prevalence of metabolic syndrome (MetS) is increasing worldwide and diet therapy plays a key role in treating this disease. Since most patients show difficulties in adhering to nutritional interventions, research on the association of positive psychological characteristics with greater engagement in healthy behaviors and better physical health is relevant to this field. The present study aimed to evaluate the association between positive psychology attributes (optimism, hope, self-esteem, positive/negative affect and life satisfaction) and changes in diet quality and anthropometric parameters of individuals with MetS who received nutritional counseling. The study assessed 63 patients (age 55.3 ± 14.1) at a nutrition outpatient clinic. Anthropometric parameters and 24-hour food recall data (for evaluation of the Brazilian Healthy Eating Index - Revised – BHEI-R) were collected at the first visit and subsequent return visit, on average five months later. Psychological data were collected at the first visit using validated and standardized scales. The results were adjusted in relation to the depression scores of the patients, which were evaluated using the Beck Depression Inventory-II (BDI-II). Changes in anthropometric factors and in the BHEI-R were assessed, associating them with the psychological attributes investigated. The results indicated that positive affect and hope were associated with improvement in BHEI-R scores (Cohen effect sizes -0.65 and -0.58; $p = 0.012$ and 0.025 , respectively). A significant association was also observed between optimism and a reduction in abdominal circumference (Cohen effect size 0.56; $p = 0.031$). The associations remained significant even after adjusting for the BDI-II ($p = 0.022$, $p = 0.037$ and $p = 0.05$, respectively). No statistically significant associations were observed for the other attributes assessed. The study suggests that some attributes may have greater influence on the nutritional treatment of MetS and that future studies should be conducted in order to enable effective multidisciplinary interventions to treat MetS.

Keywords: Metabolic syndrome, Diet, Subjective well-being, Optimism, Hope, Self-esteem

INTRODUCTION

Metabolic syndrome (MetS) is a set of interrelated factors that leads to cardiovascular disease and diabetes and is an important clinical and public health problem. The factors that contribute to the diagnosis of MetS include dyslipidemia, high blood pressure, high levels of

triglyceride, low-density lipoprotein levels and obesity, additionally with central adiposity (1). MetS is becoming increasingly prevalent worldwide and is estimated to affect about 20% to 25% of the global adult population, largely due to the increase in obesity and sedentary lifestyles over recent decades (2). MetS doubles the probability of death and triples the probability of heart attack or stroke compared to people without the syndrome (1,3). A systematic review of the prevalence of MetS in Brazil indicated a weighted average of 29.6% (range: 14.9% - 65.3%) across ten selected cross-sectional studies (4).

According to the World Health Organization, some of the most important risk factors responsible for the majority of deaths from chronic noncommunicable diseases include smoking, having excessive alcohol consumption, low levels of physical activity and poor eating habits (5). The main risk factor specifically for MetS is overweight/obesity, which seems to precede the onset of other risk factors for the syndrome (6).

Thus, the treatment and prevention of MetS and obesity follow similar patterns and are considered major clinical and public health challenges worldwide (7). In this context, diet quality plays a key role in preventing MetS and its individual components (8). Proper treatment can lead to a positive prognosis and good quality of life. However, studies document that patients exhibited significant resistance to adhering to one or more of the self-management recommendations such as medication use, physical activity and healthy eating (9, 10).

Therefore, psychological factors can play a vital role in adherence to treatment. The literature presents ample evidence that depressive symptoms and anxiety are associated with non-adherence to diet, physical activity, medication or other secondary prevention measures (11, 12). However, the literature has also recently investigated positive mental health indicators as predictors of general health and longevity, including subjective well-being (SWB), optimism and self-esteem, among others (12).

The study of these constructs is called positive psychology (PP) and aims to broaden the focus of psychological studies, which have traditionally focused on risk factors for physical and mental illnesses (13). Although also rooted in earlier humanistic psychology, PP began in 2000 and has grown significantly since then in several countries (14), especially in the context of health assessment. Seligman, a leading PP researcher, published an article titled “Positive Health” (2008) in which he specifically proposed that physical health studies take a positive perspective by investigating personal and social attributes that lead to positive outcomes in improving indicators of health, well-being, disease prevention and engagement in health-promoting situations (15).

However, it is emphasized that studies concerning the interference of positive psychological aspects in the context of metabolic syndrome are still scarce and have been relatively neglected in the literature. Some studies were found on diseases related to MetS, but not to the syndrome itself. Recent reviews and meta-analyses have demonstrated that SWB is a protective factor against chronic diseases and mortality (16, 17, 18). Likewise, Diener points out, based on several studies, that SWB is one of the variables with the greatest impact on physical health and that its mechanisms of action involve changes in health behaviors, the immune system and the cardiovascular system (19).

For example, Boylan & Ryff (20) evaluated a representative sample of middle-aged adults in the United States and found cross-sectional and longitudinal associations between well-being and MetS components (abdominal circumference, systolic and diastolic blood pressure, triglycerides, HDL cholesterol and fasting glycemia) and found that life satisfaction (LS) ($p = 0.005$) and positive affect (PA) ($p = 0.009$) predicted fewer MetS components as well as a lower risk of meeting diagnostic criteria in fully adjusted models. The results were sustained after adjustments for depressive symptoms, also, they weren't moderated by age, sex, race or socioeconomic status. The associations were stronger between SWB and abdominal circumference, HDL cholesterol and triglycerides. Therefore, according to the authors, body composition and diet may be the most relevant targets for SWB interventions.

In addition to SWB, other positive psychological attributes such as optimism, hope and self-esteem are considered important variables that protect against chronic disease, though they have been less studied in the context of physical health (21, 22). In the literature, these attributes are associated with greater engagement in appropriate health behaviors such as adopting a healthy diet (23, 24).

Considering the presented data, it is noted the importance of studying positive psychological attributes in the context of MetS, especially regarding their impact on the nutritional treatment of the syndrome. Thus, the present study aimed to evaluate the association between positive personal indicators and the response to the nutritional treatment of patients with metabolic syndrome. The study specifically investigated the relationships among attributes studied by positive psychology (positive/negative affect, life satisfaction, optimism, hope and self-esteem) and improvements in the diet quality and anthropometric parameters of Brazilian individuals with MetS receiving nutritional counseling at a hospital outpatient clinic. It should be noted that diet quality was assessed using the Brazilian Healthy Eating Index - Revised (BHEI-R) as it measures several dietary risk factors that contribute to chronic diseases while simultaneously assessing and monitoring diet of individuals and

populations (25). In agreement with previous evidence, the hypothesis is that individuals with better positive psychology indicators show an improvement in diet quality and anthropometric factors upon their return visit to their nutritionist compared to their previous individualized nutritional counseling session.

MATERIALS AND METHODS

Sample inclusion criteria

The study included individuals who received treatment at the nutrition outpatient clinic of a public hospital in southern Brazil. According to the selection criteria, the subjects needed to be on their first outpatient visit, be cognitively able to understand the nutritional guidelines and answer the questionnaires of the study, and have a confirmed diagnosis of MetS based on the biochemical data available in the patient files. The diagnostic criteria used were those adopted by the National Cholesterol Education Program's Adult Treatment Panel III (ATP III). The literature presents several definitions of MetS, which vary somewhat in the clinical cut-off points that define risk, with ATP III being the most commonly used definition for studies on psychological factors and metabolic syndrome (26). According to this definition, at least three of the following risk factors must be present to confirm the diagnosis: central obesity (AC > 102 cm for men or > 88 cm for women); triglycerides $\geq$ 150 mg/dL; HDL cholesterol < 40 mg/dL in men or < 50 mg/dL in women; blood pressure $\geq$ 130 mm Hg systolic or $\geq$ 85 mm Hg diastolic and fasting glucose $\geq$ 100 mg/dL.

Instruments

- **Socioeconomic, clinical and anthropometric questionnaire:** Questionnaire containing information relevant to the sample assessed including age, sex, schooling, clinical comorbidities, monthly income and anthropometric data. The information was collected by the staff at the nutrition outpatient clinic. Abdominal circumference, weight and height were measured according to the standard procedures recommended by the World Health Organization (27). Height and weight were measured using a Welmy[®] digital scale with a stadiometer. Abdominal circumference was measured using an inelastic anthropometric tape at the midpoint between the ribs and the iliac crest. All anthropometric data were collected by the nutrition outpatient clinic team.
- **Brazilian Healthy Eating Index - Revised (BHEI-R):** Dietary consumption was measured using a 24-hour recall (24HR). Household measurements were converted

into SI units of measure and nutritional value was calculated with the Nutrition Data System for Research (NDSR, 2016 version). The results were used for classification by the BHEI-R, which was validated for the Brazilian population by Previdelli et al. (2011) (25). The BHEI-R is a dietary index comprising 12 components, nine of which refer to food groups based on recommendations of the Food Guide for the Brazilian Population, in which higher consumption receives a higher score. The components for total fruit (including fruit and natural fruit juice); whole fruit (excluding fruit juice); total vegetables; dark green, orange and leguminous vegetables; total cereals (including cereals, roots and tubers); and whole grains have a maximum score of five points. The components for milk and dairy products (including soy derivatives), oils (monounsaturated and polyunsaturated fats, oils from oilseeds and fish fat); meat, eggs, and legumes have a maximum score of ten points. Two other components evaluate sodium and saturated fat specifically on a ten-point scale. Finally, the component that evaluates solid fats, alcoholic beverages and added sugar has a maximum score of 20 points. These last three components reflect an unhealthy diet. Thus, lower consumption receives a higher score. More information on the use of the BHEI-R can be found in the paper by Previdelli et al. (2011) (25).

- **Psychological scales:**

Beck Depression Inventory: This inventory consists of a questionnaire with 21 multiple-choice questions and is intended to assess mood. Each item is scored on a scale of 0 to 3. The inventory was developed by Aaron Beck and has been standardized for Brazilian Portuguese and has good internal consistency indicators and ample evidence of validity (28). The instrument was applied at the beginning of the first interview with the patient to evaluate possible interference in the answers to the scales. The results of the other scales were adjusted to correct this factor since individuals with depression may have attention, memory and interpretation disorders related to emotionally relevant information (29). The influence of the results of this scale on the change of the outcomes evaluated was also assessed.

Positive and Negative Affect Scale: This scale comprises ten items that evaluate PA and ten that evaluate negative affect (NA). The items consist of adjectives with answer keys on a five-point Likert scale ranging from “not at all” to “extremely.” The scale was developed and validated by Zanon et al. (30), based on Watson & Clark’s (1994) Positive and Negative Affect Schedule (PANAS) and a two-dimensional structure (31). These factors add PA and NA items, respectively. The PANAS has been standardized for the Brazilian context and has

adequate internal consistency indexes (with alphas of 0.83 and 0.77) as well as validity evidence based on internal structure and convergent validity.

Life Satisfaction Scale: This scale consists of five questions that are graded on a seven-point Likert scale, with responses ranging from “strongly disagree” to “strongly agree”. Studies have shown that the scale comprises a single factor and has high internal consistency ($\alpha = 0.87$) and high test-retest reliability ($r = 0.82$) (30). The instrument also features ample validity evidence based on internal structure and Brazilian standardization data.

Brazilian version of the Revised Life Orientation Test (LOT-R): This test was developed to measure dispositional optimism and includes ten items: three statements about optimism (items 1, 4 and 10), three about pessimism (items 3, 7 and 9) and four distractors (items 2, 5, 6 and 8). Individuals indicate their level of agreement with the items on a five-point Likert scale with responses ranging from “strongly disagree” to “strongly agree.” Scores closer to 5 always indicate a higher degree of optimistic expectation. The LOT-R (31) is an abridged and revised version of the Life Orientation Test (LOT) (32). Bastianello et al. (2014) adapted, validated and standardized the instrument for Brazilian Portuguese, creating the Brazilian version of the LOT-R, which had internal consistency of 0.80 and a single factor that accounted for 51% of the data variance (35).

Adult Dispositional Hope Scale (ADHS): The scale assesses dispositional hope and contains 12 items distributed equally among agency factors, pathway factors and fillers. The responses were indicated on a five-point Likert scale and ranged from “totally false” to “totally true.” In Brazil, the original ADHS version by Snyder et al. (1991) (36) was adapted, validated and standardized by Pacico, Bastianello & Hutz (2013) (37) and an alpha coefficient of 0.79 was obtained. In the adapted instrument, the two-factor structure (pathways and agency) was not maintained and the resulting factor structure was one-dimensional (38).

Rosenberg’s Self-Esteem Scale: This scale has a one-dimensional measure consisting of ten statements that assess general self-esteem. The items are answered on a four-point Likert scale with responses ranging from “totally agree” to “totally disagree.” Hutz & Zanon (39) revised the adaptation, validation and standardization of the scale, which had been previously adapted based on preceding studies by Hutz. An analysis of its main components confirmed its one-factor solution, as was found in the previous Brazilian study and in the original American instrument. The internal consistency of the adapted scale ($\alpha = 0.90$) was satisfactory.

Procedures

The present study has an observational longitudinal design and its data were evaluated at two times in a distinct manner. At moment 1 (M1), which occurred immediately after the first visit to the nutrition outpatient clinic, the interviewer read each question aloud so that the interviewees could better understand it. All of the instruments were applied at M1. Although the instruments were validated for self-application, it was found that the interviewer needed to mediate this adaptation in the pilot test of the present study possibly due to the lower educational level of the sample compared to that used in the validations of the applied psychological scales.

At Moment 2 (M2), which corresponded to the return of the patient to the outpatient clinic (i.e., the second visit to the outpatient clinic), only the 24HR for the BHEI-R, weight (kg), height (m) and abdominal circumference (cm) data were collected. Since the outpatient clinic visits always took place on Wednesdays, all patients were interviewed about the food they had consumed on the previous Tuesday, thus enabling the evaluation of a more usual weekly food consumption both at M1 and at M2. The subjects were evaluated for psychological constructs only at M1 since studies indicate that, although not immutable, these constructs have moderate temporal stability (33, 34, 40, 41, 42, 43).

The present study did not aim to evaluate the methodology of the nutritional orientation strategies of the outpatient clinic where the data were collected. However, it should be clarified that the food behavior change methodology was based on the precepts of Bandura's Cognitive Social Theory (2005), which adopts the perspective of acting for self-development, adaptation and change, and that the nutritional guidance was provided in accordance with the First Brazilian Guideline for MetS Diagnosis and Treatment (44).

According to anamnesis of each patient and based on the aforementioned guideline, each diet plan was individualized and provided for sustainable weight reduction, varying from 5% to 10% of initial body weight. The first step in the design of the plan was to establish the needs of the individual based on nutritional assessment, including determination of body mass index and abdominal circumference. The eating plan provided a total caloric value compatible with obtaining desirable body weight. For obese subjects, the diet was hypocaloric, with a reduction by 500 to 1000 kcal in the total daily energy expenditure (DEE) predicted, aiming to promote weight losses from 0.5 to 1.0 kg/week. In addition, diet distribution, as recommended by the Guideline (SBC, 2005) (45), was 50 to 60% of the total caloric value (TCV) from carbohydrates while dietary fiber should be present at 20 to 30 g per day. Total fats represented 20% to 30% of the TCV, with less than 10% of saturated, up to 10% of monounsaturated and up to 20% of polyunsaturated fats.

At moment 2, on average five months later, the results reached and the difficulties presented by the subjects were assessed. Nutritional counseling based on the same recommendations described above was provided again and the diet was calculated using the same goals.

Statistical analyses

Due to the scarcity of data in the literature, a moderate effect size was used to calculate the sample size (46). The calculation was performed in the software WINPEPI v.11.43. For a significance level of 5%, 90% power and a minimum correlation coefficient of 0.4 of diet quality variation (delta) in relation to the anthropometric parameters and test scores for the psychological attributes, the resulting minimum number was 62.

Aiming to evaluate the change in the values between the moments analysed for the IQD-R score and the anthropometric factors, the delta, symbol Δ , was used. The delta calculation was performed by the difference between moment two (M2) and moment one (M1).

The analyses were performed in the software SPSS v.21.0. The Shapiro-Wilk test was used to evaluate the normality of the quantitative variables. Student's t-test for paired samples was used to compare the means at M1 and M2 and Wilcoxon test was applied in cases of asymmetry. All the results of the psychological scales were dichotomized by the median scores. To compare the means of the anthropometric and BHEI-R variables according to the dichotomized psychological scales, Student's t-test for independent samples was applied and the effect size was checked with the Cohen formula. According to Cohen (45), values < 0.5 indicate a minor effect, while values between 0.5 and 0.79 indicate a moderate effect and values > 0.8 indicate a major effect. Analysis of covariance was used to control the confounding effect of the BDI-II results on the relationship of the psychological data with the change in BHEI-R score and anthropometric factors.

Ethics procedures

The project was duly approved by the ethics committee for research on human beings of the institutions that took part in the study. This study was carried out in accordance with the recommendations of the Ethics Committee of Irmandade Santa Casa de Misericórdia de Porto Alegre (ISCOMPA) and of the Federal University of Healthcare Sciences of Porto Alegre (UFCSPA) and was approved under protocols 724,805 and 760,631, respectively. All subjects provided written informed consent in accordance with the Declaration of Helsinki.

RESULTS

The sample consisted of 63 subjects. Mean participant age was 55.3 ± 14.1 , 68% (n=43) of the subjects were female and 84% (n=53) were white. Of the participants, 46% (n=29) had less than eight years of schooling and 59% (n=36) reported incomes between three and five times the minimum wage. Regarding comorbidities, 73% (n=46) had arterial hypertension, 76% (n=48) had diabetes mellitus and 48% (n=30) had dyslipidemia.

Scores in the BHEI-R, which is separated into 12 components, indicated a significant increase in total grain consumption between M1 and M2 ($p = 0.038$), on average five months later, as described on Table 1.

Table 1 – Brazilian Healthy Eating Index -Revised (BHEI-R) score between evaluations at M1 and M2 of patients with metabolic syndrome, Porto Alegre, Brazil (n = 63).

Food Groups / Nutrients	M1	M2	P
	Md (P25 – P75)	Md (P25 – P75)	
Total grains	5 (3.8 – 5)	5 (4.1 – 5)	0.981*
Whole grains	0 (0 – 3.2)	0 (0 – 5)	0.038*
Total fruits	4.7 (0 – 5)	4.8 (0 – 5)	0.689*
Whole fruits	5 (0 – 5)	5 (0 – 5)	0.334*
Milk and dairy products	4.6 (2.2 – 8.0)	5.2 (2.6 – 9.1)	0.257*
Meats	10 (10 – 10)	10 (9.9 – 10)	0.977*
Total vegetables	5 (5 – 5)	5 (5 – 5)	0.429*
Dark-green, orange and leguminous vegetables	5 (5 – 5)	5 (5 – 5)	0.646*
Oils	10 (4.9 – 10)	10 (2.8 – 10)	0.366*
Saturated fats	7.8 (3.9 – 9.7)	8.4 (4.0 – 9.5)	0.777*
Sodium	1.9 (0.4 – 3.8)	2.2 (0 – 4.0)	0.954*
SoFAAS	17.3 (13.4 – 19.8)	17.7 (14.9 – 20)	0.351*
Final – mean $\pm$ SD	68.4 $\pm$ 10.4	69.0 $\pm$ 10.2	0.680**

M1: Moment one; M2: Moment two; SoFAAS: calories from solid fat, alcohol and added sugar; Md:Median; P25: 25th percentile; P75: 75th percentile; *Wilcoxon test; **Paireded t-student

Nevertheless, the final BHEI-R score did not change significantly. Consequently, no change occurred in the anthropometric parameters evaluated, with mean BMI of $33.4 \text{ kg/m}^2 \pm$

6.0 at M1 and $33.2 \text{ kg/m}^2 \pm 6.2$ at M2 ($p = 0.485$) while mean abdominal circumference was 106.6 ± 12.5 at M1 and 105.8 ± 13.4 at M2 ($p = 0.173$) (Table 2).

Table 2 – Anthropometric factors between M1 and M2 of patients with metabolic syndrome, Porto Alegre, Brazil (n = 63).

Anthropometric variables	M1	M2	p*
	Mean ± SD	Mean ± SD	
<u>Total Sample</u>			
Weight (kg)	86.8 ± 18.3	86.3 ± 18.6	0.472
Body Mass Index (kg/m²)	33.4 ± 6.0	33.2 ± 6.2	0.485
Abdominal Circunference (cm)	106.6 ± 12.5	105.8 ± 13.4	0.173

M1: Moment one; M2: Moment two; BMI: body mass index; AC: abdominal circumference; SD: standard deviation; *Paired t-test; kg: kilogram; kg/m^2 : kilogram per metre squared; cm: centimeter.

The Table 3 shows the score for each of the main psychological variables analysed.

Table 3 – Scores of the psychological variables applied to patients with metabolic syndrome, Porto Alegre, Brazil (n = 63).

Psychological variables	Mean $\pm$ SD	Md (P25-P75)
BDI-II	10.0 ± 8.7	8 (4-14)
Positive affect	35.3 ± 8.2	36 (29-40)
Negative affect	20.9 ± 8.1	20 (15-27)
Life satisfaction	26.1 ± 6.6	27 (23-31)
Self-esteem	33.8 ± 4.1	34 (31-37)
Optimism	26.4 ± 3.6	27 (24-30)
Hope	34.6 ± 4.9	36 (31-38)

BDI-II: Beck Depression Inventory II; SD: standard deviation; Min: minimum; Max: maximum; Md:Median; P25: 25th percentile; P75: 75th percentile.

Tables 4 to 10 show the classifications of the psychological characteristics associated with the BHEI-R, BMI, AC and weight of the 63 MetS evaluated patients.

Table 4 – Classification of positive affect (by median) associated with the BHEI-R, BMI, AC and weight of patients with metabolic syndrome, Porto Alegre, Brazil (n = 63).

Variables	Positive affect		Cohen effect size (d)	P*
	≤ 36 points	> 36 points		
	(n = 32)	(n = 31)		
	Mean $\pm$ SD	Mean $\pm$ SD		
Δ BHEI-R	-2.94 $\pm$ 11.2	4.26 $\pm$ 10.9	-0.65	0.012
Δ BMI	-0.16 $\pm$ 2.39	-0.25 $\pm$ 2.26	0.04	0.885
Δ AC	-0.73 $\pm$ 4.84	-0.79 $\pm$ 3.81	0.01	0.956
Δ Weight	-0.62 $\pm$ 5.96	-0.46 $\pm$ 5.94	-0.03	0.916

Δ : variation between the two times evaluated; BHEI-R: Brazilian Healthy Eating Index - Revised; BMI: body mass index; AC: abdominal circumference; SD: standard deviation; *Independent Samples t Test; n: sample size

Table 5 – Classification of positive affect (by median) associated with the BHEI-R, BMI, AC and weight of patients with metabolic syndrome, Porto Alegre, Brazil (n = 63).

Variables	Negative affect		Cohen effect size (d)	P*
	≤ 20 points	> 20 points		
	(n = 33)	(n = 30)		
	Mean $\pm$ SD	Mean $\pm$ SD		
Δ BHEI-R	0.20 $\pm$ 9.74	1.04 $\pm$ 13.3	-0.07	0.774
Δ BMI	-0.58 $\pm$ 1.27	0.21 $\pm$ 3.05	-0.34	0.191
Δ AC	-1.15 $\pm$ 4.54	-0.31 $\pm$ 4.08	-0.19	0.447
Δ Weight	-1.56 $\pm$ 3.51	0.58 $\pm$ 7.64	-0.36	0.168

Δ : variation between the two times evaluated; BHEI-R: Brazilian Healthy Eating Index - Revised; BMI: body mass index; AC: abdominal circumference; SD: standard deviation; *Independent Samples t Test; n: sample size

Table 6 – Classification of life satisfaction (by median) associated with the BHEI-R, BMI, AC and weight of patients with metabolic syndrome, Porto Alegre, Brazil (n = 63).

Variables	Life Satisfaction		Cohen effect size (d)	P*
	≤ 27 points	> 27 points		
	(n = 33)	(n = 30)		
	Mean $\pm$ SD	Mean $\pm$ SD		
Δ BHEI-R	-1.31 $\pm$ 10.8	2.70 $\pm$ 12.0	-0.37	0.169
Δ BMI	0.02 $\pm$ 2.78	-0.45 $\pm$ 1.67	0.20	0.431
Δ AC	-0.82 $\pm$ 4.37	-0.69 $\pm$ 4.34	-0.03	0.910
Δ Weight	-0.17 $\pm$ 6.92	-0.95 $\pm$ 4.60	0.13	0.605

Δ : variation between the two times evaluated; BHEI-R: Brazilian Healthy Eating Index - Revised; BMI: body mass index; AC: abdominal circumference; SD: standard deviation; *Independent Samples t Test; n: sample size

Table 7 – Classification of optimism (by median) associated with the BHEI-R, BMI, AC and weight of patients with metabolic syndrome, Porto Alegre, Brazil (n = 63).

Variables	Optimism		Cohen effect size (d)	P*
	≤ 27 points	> 27 points		
	(n = 34)	(n = 29)		
	Mean $\pm$ SD	Mean $\pm$ SD		
Δ BHEI-R	-1.70 $\pm$ 11.4	3.29 $\pm$ 11.3	-0.44	0.086
Δ BMI	0.05 $\pm$ 2.02	-0.50 $\pm$ 2.62	0.24	0.352
Δ AC	0.35 $\pm$ 3.58	-2.01 $\pm$ 4.79	0.56	0.031
Δ Weight	0.15 $\pm$ 5.50	-1.35 $\pm$ 6.33	0.25	0.319

Δ : variation between the two times evaluated; BHEI-R: Brazilian Healthy Eating Index - Revised; BMI: body mass index; AC: abdominal circumference; SD: standard deviation; *Independent Samples t Test; n: sample size

Table 8 – Classification of hope (by median) associated with the BHEI-R, BMI, AC and weight of patients with metabolic syndrome, Porto Alegre, Brazil (n = 63).

Variables	Hope		Cohen effect size (d)	P*
	<36 points	≥ 36 points		
	(n = 29)	(n = 34)		
	Mean ± SD	Mean ± SD		
Δ BHEI-R	-2.88 ± 10.3	3.57 ± 11.8	-0.58	0.025
Δ BMI	-0.16 ± 2.34	-0.24 ± 2.32	0.03	0.894
Δ AC	-0.75 ± 5.63	0.76-2.93	0.00	0.996
Δ Weight	-0.49 ± 6.52	-0.58 ± 5.41	0.02	0.953

Δ: variation between the two times evaluated; BHEI-R: Brazilian Healthy Eating Index - Revised; BMI: body mass index; AC: abdominal circumference; SD: standard deviation; *Independent Samples t Test; n: sample size

Table 9 – Classification of self-esteem (by median) associated with the BHEI-R, BMI, AC and weight of patients with metabolic syndrome, Porto Alegre, Brazil (n = 63).

Variables	Self-esteem		Cohen effect size (d)	P*
	≤ 34 points	> 34 points		
	(n = 34)	(n = 29)		
	Mean ± SD	Mean ± SD		
Δ BHEI-R	-1.25 ± 11.1	2.77 ± 11.7	-0.35	0.169
Δ BMI	-0.01 ± 2.75	-0.43 ± 1.68	0.18	0.475
Δ AC	-0.63 ± 4.16	-0.90 ± 4.57	0.06	0.809
Δ Weight	-0.29 ± 6.91	-0.83 ± 4.54	0.09	0.718

Δ: variation between the two times evaluated; BHEI-R: Brazilian Healthy Eating Index - Revised; BMI: body mass index; AC: abdominal circumference; SD: standard deviation; *Independent Samples t Test; n: sample size.

Table 10 – Classification of BDI-II (by median) associated with the BHEI-R, BMI, AC and weight of patients with metabolic syndrome, Porto Alegre, Brazil (n = 63).

Variables	BDI-II			P*
	≤ 8 points	> 8 points	Cohen	
	(n = 34)	(n = 29)	effect size	
	Mean ± SD	Mean ± SD	(d)	
Δ BHEI-R	0.85 ± 10.3	0.31 ± 12.9	0.05	0.854
Δ BMI	-0.43 ± 1.62	0.06 ± 2.93	-0.21	0.401
Δ AC	-1.29 ± 4.72	-0.11 ± 3.77	-0.27	0.287
Δ Weight	-1.02 ± 4.53	0.03 ± 7.23	-0.18	0.486

Δ: variation between the two times evaluated; BHEI-R: Brazilian Healthy Eating Index - Revised; BMI: body mass index; AC: abdominal circumference; SD: standard deviation; *Independent Samples t Test; n: sample size.

PA and hope were significantly associated with a change in the BHEI-R, indicating that patients with higher scores on these scales at M1 had a greater increase in their BHEI-R scores at M2 compared to M1, although the effect size for these variables was moderate. Even when the results were adjusted for patient mood (BDI-II score), the differences remained significant ($p = 0.022$ and $p = 0.037$, respectively). A significant association between optimism and AC was also observed, as patients who had higher LOT-R scores experienced a greater reduction in AC, even after adjusting for the BDI-II scale ($p = 0.05$), and the effect size for this variable also was moderate.

DISCUSSION

The results indicated a significant increase in the consumption of whole grains, which is an important factor for glycemic control in subjects with type-2 diabetes mellitus (which corresponded to 76% of the sample) (48). As expected, the mean BHEI-R score (i.e., the diet quality of the sample) was lower than that of national samples since the development of MetS is associated with poor diet quality, thus confirming the need for studies that contribute to its improvement. The sample evaluated had mean BHEI-R scores of 68.4 ± 10.4 and 69.0 ± 10.4 at M1 and M2, respectively. Loureiro et al. (49) evaluated 195 adults aged 20 to 50 in Brazil's Center-West region and found an average of 75.2 (95% CI = 74.2-76.1). Ceccatto et al. (50) evaluated women with breast cancer and found a mean score of 77.9 ± 9.07 before and 77.7 ± 10.41 after they had received treatment for the disease. Silva, Prata and Cunha (51) evaluated the BHEI-R scores of 38 patients with MetS in Brazil and found that their mean index score

was even lower than that found in the present study (53.5, 31.2-78.1), thus indicating a relationship between MetS and poor diet quality.

No significant change occurred in the anthropometric parameters either. According to Robertson, Davies & Winefield, despite multidisciplinary efforts, resistance to weight loss in overweight and obese patients remains high, suggesting that the approaches that have been taken are insufficient and that traditional psychology has been relatively ineffective in managing weight (52). Faith et al. (53) attribute the difficulty in drawing conclusions about the importance of psychological attributes in this context to the fact that most studies have explored “simple associations” between weight and psychological characteristics such as the attempts to discover causal pathways, despite the potential to deepen current knowledge in the field, as this study aimed to do by approaching the subject longitudinally.

Possible factors that contributed to the minimal change in diet quality and, therefore, in anthropometric factors of the sample evaluated include age, schooling and method of dietary assessment. The literature shows that older individuals tend to be more resistant to change and that schooling is proportional to one’s understanding of dietary guidelines (54). It should also be noted that the perception of being in an environment of nutritional guidance may lead individuals to fail to mention foods considered to be nutritionally poor or to overestimate their consumption of foods considered to be healthy, and that obese people tend to systematically underestimate their dietary intake (55). In addition to these factors, a recent review suggests that MetS and its components exert synergistic and independent effects on brain structures, thus accelerating brain aging and cognitive decline, which could interfere with the understanding of nutritional guidelines (56).

Nevertheless, it was possible to confirm the initial hypothesis that individuals with higher PP constructs showed improvements in their diet quality or abdominal circumference in three of the constructs evaluated (PA, hope and optimism), even when adjusting for the BDI-II (which was found to have a moderate effect).

PA represents the emotional evaluation of SWB, which is generally a three-part structure. One of these parts concerns the cognitive judgment of life satisfaction (LS). The other two correspond to affective components: positive affect and negative affect (19). Although some studies have evaluated these factors in isolation and others have investigated overall well-being, they have generally shown similar results when health outcomes are assessed regarding to MetS (57).

However, Grant, Wardle and Steptoe (59), after evaluating the relationship between life satisfaction (LS) and seven health habits (smoking, exercise, alcohol consumption, sun

protection, fruit consumption, fat intake and fiber intake) in an intercultural study with 17,246 young adults, concluded that there were differences in the influence of LS depending on culture. That study showed LS was positively associated with healthy habits in the entire sample, except for alcohol consumption and dietary fiber intake. However, in the sample from the United States and Western Europe ($n = 10,603$), fruit consumption was not associated with LS. Thus, LS was not relevant to eating habits in this sample, which matches the results obtained in the present study. Considering the Brazilian diet is approaching US standards (with an increase in overweight, obesity and the consumption of ultra-processed foods (60), the data from the present study sample corroborate the results presented in the study cited above.

Both Ford et al. (60) and the present study found a significant positive association between a healthy diet and PA when investigating associations between affect and the consumption of foods typical of the Mediterranean region as opposed to Western diets in 9,255 Americans who answered a food frequency questionnaire. White et al. (61) also evaluated the relationship between PA and NA and food intake among 281 adults in New Zealand for 21 days. Using a food diary, the subjects reported how many servings they had consumed from five food groups: fruits, vegetables, chocolates and cookie sandwiches, salty snacks, and cakes. The authors concluded that consuming more servings of fruits and vegetables was positively related to a higher PA score.

The present study found optimism to be another variable related to nutritional treatment. The analyses indicated that patients with higher optimism scores had greater reductions in abdominal circumference ($d = 0.56$, $p = 0.031$). It should be noted that abdominal circumference is a marker used to assess cardiovascular disease (CVD) risk according to the American Heart Association (1). Among the metabolic changes associated with abdominal obesity (defined by abdominal circumference) that contribute to an increase in the occurrence of MetS, glycemic disorder is strongly associated with CVD risk (62).

Among the positive psychological attributes, optimism is cited in the literature as being the most strongly associated with reduced CVD risk. A systematic review conducted by Schiavon et al. (21) evaluated optimism and hope in relation to chronic diseases and found empirical evidence in this sense. One of the mediating factors of this association is healthy eating habits (23). A review conducted by Boehm & Kubzansky (24) investigated the association between positive constructs and CVD and presented several studies that indicate that optimism and well-being are related to the consumption of healthier foods. Furthermore, those authors stated that causal direction cannot be determined since nearly all of the studies

reviewed were cross-sectional. Thus, they suggested reviewing longitudinal studies like the present research.

Besides PA and optimism, hope was also a construct that had significant relationships with an outcome evaluated, that is, improvement in BHEI-R. Optimism and hope are positively related, thus, associations with the same outcomes were expected. However, they are distinct concepts. In a meta-analysis that examined both constructs in a simplified manner, Alarcon, Bowling and Khazon (63) stated that an optimistic person believes that his or her future will somehow be successful and satisfying – whether due to luck, the actions of others or their own actions. The hopeful individual, on the other hand, specifically believes in his or her own ability to ensure a successful and satisfying future. In this way, it can be supposed that these differences in concepts reflect in the significant association of both attributes with different outcomes. If, on the one hand, hope was associated with improvement in diet quality, on the other hand, optimism was associated with improvement in AC, while there was no association of optimism with improvement in diet quality. It can be reflected if optimism was more related to other changes in healthy behaviors, such as improvement in the practice of physical activity, which may have reflected in the CA and not due to the improvement in the quality of the diet itself.

Likewise, Snyder and Lopes (64) proposed that hope is goal-oriented thinking composed of pathways and agency. In a study by Pacico et al. (37), the authors explain that pathways refer to the ability to create appropriate routes to achieve a desired goal. Agency is referred to as the motivating component that drives the search for a goal using pathways. It is described as the belief in one's own ability to use pathways and to achieve proposed goals (37). Thus, in the article titled "Hope Theory: Rainbows in the Mind," Snyder (65) noted that people with high scores on the hope scale were able to use information about physical illness as a pathway to prevention efforts since the construct is defined as the perceived ability to discover ways of reaching goals and to keep motivation to use these new pathways through thoughts.

Therefore, it can be inferred that such motivation, which is inherent to the construct, contributed to improving the BHEI-R scores of the individuals in this study who had the highest scores on the hope scale. In 2013, Nothwehr et al. also explored the concept of hope and its association with diet, but in a different way: By evaluating the use of behavioral strategies such as serving size control or meal planning. The authors evaluated 178 patients at a primary health care clinic who had BMI > 25. The analyses demonstrated a significant association ($p < 0.05$) between the total hope score and all of the behavioral strategy

measures, concluding that hope measures should be explored in weight loss intervention as there seems to have an association with the use of behavioral strategies (66).

More recently, Scioli et al. (67) evaluated the positive contributions of hope to maintaining and restoring health and concluded that higher levels of hope were associated with a stronger commitment to adopting a healthier dietary routine. In the study, diet was assessed by asking the participants if they were eating at least four servings of fruits and/or vegetables a day and, if so, for how long. If they were not, they were asked if they intended to make this change and when they planned to do so. The authors did not evaluate diet specifically, but used a structured questionnaire based on the Transtheoretical Model (TM). The TM presumes that positive behavioral transformations go through five stages of change: precontemplation, contemplation, preparation, action and maintenance. The study concluded that individuals who had higher hope scores were more likely to be in the contemplation stage than the precontemplation stage. This suggests that hope may contribute to direct thoughts toward a healthier diet.

The results of the present study did not show a significant relationship of self-esteem with the outcomes evaluated. Nevertheless, the literature indicates that high self-esteem scores mediated coping strategies for physical illnesses while low self-esteem can lead to inappropriate eating behaviors in order to control negative emotions (68). In fact, a study by Bonsaksen et al. (69) found that low self-esteem was associated with minor weight loss in obese people after they received nutritional counseling. It should also be noted that the sample evaluated in the present study had a similar mean score on the Rosenberg Self-Esteem Scale (33.80 ± 4.10) as a sample of similar age evaluated in another study in southern Brazil (35.10 ± 4.10) (70), so this may be not a possible explanation for the lack of improvement in diet quality and, thus, in anthropometric parameters. However, there is still a gap in the literature regarding the predictive effect of self-esteem in the context of treating chronic diseases.

Finally, as previously mentioned, a complementary analysis was performed with the BDI-II results, associated with the outcomes evaluated, although the main objective of the BDI-II evaluation had been to correct possible confounding factors. Diet quality studies among psychiatrically diseased samples are largely lacking (71), but are know that individuals with depression may have attention, memory and interpretation disorders related to emotionally relevant information (29), which could also contribute to decreasing the understanding of the nutritional counseling and, consequently, adherence to treatment. However, no differences were observed among subjects with different BDI-II scores

compared to the changes in the outcomes evaluated between the two evaluation moments in this study.

Somerset et al. (2011) (72) evaluated depression scores and adherence in a dietary weight loss intervention trial and concluded that there was a significant correlation ($R = 0.38$, $p < 0.05$) between BDI-II baseline scores and commitment to participation in the trial. Subjects with moderate to severe depression symptoms were more susceptible to quitting intervention before 10 weeks ($p < 0.001$). In our study we also observed withdrawals and intervals between consultations very extensive.

The authors (72) discussed that the trial resignation phenomenon damage the development of effective weight loss intervention programs due to the fact that it demands substantial up-front costs to research studies, since baseline data are collected and subjects are then lost on follow-up. In addition to the added cost, this compromises statistical analysis of outcomes, which is replicated in the clinical setting, where investments in baseline assessment and intervention are spent on patients who dropout. In essence, the evidence base for effective weight loss intervention is restricted to patients who commit to treatment. Therefore, it is expected that more studies on positive psychological attributes can contribute in improving the follow-up in treatments

Finally, the study has some shortcomings, primarily concerning the small sample size, which prevented a broader variety of statistical tests and analyses by sex, among other measures. However, as it sought subjects submitted to the same nutritional treatment methodology, and considering the longitudinal nature of the study, a larger sample would render the study unfeasible due to time. More dietary information, based on a higher number of 24RHs, would also have provided more precise information on the dietary habits of the sample. Nevertheless, the authors understand that collecting such information in a way other than in person might have compromised the standardization of the data surveyed. Another shortcoming refers to the psychological scales employed, whose validations were, in general, performed with populations with more schooling than that of the sample in this study. In order to minimize this possible bias, the interviewer read each question aloud in an attempt to obtain better comprehension of the sentences by the respondents. The reliability of the self-report must be highlighted. As previously mentioned in the diet evaluation, this is also an issue with psychological data. Several areas of knowledge, such as psychology and nutrition, use self-report in research, but it is known that there are limitations in this practice. Self-report does not guarantee the likelihood that behavior will be real and assured, according to Kohlsdorf and Costa Junior (2017) (73), because (a) reported behavior differs from actual

behavior when facts are not highlighted naturally; (b) the reported behavior is not real, but socially desired behavior, considering influences from the history of reinforcement of the individual; and (c) the participant does not understand the items that make up the instrument used in view of the distinctions between the participant and researcher.

CONCLUSION

Studies that have assessed this relationship have done so by evaluating specific dietary components, such as fruit and vegetable consumption. However, diet quality goes beyond the consumption of specific food groups, as the present study has shown. Some constructs seem to be more relevant to engaging individuals in improving their diets and, hence, their anthropometric measurements.

As this is an observational study, its findings do not indicate causality. Therefore, it is suggested further studies to be conducted in order to better understand the importance of these attributes to the adherence to nutritional guidelines. Since it is of the utmost importance to prevent difficult-to-treat comorbidities associated with MetS. The constructive approach of positive psychology is currently proving to be a promising path to reach such an understanding. Also, The present study contributes to the current literature in the sense of bringing an evaluation of which constructs can be targetted in future interventions in order to maintain commitment to treatment. Also it brings a reflection on the sustainability of these results across time and fields of study, evaluating whether these constructs contribute only on a nutritional level or also in other types of interventions.

Finally, it is pointed out that the results of the present study may be implemented in futures interventions since the attributes are stable as long as they do not undergo intervention and that there are currently promising documented results of interventions using positive psychology, including in hospital environments (74).

AUTHORS' CONTRIBUTIONS

CCS, FMB and CTR contributed to the study conception and design as well as to data collection, analysis and interpretation and to writing the paper.

FOA, JB and GL contributed to data collection, organization and analysis.

CZ contributed to the analysis.

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DECLARATION OF CONFLICT OF INTEREST

The authors declare that the study was conducted without any funding that could be defined as posing a potential conflict of interest.

Abbreviations

AC – abdominal circumference
 BDI-II – Beck Depression Inventory
 BHEI-R: Brazilian Healthy Eating Index – Revised
 BMI: body mass index
 M1 – Moment 1
 M2 – Moment 2
 MetS – Metabolic syndrome
 LS – Life satisfaction
 PA – Positive affect
 NA – Negative affect
 SD: standard deviation
 Δ: variation between the two times evaluated

REFERENCES

- (1) Alberti KGMM, Eckel RH, Grundy SM, Zimmert PZ, Cleeman JI, Donato KA, et al. Harmonizing the Metabolic Syndrome. A Joint Interim Statement of the International Diabetes Federation Task Force on Epidemiology and Prevention; National Heart, Lung, and Blood Institute; American Heart Association; World Heart Federation; International Atherosclerosis Society; and International Association for the Study of Obesity. *Circulation* (2009), 120, 1640-1645. doi: 10.1161/CIRCULATIONAHA.109.192644
- (2) IDF - International Diabetes Federation: The IDF Worldwide Definition of the Metabolic Syndrome. 2006.
- (3) Santos CE, Schrank Y, Kupfer R. Critical analyses of WHO, IDF and NCEP criteria for metabolic syndrome among patients with type 1 diabetes mellitus. *Arq Bras Endocrinol Metab.* (2009), 53:1096-102. doi:10.1590/S0004-2730200900090000
- (4) de Carvalho Vidigal F, Bressan J, Babio N, Salas-Salvadó J. Prevalence of metabolic syndrome in Brazilian adults: a systematic review. *BMC Public Health* (2013), 13:1198. doi:10.1186/1471-2458-13-1198.
- (5) World Health Organization (WHO). Noncommunicable diseases country profiles 2014. Geneva (2014).
- (6) O'Neill S and O'Driscoll L. Etiology and Pathophysiology/Obesity Comorbidities Metabolic syndrome: a closer look at the growing epidemic and its associated pathologies.

Obesity Reviews (2015), 16, 1–12 doi:10.1111/obr.12229

- (7) Kaur J. Cardiology Research and Practice. Volume 2014, Article ID 943162, 21 pages. doi:10.1155/2014/943162
- (8) Kastorini, CK, Milionis HJ, Esposito K, Giugliano D, Goudevenos JA, Panagiotakos DB, et al. The Effect of Mediterranean Diet on Metabolic Syndrome and Its Components: A Meta-Analysis of 50 Studies and 534, 906 Individuals. *Journal of the American College of Cardiology* (2011), Vol. 57, No. 11. doi:10.1016/j.jacc.2010.09.073
- (9) Huffman JC, DuBois CM, Millstein RA, et al. Positive psychological interventions for patients with type 2 diabetes: rationale, theoretical model, and intervention development. *J Diabetes Res.* (2015), 428349. doi:10.1155/2015/428349
- (10) de Santa Helena, ET, Nemes, MIB, Eluf-Neto J. Avaliação da Assistência a Pessoas com Hipertensão Arterial em Unidades de Estratégia Saúde da Família. *Saúde Soc.* (2010) São Paulo, v.19, n.3, p.614-626 doi:10.1590/S0104-12902010000300013
- (11) Huffman JC, DuBois CM, Healy BC, Boehm JK, Kashdan TB, Celano CM, et al. Feasibility and utility of positive psychology exercises for suicidal inpatients. *Gen Hosp Psychiatry* (2014), 36(1):88–94. doi:10.1016/j.genhosppsych.2013.10.006
- (12) Stranges S, Samaraweera PC, Taggart F, Kandala N, Stewart-Brown S. Major health-related behaviours and mental well-being in the general population: the Health Survey for England. *BMJ Open* (2014), 4:e005878. doi:10.1136/bmjopen-2014-005878
- (13) Seligman MEP and Csikszentmihalyi M. Positive Psychology: An Introduction. *American Psychologist* (2000), 55, 1, 5-14.
- (14) Reppold CT, Gurgel LG, Schiavon CC. Pesquisas em Psicologia Positiva: uma Revisão Sistemática da Literatura. *Psico-USF* (2015), vol.20 no.2 doi: 10.1590/1413-82712015200208
- (15) Seligman, MEP. Positive Health. *Applied psychology* (2008), 57, 3–18. doi:10.1111/j.1464-0597.2008.00351.x
- (16) Steptoe A, Deaton A, Stone AA. Psychological wellbeing, health and ageing. *Lancet* (2015), 14; 640–648. doi:10.1016/S0140-6736(13)61489-0.
- (17) Gana K, Broc G, Saada Y, Amieva H, Quintard B. Subjective well-being and longevity: Findings from a 22-year cohort study. *Journal of Psychosomatic Research* (2016), 85, 28–34. doi: 10.1016/j.jpsychores.2016.04.004.
- (18) Martin-Maria N, Miret M, Caballero FF, Rico-Uribe LA, Steptoe A, Chatterji S, et al. The impact of subjective well-being on mortality: A meta-analysis of longitudinal studies in the general population. *Psychosomatic Medicine* (2017), 79 (5), 565-575. doi: 10.1097/PSY.0000000000000444
- (19) Diener E, Pressman SD, Hunter J, Delgadillo-Chase D. If, Why, and When Subjective Well-Being Influences Health, and Future Needed Research. *Applied Psychology: Health and Well-being* (2017), 9 (2), 133–167 doi:10.1111/aphw.12090

- (20) Boylan JM and Ryff CD. Psychological Well-being and Metabolic Syndrome: Findings from the MIDUS National Sample. *Psychosom Med.* (2015), June; 77(5): 548–558. doi:10.1097/PSY.0000000000000192.
- (21) Schiavon CC, Marchetti E, Gurgel LG, Busnello FM, Reppold CT. Optimism and Hope in Chronic Disease: A Systematic Review. *Front. Psychol.* (2017), 7:2022. doi:10.3389/fpsyg.2016.02022
- (22) Lundgren O, Garvin P, Jonasson L, Andersson G, Kristenson M. Psychological Resources are Associated with Reduced Incidence of Coronary Heart Disease. An 8-Year Follow-up of a Community-Based Swedish Sample. *Int.J. Behav. Med.* (2015), 22, 77–84. doi:10.1007/s12529-014-9387-5.
- (23) Kelloniemi H, Ek E, Laitinen J. Optimism, dietary habits, body mass index and smoking among young Finnish adults. *Appetite.* 2005;45:169–76. doi:10.1016/j.appet.2005.05.001
- (24) Boehm JK, Kubzansky LD. The Heart's Content: The Association Between Positive Psychological Well-Being and Cardiovascular Health. *Psychological Bulletin* (2012), Vol. 138, No. 4, 655–691. doi: 10.1037/a0027448
- (25) Previdelli AN, de Andrade SC, Pires MM, Ferreira SRG, Fisberg RM, Marchioni DM. Índice de Qualidade da Dieta Revisado para população brasileira. *Rev Saúde Pública* (2011), 45(4), 794-8. doi:10.1590/S0034-89102011005000035
- (26) Boylan JM, Ryff CD. Psychological Well-Being and Metabolic Syndrome: Findings from the MIDUS National Samples. *Psychosom Med.* (2015), June;77(5): 548–558. doi:10.1097/PSY.0000000000000192
- (27) WHO - World Health Organization. Physical Status: the use and interpretation of anthropometry. WHO technical report series 854. Geneva: WHO, 1995.
- (28) Gomes-Oliveira MH, Gorenstein C, Lotufo NF, Andrade, LH; Wang, Y.P. Validation of the Brazilian Portuguese version of Beck Depression Inventory-II in a community sample. *Revista Brasileira de Psiquiatria* (2012), Dec;34(4):389-94. doi:10.1016/j.rbp.2012.03.005
- (29) Borralha, SJP. Processos Cognitivos em Adultos com Depressão Major. Dissertação - Curso de 2o Ciclo em Psicologia, Aconselhamento e Psicoterapia, Universidade Lusófona de Humanidades e Tecnologias (2011). URI:<http://hdl.handle.net/10437/1679>
- (30) Zanon C, Bastianello MR, Pacico JC, Hutz CS. Desenvolvimento e validação de uma escala de afetos positivos e negativos. *Psico-USF* (2013a), 8(2), 193-202. doi:10.1590/S1413-82712013000200003
- (31) Watson D and Clark LA. The PANAS-X: Manual for the positive and negative affect Schedule – Expanded Form. The University of Iowa. (1994) doi:10.13072/midss.438
- (32) Zanon C, Bardagi MP, Layous K, Hutz CS. Validations of Satisfaction with Life Scale to Brazilians: Evidences of Measurement Noninvariance Across Brazil and US. *Soc Indic Res.*

(2013b) doi:10.1007/s11205-013-0478-5

- (33) Scheier MF, Carver CS, Bridges MW. Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A re-evaluation of the Life Orientation Test. *Journal of Personality and Social Psychology*, (1994), 67, 1063-1078. doi:10.1037//0022-3514.67.6.1063
- (34) Scheier MF & Carver CS. Optimism, Coping, and Health: Assessment and Implications of Generalized Outcome Expectancies. *Health Psychology* (1985), 4, 219. doi:10.1037/0278-6133.4.3.219
- (35) Bastianello MR, Pacico JC, Hutz CS. Optimism, self-esteem and personality: adaptation and validation of the Brazilian Version Of The Revised Life Orientation Test (LOT-R). *Psico-USF* (2014), Bragança Paulista, v. 19, n. 3, p. 523-531. doi:10.1590/1413-82712014019003014
- (36) Snyder CR, Harris C, Anderson JR, Holleran SA, Irving LM, Sigmon ST, et al. The Will and the Ways: Development and Validation of an Individual-Differences Measure of Hope. *Journal of Personality and Social Psychology* (1991), 60, 570. doi:10.1037/0022-3514.60.4.570
- (37) Pacico JC, Zanon C, Bastianello MR, Reppold CT, Hutz CS. Adaptation and Validation of the Brazilian Version of the Hope Index. *International Journal of Testing* (2013), v. 13, p. 193–200. doi:10.1080/15305058.2012.664833
- (38) Hutz CS. *Avaliação em Psicologia Positiva*. Porto Alegre: Artmed (2014), 151 p.
- (39) Hutz CS and Zanon C. Revisão da adaptação, validação e normatização da escala de autoestima de Rosenberg: Revision of the adaptation, validation, and normalization of the Rosenberg self-esteem scale. *Avaliação Psicológica* (2011), 10(1), 41-49.
- (40) Galinha IC, Pereira CR, Esteves F. Versão reduzida da escala portuguesa de afeto positivo e negativo - PANAS-VRP: Análise fatorial confirmatória e invariância temporal. *Psicologia* (2014), [s.l.], v. 28, n. 1, p.53-59, 2 jul. 2014. Associação Portuguesa de Psicologia. doi:10.17575/rpsicol.v28i1.622.
- (41) Snyder CR, Harris C, Anderson JR, Holleran SA, Irving LM, Sigmon ST, et al. The Will and the Ways: Development and Validation of an Individual-Differences Measure of Hope. *Journal of Personality and Social Psychology* (2008), 60, 570. doi:10.1037/0022-3514.60.4.570 C.
- (42) Eid M and Diener E. Global Judgments of Subjective Well-Being: Situational Variability and Long-Term Stability. *Social Indicators Research* (2004), 65, 245-277. doi:10.1023/B:SOCI.00000003801.89195.bc
- (43) Sbicigo JB, Bandeira DR, Dell’Aglia DD. Rosenberg Self-Esteem Scale (RSS): factorial validity and internal consistency. *Psico-USF* (2010), 15(3), 395-403. doi:10.1590/S1413-82712010000300012
- (44) Bandura A. The evolution of social cognitive theory. In: Smith, K.G.; Hitt, M.A. *Great*

minds in management. Oxford University Press. (2005):9-35.

(45) Sociedade Brasileira de Cardiologia (SBC), 2005. I Diretriz Brasileira de Diagnóstico e Tratamento da Síndrome Metabólica, Arquivos Brasileiros De Cardiologia, v.84, Suplemento I, Abril 2005.

(46) Callegari-Jaques, SM. Bioestatística: princípios e aplicações. Porto Alegre: Artemed (2003), 255p.

(47) Cohen, J. Statistical power analysis for the behavioral sciences. 2ª ed. Hillsdale, New Jersey: Lawrence Erlbaum (1988).

(48) Post RE, Mainous AG, King DE, Simpson KN. Dietary Fiber for the Treatment of Type 2 Diabetes Mellitus: A Meta-Analysis JABFM (2012), 25 (1), 16-23. doi: 10.3122/jabfm.2012.01.110148.

(49) Loureiro AS, da Silva RMVG, Rodrigues PRM, Pereira RA, Wendpap LL, Ferreira MG. Diet quality in a sample of adults from Cuiabá (MT), Brazil: Association with sociodemographic factors. Rev. Nutr. (2013), 26 (4), 431-441. doi:10.1590/S1415-52732013000400005

(50) Ceccatto V, Di Pietro P, Previdelli AN, Vieira FGK, Schiavon CC, Engel R, et al. Brazilian Healthy Eating Index Revised (BHEI-R) of women before and during adjuvant treatment for breast cancer. Nutricion Hospitalaria (2014) Nov 1;30(5):1101-9. doi: 10.3305/nh.2014.30.5.7439

(51) Silva KF, Prata A, da Cunha DF. Frequency of metabolic syndrome and the food intake patterns in adults living in a rural area of Brazil. Revista da Sociedade Brasileira de Medicina Tropical (2011), 44(4):425-429, jul-ago. doi:0.1590/S0037-86822011000400005

(52) Robertson S, Davies M, Winefield H. Why weight for happiness? Correlates of BMI and SWB in Australia. Obesity Research & Clinical Practice 9 (2015) 609-612. doi:10.1016/j.orcp.2015.04.011

(53) Faith MS, Flint J, Fairburn JJ, Goodwin GM, Allison DB. Gender differences in the relationship between personality dimensions and relative body weight. Obes Res. 9 (2001) 647–650. doi:10.1038/oby.2001.86

(54) Sousa AEC and Nunes RM. Avaliação da adesão terapêutica nutricional e sua relação com os modelos de mudança do comportamento alimentar. HU Revista (2014), 40:221–9.

(55) Fisberg RM, Marchioni DML, Colucci ACA. Avaliação do consumo alimentar e da ingestão de nutrientes na prática clínica. Arq Bras Endocrinol Metab. (2009);53/5. doi:10.1590/S0004-27302009000500014

(56) Alfaro FJ, Gavrieli A, Saade-Lemus P, Lioutas V, Upadhyay J, Novak V. White matter microstructure and cognitive decline in metabolic syndrome: a review of diffusion tensor imaging. Metabolism Clinical and Experimental (2018), 78, 52 – 68. doi:10.1016/j.metabol.2017.08.009

- (57) Steptoe A, Dockray S, Wardle J. Positive Affect and Psychobiological Processes Relevant to Health. *J Pers.* (2009), 77(6): 1747–1776. doi:10.1111/j.1467-6494.2009.00599.x.
- (58) Grant N, Wardle J, Steptoe A. The Relationship Between Life Satisfaction and Health Behavior: A Cross-cultural Analysis of Young Adults. *Int J Behav Med.* (2009), 16(3):259-68. doi: 10.1007/s12529-009-9032-x.
- (59) Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de Vigilância de Doenças e Agravos não Transmissíveis e Promoção da Saúde. Vigitel Brasil 2016: vigilância de fatores de risco e proteção para doenças crônicas por inquérito telefônico: estimativas sobre frequência e distribuição sociodemográfica de fatores de risco e proteção para doenças crônicas nas capitais dos 26 estados brasileiros e no Distrito Federal em 2016/Ministério da Saúde, Secretaria de Vigilância em Saúde, Departamento de Vigilância de Doenças e Agravos não Transmissíveis e Promoção da Saúde. – Brasília: Ministério da Saúde, 2017. 160 p.: i
- (60) Ford PA, Jaceldo-Siegl K, Lee JW, Youngberg W, Tonstad S. Intake of Mediterranean foods associated with positive affect and low negative affect. *Journal of Psychosomatic Research* (2013), 74, 142-148. doi:10.1016/j.jpsychores.2012.11.002
- (61) White BA, Horwath CC, Conner TS. Many apples a day keep the blues away – Daily experiences of negative and positive affect and food consumption in young adults. *British Journal of Health Psychology* (2013), 18, 782–798. doi: 10.1111/bjhp.12021
- (62) de Carvalho CA, Fonseca PC, Barbosa JB, Machado SP, dos Santos AM, da Silva AA. The association between cardiovascular risk factors and anthropometric obesity indicators in university students in São Luís in the State of Maranhão, Brazil. *Cien Saude Colet.* 2015;20(2):479-90. doi: 10.1590/1413-81232015202.02342014.
- (63) Alarcon GM, Bowling NA, Khazon S. Great expectations: a meta-analytic examination of optimism and hope. *Pers. Individ. Differ.* (2013), 54, 821–827. 10.1016/j.paid.2012.12.004
- (64) Snyder C and Lopez S. (2005). Positive psychology: A declaration of independence. In C. Snyder & S. Lopez (Eds.), *Handbook of positive psychology* (pp. 751-767). Oxford: Oxford University Press.
- (65) Snyder CR. TARGET ARTICLE: Hope Theory: Rainbows in the Mind, *Psychological Inquiry: An International Journal for the Advancement of Psychological Theory* (2002), 13:4, 249-275, doi: 10.1207/S15327965PLI1304_01.
- (66) Nothwehr F, Clark DO and Perkins A. Hope and the use of behavioral strategies related to diet and physical activity. *Journal of Human Nutrition and Dietetics: The Official Journal of the British Dietetic Association* (2013), 26(Suppl. 1): 159–163. doi: 10.1111/jhn.12057
- (67) Scioli A, Scioli-Salter ER, Sykes K, Anderson C, Fedele M. The positive contributions of hope to maintaining and restoring health: An integrative, mixed-method approach, *The Journal of Positive Psychology* (2016), 11:2, 135-148, doi:

10.1080/17439760.2015.1037858.

- (68) Canetti L, Berry EM, Elizur Y. Psychosocial predictors of weight loss and psychological adjustment following bariatric surgery and a weight-loss program: the mediating role of emotional eating. *International Journal of Eating Disorders* (2009) 42, 109–117. doi:10.1002/eat.20592
- (69) Bonsaksen T, Fagermoen MS, Lerdal A. Factors associated with self-esteem in persons with morbid obesity and in persons with chronic obstructive pulmonary disease: a cross-sectional study. *Psychol Health Med.* (2015), 20(4):431–442. doi:10.1080/13548506.2014.959529
- (70) Meurer ST, Luft CB, Benedetti TR, Mazo GZ. Validade de construto e consistência interna da escala de autoestima de Rosenberg para uma população de idosos brasileiros praticantes de atividades físicas. *Motricidade* (2012), Vila Real, v. 8, n. 4, p. 5-15. doi:10.6063/motricidade.8(4).1548
- (71) Gibson-Smith D.; Bot M., Brouwer I, Visser M, Penninx BWJH. Diet quality in subjects with and without depressive and anxiety disorders. *Proceedings of the Nutrition Society* (2018), 77 (OCE2), E39 doi:10.1017/S0029665118000332
- (71) Kohlsdorf M, Costa Júnior AL. O autorrelato na pesquisa em psicologia da saúde : desafios metodológicos (2009), *Psico. Argum.*, Curitiba, 27 (57), 131-139.
- (72) Somerset SM, Graham L., Markwell K. (2011) Depression scores predict adherence in a dietary weight loss intervention Trial. *Clinical Nutrition*, 30, 593-598.
- (73) Kohlsdorf M, Costa Júnior AL. O autorrelato na pesquisa em psicologia da saúde : desafios metodológicos (2009), *Psico. Argum.*, Curitiba, 27 (57), p.131-139.
- (74) Hutz CS and Reppold CT (2018). *Intervenções em Psicologia Positiva Aplicadas à Saúde*. Ed. Leader: São Paulo, 2018.

- **Cover Letter:**



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Porto Alegre, May, 2019.

Dear Editor, On behalf of all authors, I am submitting the manuscript entitled “Relationship Between Diet Quality, Subjective Well-being, and Personality in Metabolic Syndrome” for your appreciation and also for editorial analysis by the Journal of Human Nutrition and Dietetics, as to the possibility of its publication as a Research Article. The treatment and prevention of metabolic syndrome (MetS), a major clinical and public health issue, has been considered a challenge as they require multidisciplinary actions and individual motivations for adherence to treatment. Thus, the need arises of understanding the key components in controlling MetS. Evidence has shown that positive psychological attributes such as subjective well-being (SWB), which comprises the constructs of satisfaction with life, and positive and negative affects, whether or not determined by personality factors, can be important matters in this issue. Hence, the present study aimed to investigate the relationship between positive affects (PA) and negative affects (NA) and satisfaction with life with the improvement in diet quality, analysed by Brazilian Healthy Eating Index Revised (BHEI-R) and anthropometric parameters of patients with MetS, in addition to whether personality factors were associated with SWB, BHEI-R, or anthropometric factors. The study sample included 63 patients with MetS seen at the Nutrition Outpatient Clinic of a public hospital in southern Brazil. The study was carried out by applying two clinical/nutritional instruments and four psychological scales and the analyses were performed in the software SPSS 21.0. The results indicated a significant positive association between PA and BHEI-R. No

significant association was found between satisfaction with life and BHEI-R or anthropometric factors. Furthermore, the five personality factors assessed were not significantly associated with an improvement in BHEI-R or with anthropometric factors. Thus, the association of PA with improved BHEI-R seems not to be explained by personality factors, although associations between PA and personality factors have been confirmed. In face of the results, it is believed that studies that bring different areas together, such as psychology and nutrition, are crucial to enable more effective interventions in the treatment of MetS. None of the material in the manuscript is included in another manuscript, has been published previously, or is currently under consideration for publication elsewhere. Ethical guidelines were followed by the investigator in performing studies and each author has participated sufficiently in the work to take public responsibility for the content of the paper and also for approve of the manuscript final version approval. If requested, the authors will provide the data or will cooperate fully in obtaining and providing the data on which the manuscript is based for examination by the editors or their assignees. It does not have conflict of interest. We agree to assign exclusive copyright to the Journal of Human Nutrition and Dietetics, if and when the manuscript is accepted for publication.

Yours sincerely,



Cecilia Cesa Schiavon

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RELATIONSHIP BETWEEN DIET QUALITY, SUBJECTIVE WELL-BEING, AND PERSONALITY IN METABOLIC SYNDROME

ABSTRACT

The treatment and prevention of metabolic syndrome (MetS), a major clinical and public health issue, has been considered a challenge as they require multidisciplinary actions and individual motivations for adherence to treatment. Thus, the need arises of understanding the key components in controlling MetS. Evidence has shown that positive psychological attributes such as subjective well-being (SWB), which comprises the constructs of satisfaction with life, and positive and negative affects, whether or not determined by personality factors, can be important matters in this issue. Hence, the present study aimed to investigate the relationship between positive affects (PA) and negative affects (NA) and satisfaction with life with the improvement in diet quality, analysed by Brazilian Healthy Eating Index Revised (BHEI-R), and anthropometric parameters of patients with MetS, in addition to whether personality factors were associated with SWB, BHEI-R, or anthropometric factors. The study sample included 63 patients with MetS seen at the Nutrition Outpatient Clinic of a public hospital in southern Brazil. The study was carried out by applying two clinical/nutritional instruments and four psychological scales and the analyses were performed in the software SPSS 21.0. The results indicated a significant positive association between PA and BHEI-R. No significant association was found between satisfaction with life and BHEI-R or anthropometric factors. Furthermore, the five personality factors assessed were not significantly associated with an improvement in BHEI-R or with anthropometric factors. Thus, the association of PA with improved BHEI-R seems not to be explained by personality factors, although associations between PA and personality factors have been confirmed. In face of the results, it is believed that studies that bring different areas together, such as

psychology and nutrition, are crucial to enable more effective interventions in the treatment of MetS.

Keywords: Subjective well-being, Positive Psychology, Satisfaction with Life, Positive Affects, Negative Affects, Personality.

INTRODUCTION:

Metabolic syndrome (MetS) is characterized by a set of interconnected factors that lead to cardiovascular disease and diabetes and is a major clinical and public health issue. Such factors include dyslipidemia, high arterial blood pressure, increased levels of triglycerides, low levels of high-density lipoprotein, and obesity, particularly with central adiposity [1]. The incidence of MetS among the global adult population is around 20 to 25%, with overweight and obesity being the main risk factors as they seem to precede the onset of the other risk factors for the syndrome [2]. The treatment and prevention of MetS and obesity follow similar patterns and are considered clinical and public health challenges worldwide [3]. In this context, diet quality plays a key role in preventing and controlling MetS and its individual components [4]. However, studies have documented an important resistance by patients in complying with the recommendations for diet self-management such as the adoption of a healthy diet [5, 6].

In face of this reality, studies on the impact of psychological factors on adherence to the diet are relevant to the field. The literature has documented several pieces of evidence that depressive symptoms and anxiety are associated with failure to adhere to the diet [5, 7]. Moreover, studies developed under the viewpoint of positive psychology have shown consistent evidence that positive psychological attributes are associated with physical health. The results point to subjective well-being (SWB), a subjective indicator of happiness, as one of the main predictors of health and longevity [8, 7]. A recent meta-analysis [9] corroborates

this conclusion by reporting, based on the analysis of 29 studies on the association power between health status and SWB, that the association has a considerable effect for studies of this nature ($r = 0.347$, 95% CI = 0.309–0.385; $Q = 691.51$, $I^2 = 94.99\%$, $p < 0.001$).

SWB is a descriptive measure of what patients think of their life conditions and how they feel about it [10]. It involves an evaluation of satisfaction with life (SWL), the cognitive component of SWB, and of positive and negative affects, both orthogonal measures and emotional components of the construct [11, 12]. With the development of research on SWB, several lines of investigation have shown that this variable is related to extrinsic factors such as sociodemographic and cultural characteristics and life events, and intrinsic factors such as genetic characteristics, cognitive styles, coping strategies, and other psychological attributes [13].

In this perspective, personality is suggested as one of the strongest and most consistent predictors of SWB [14], particularly in studies developed under the model of the Big Five Factors (BFF) of personality [15, 16, 17]. This model is a modern version of the trait theory and is internationally considered the most parsimonious and complete model to describe personality traits in a consistent and reproducible manner [12].

The model postulates that personality comprises five dimensions, which can be assessed, in Brazil, by the *Bateria Fatorial de Personalidade* – BFP [18]. The dimensions assessed by this instrument are: extraversion – tendency to seek stimulation in the interaction with others, to be active and communicative; agreeableness – tendency to show compassion, altruism, and pro-social behavior; consciousness – tendency to self-control when carrying out tasks that lead to a goal, to be disciplined and organized; neuroticism – tendency to show emotional instability, experience negative emotions, anxiety, and depression; openness – tendency to try new things, to show curiosity and intellectual complexity [19]. Among the

BFF, neuroticism and extraversion appear in studies as the strongest predictors of SWB [17, 13].

Applied to the area of physical and nutritional health evaluation, studies on the relationship between SWB and personality have shown consistent results, although further investigations are still required concerning the context of the evaluation of health behaviors and their effects on physical health. A recent illustrative study is a meta-synthesis developed [20] based on 36 meta-analyses that assessed the relation between the BFF and health and well-being variables. A non-weighted model was used to aggregate data through meta-analyses. When input simultaneously, the BFF were moderately associated with overall health (multiple $\bar{R} = 0.35$). As expected, the relationships between personality and health were relatively strong when results of mental health ($\bar{R} = 0.43$) were examined, relatively weak when results of physical health ($\bar{R} = 0.06$) were examined, and intermediate when health behaviors were examined ($\bar{R} = 0.18$). The authors suggest that may have been because mental health results were measured through self-reporting, a more subjective measure than those used to assess health behaviors, which may magnify the effects due to the inherent variation of the method.

Researches evaluating these associations between SWB and personality among patients with MetS are still scarce. Understanding the dynamics of such associations in these cases may help plan individualized nutritional treatment in the future, including forms of interventions that take into account the effect of personality traits or well-being on the adherence to and maintenance of treatment.

In face of this gap, the study hereby presented aimed to assess the association between SWB and the response to nutritional treatment of patients with MetS, as well as the association between SWB and the BFF. Furthermore, it sought to assess the association between the BFF and the response to nutritional treatment. Specifically, the study investigated

the relationship between positive and negative affects and SWL with the improvement in diet quality and anthropometric parameters of Brazilian patients with MetS who received nutritional counseling at an outpatient clinic, in addition to whether personality factors were associated with SWB, BHEI-R, or anthropometric factors. Diet quality was assessed using the Brazilian Health Eating Index Revised (BHEI-R), an instrument that enables measuring several dietary risk factors for chronic diseases, simultaneously allowing for the evaluation and monitoring of the diet at the individual or population levels [21].

In agreement with aforementioned evidence, the hypothesis that persons with better SWB indicators exhibit improved diet quality and anthropometric factors during the return visit with the nutritionist after prior individualized nutritional counseling was tested. Another hypothesis tested was that specific personality factors might explain the positive association between higher SWB and improvement in the outcomes mentioned above.

METHOD:

Criteria for Inclusion in the Sample

The study sample included patients seen at the Nutrition Outpatient Clinic of a public hospital in southern Brazil. The selection criteria were being on the first visit at the outpatient clinic, exhibiting cognitive conditions to understand nutritional counseling and answer the study questionnaires, and having a confirmed diagnostic of MetS according to the criteria adopted by the National Cholesterol Education Program's Adult Treatment Panel III (ATP III). The literature carries several definitions of MetS, with small variations in clinical cut-off points that define risk, but ATP III is the most commonly used guideline used in studies on psychological factors and MetS [22]. According to that definition, at least three of the

following risk factors must be present for a positive diagnostic: Central obesity (Waist circumference > 102 cm for men > 88 cm for women), triglycerides ≥ 150 mg/dL, HDL cholesterol < 40 mg/dL in men or < 50 mg/dL in women, systolic arterial blood pressure ≥ 130 mm Hg or diastolic ≥ 85 mm Hg, fasting glucose ≥ 100 mg/dL.

Instruments

The study was carried out by applying two clinical/nutritional instruments and four psychological scales, namely:

Socioeconomic, Clinical, and Anthropometric Questionnaire: Questionnaire containing relevant information to the sample evaluated, among which age, sex, education, clinical comorbidities, and monthly income; and anthropometric data of waist circumference (WC), weight, and height measured according to the standard procedures recommended by the World Health Organization [23]. Weight and height were measured using a Welmy® digital scale equipped with a stadiometer. WC was measured using a non-elastic and inextensible anthropometric tape with the medial point between the rib and iliac crest. All anthropometric data were collected by the staff of the Nutrition Outpatient Clinic.

Brazilian Healthy Eating Index Revised (BHEI-R): The BHEI-R is a dietary index composed of 12 components, nine of which regarding food groups, based on the food groups and recommendations of the Dietary Guide for the Brazilian Population (*Guia Alimentar para População Brasileira*) so that a higher intake receives a higher score. The component total fruits (which include fruits and natural fruit juices), whole fruits (excluding fruit juices), total vegetables, dark-green vegetables, orange vegetables, and legumes (of acronym VEVEAL in Portuguese), total grains (including grains, roots, and tubers), and whole grains had a maximum score of 5 points. Milk and dairy products (including soy milk), oils (mono- and

polyunsaturated fats, oils from oilseeds, and fish oil), meats, eggs, and legumes scored a maximum of 10 points. Two other components assess specific nutrients, i.e., sodium and saturated fat, with a maximum score of 10 points. Finally, the component assessing solid fats, alcoholic beverages, and added sugars (acronym Gord_AA in Portuguese) score a maximum of 20 points. These latter three reflect an unhealthy diet, so smaller intake scores higher. Dietary intake was assessed through a 24-hour dietary recall (24RH). The household measures were converted into units of measurement and the nutritional value was calculated by the software Nutrition Data System for Research (NDSR, version 2016). The results were used to classify the BHEI-R, validated for the Brazilian population by the researchers [21].

Psychological Scales:

Beck's Depression Inventory (BDI-II): It consists of a multiple-choice questionnaire with 21 items and aims to assess humor. Its score ranges from 0 to 3 for all items. The inventory was developed by Aaron Beck and has been normalized for Brazilian Portuguese. It has good internal consistency indicators and several pieces of evidence of validity [24].

Positive and Negative Affects Schedule - PANAS: It is composed of ten items that assess positive affects (PA) and ten that assess negative affects (NA). The items are made up of adjectives with answers using a five-point Likert scale ranging from “not at all” to “extremely.” The scale was developed and validated by Zanon et al. (2013a) [25] based on the PANAS [26]. It has adequate internal consistency indices and evidence of validity and internal structure, of convergent validity, and has been normalized for the Brazilian context.

Satisfaction with Life Scale (SWLS): It consists of five questions classified on a seven-point Likert scale ranging from “strongly disagree” to “strongly agree.” Studies have shown that the scale comprises a single factor and has high internal consistency ($\alpha = 0.87$) and high test-

retest reliability ($r = 0.82$) [27]. The instrument has several pieces of evidence of internal structure validity and data on Brazilian normalization.

Bateria Fatorial de Personalidade (BFP): An instrument to assess personality based on the BFF model. It comprises 126 statements that describe feelings, opinions, and attitudes and must be answered based on a seven-point Likert scale that indicates how much the respondent identifies with each item. The questionnaire was developed and normalized for Brazil by Nunes, Hutz and Nunes (2013) [28] and has adequate psychometric parameters. The exploratory factorial analyses indicated the instrument assessed five factors coherent with the theoretical model, namely: neuroticism, with 29 items ($\alpha = 0.89$), extraversion, 25 items ($\alpha = 0.84$), agreeableness, 28 items ($\alpha = 0.85$), consciousness, 21 items ($\alpha = 0.83$), and openness, 23 items ($\alpha = 0.74$). The raw scores were calculated in a computer system to assess the BFP.

Procedures

The study was conducted using an observational longitudinal design since its data were assessed at two moments in distinct manners, as shown in Figure 1. The psychological scales were applied immediately after the subject's visit to the Nutrition Outpatient Clinic, except for BDI-II, which was applied at the beginning of the first interview with the patient to detect possible interference on the answers to the scales since the instrument sought to measure the intensity of depression if present. The results of the other scales were adjusted to correct for this factor since persons with depression may have issues with attention, memory, and interpretation related to relevant emotional information, thus impacting the answers to the scales assessed in the present study [29].

At T1 (first data collection moment), the first 24RH, the socioeconomic questionnaire, the BDI-II, the SWLS, and the PANAS were applied. Anthropometric data of weight (kg),

height (m), and waist circumference (cm) were also collected. At T2 (return of the patient to the outpatient clinic), the 24HR and the same anthropometric data were collected and the BFP was applied. Since the visits at the outpatient clinic always occurred on Wednesdays, the subjects of the study were interviewed regarding the dietary intake on the previous Tuesday both at T1 and T2, enabling a more usual evaluation of intake than the weekly intake.

Note that the subjects were assessed concerning the psychological constructs only once since studies indicate the constructs approach have moderate temporal stability [30, 31, 32, 33, 34, 35].

This study did not seek to evaluate the methodology of the nutritional counseling strategies at the outpatient clinic where the data were collected. However, it should be stated that the dietary behavior change methodology was based on the principles of Bandura's Social Learning Theory [36], which adopts the perspective of acting for self-development, adaptation, and change, while the nutritional counseling was in compliance with the I Brazilian Guideline of Diagnostic and Treatment of MetS (*I Diretriz Brasileira de Diagnóstico e Tratamento da SM*) [37].

Time 1 (T1) First visit	Time 2 (T2) Return visit
• 24RH 1 • Anthropometric data 1 • Socioeconomic questionnaire • Psychological scales (except BFP)	• 24RH 2 • Anthropometric data 2 • <i>Bateria Fatorial de Personalidade</i> (BFP)

Statistical Analyses

In face of the scarcity of data in the literature, a moderate-sized effect was used for sample calculation according to the parameters by Callegari-Jacques (2003) [38] using the software WINPEPI version 11.43. For a 5%, significance level, 90% power, and minimum

correlation coefficient of 0.4 between the variation in diet quality (delta) in relation to the anthropometric parameters and the psychological attribute test scores, the minimum resulting number was 62. This way, the 63 subjects evaluated ensured greater confidence of the results in face of the aforementioned indicators.

The analyses were performed in the software SPSS version 21.0. Student's t-test for paired samples was applied to compare the averages between T1 and T2. In case of asymmetry, Wilcoxon test was used. The association among the quantitative variables was assessed based on the Pearson or Spearman linear correlation tests. Analysis of co-variance (ANCOVA) was employed to control for confounding factors. Finally, multivariate linear regression analysis using backward elimination was applied to independently assess factors associated with the variations in BHEI-R, BMI, WC, and weight. The entry criterion for a variable into the multivariate model was having $p < 0.20$ in the bivariate analysis and, when backward elimination was applied, only the variables with $p < 0.10$ remained in the final model. The level of significance adopted was 5% ($p < 0.05$).

Ethics Procedures

The study project was duly approved by the Human Research Ethics Committee at the respective institutions where it was conducted. Hence, the research was carried out according to the recommendation by the Ethics Committees of the Irmandade Santa Casa de Misericórdia de Porto Alegre (ISCOMPA) under protocol 724.805, and of the Federal University of Healthcare Sciences of Porto Alegre (UFCSPA) under protocol number 760.631. All subjects signed a term of free and informed consent in compliance with the Declaration of Helsinki.

PRESENTATION OF RESULTS:

The sample comprised 63 subjects. Its sociodemographic and clinical data are presented in Table 1.

Table 1 – Sociodemographic and clinical data of the sample - Porto Alegre, Brazil (n = 63).

Variables	n = 63
Age (years) – mean $\pm$ SD	55.3 $\pm$ 14.1
Sex – n (%)	
Male	20 (31.7)
Female	43 (68.3)
Ethnicity – n (%)	
White	53 (84.1)
<i>Pardo</i> *	4 (6.3)
Black	4 (6.3)
Yellow	2 (3.2)
Years of education - mean $\pm$ SD	8.0 $\pm$ 3.9
Level of schooling - n (%)	
Incomplete elementary	29 (46.0)
Complete elementary	7 (11.1)
Incomplete high school	7 (11.1)
Complete high school	12 (19.0)
Incomplete higher education	2 (3.2)
Complete higher education	6 (9.5)
Physical exercise practice - n (%)	25 (39.7)
Smoking - n (%)	2 (3.2)
Alcohol consumption - n (%)	11 (17.5)
Comorbidities - n (%)	

SHBP	46 (73.0)
DM	48 (76.2)
Hypercholesterolemia	30 (47.6)
Income** - n (%)	
1 to 2	1 (1.6)
3 to 5	36 (59.0)
5 to 8	23 (37.7)
8 to 10	1 (1.6)
Return time (months) - md (P25 – P75)	5 (4 – 7)

Legend: SHBP - systemic high blood pressure. DM - Diabetes Mellitus. md = Median; P25 = Percentile 25; P75 = Percentile 75; SD = Standard deviation.

* Official term used by the Brazilian census, meaning dark-skinned; ** In multiples of the minimum legal monthly wage in Brazil.

Regarding anthropometric factors, the initial BMI indicated three subjects (4.8%) were eutrophic, 14 (22.2%) were overweight, and 46 (73%) were obese. When the patients returned to the outpatient clinic, the results indicated two (3.2%) were eutrophic, 19 (30.2%) were overweight, and 42 (66.7%) were obese, with a shift in BMI from $33.4 \pm 6.0 \text{ kg/m}^2$ at the initial visit to $33.2 \pm 6.2 \text{ kg/m}^2$ at the return. The mean initial WC was $104.6 \pm 12.2 \text{ cm}$ among the women and $110.8 \pm 12.4 \text{ cm}$ among the men. At the return visit, these values were $103.1 \pm 12.1 \text{ cm}$ and $111.5 \pm 14.4 \text{ cm}$, respectively, revealing a significant reduction in WC among women at the second moment. The BHEI-R score split among the 12 components of this indicator showed a significant increase only in the intake of whole grains between T1 and T2 ($p = 0.038$). However, the final score showed no significant change ($p = 0.680$) in face of the mean values of 68.4 ± 10.4 at T1 and 69.0 ± 10.2 at T2. Consequently, no change occurred in the anthropometric parameters assessed, with mean BMI at T1 of $33.4 \pm 6.0 \text{ kg/m}^2$ and at T2

of $33.2 \pm 6.2 \text{ kg/m}^2$ ($p = 0.485$), while the mean WC at T1 was $106.6 \pm 12.5 \text{ cm}$ and at T2, $105.8 \pm 13.4 \text{ cm}$ ($p = 0.173$).

The descriptive statistics derived from the application of the psychological instruments are presented in Table 2. The maximum score on the Affects Scale was 50 points in each factor (PA and NA) and 35 points on the SWLS. For the BFP, the scores were calculated based on the means due to the uneven number of items. It is noteworthy that the mean values found did not differ from the mean values of the cut-off points among the population based on the references of the instruments employed [39, 28].

Table 2 – Scores of the psychological scales applied to patients with metabolic syndrome, Porto Alegre, Brazil (n = 63).

Variables	Mean $\pm$ SD	Md (P25 – P75)	Min – Max
BDI	10.0 ± 8.7	8 (4 – 14)	0 – 50
Positive affects	35.3 ± 8.2	36 (29 – 40)	14 – 50
Negative affects	20.9 ± 8.1	20 (15 – 27)	10 – 47
Satisfaction with Life	26.1 ± 6.6	27 (23 – 31)	8 – 35
Rosenberg scale	33.8 ± 4.1	34 (31 – 37)	23 – 40
Optimism scale	26.4 ± 3.6	27 (24 – 30)	12 – 30
Hope scape	34.6 ± 4.9	36 (31 – 38)	23 – 40
Neuroticism	3.32 ± 0.99	3.31 (2.79 – 3.99)	1.30 – 5.67
Extraversion	4.45 ± 0.76	4.52 (3.99 – 5.03)	2.67 – 5.88
Agreeableness	5.53 ± 0.65	5.62 (5.10 – 6.02)	4.07 – 6.67
Consciousness	5.05 ± 0.87	5.08 (4.43 – 5.80)	2.94 – 6.78
Openness	3.84 ± 0.59	3.91 (3.56 – 4.11)	1.99 – 4.99

When the psychological scales were associated with the delta of the BHEI-R score, a significant association was found between PA and changes in BHEI-R. The patients with higher scores on this scale had higher BHEI-R scores at the return visit. The other variables assessed showed no statistically significant association with BHEI-R (Table 3).

Table 3 – Association between the psychological scales and BHEI-R data of patients with metabolic syndrome according to the Pearson correlation coefficient, Porto Alegre, Brazil (n = 63).

Variables	BHEI-R
	Difference (Δ)
BDI	$r = -0.198$; $p = 0.121$
Positive affects	$r = 0.277$; $p = 0.028$
Negative affects	$r = -0.062$; $p = 0.630$
Satisfaction with Life	$r = 0.197$; $p = 0.122$

When the psychological scales were associated with the delta of the scores of anthropometric variables, no statistically significant associations were found (Table 4).

Table 4 – Association between the psychological scales and anthropometric data of patients with metabolic syndrome according to the Pearson correlation coefficient, Porto Alegre, Brazil (n = 63).

Variables	Anthropometric data		
	Δ BMI	Δ Waist	Δ Weight
BDI	$r = 0.071$; $p = 0.580$	$r = 0.141$; $p = 0.275$	$r = 0.053$; $p = 0.678$
Positive affects	$r = -0.060$; $p = 0.639$	$r = -0.015$; $p = 0.910$	$r = -0.030$; $p = 0.813$

Negative affects	$r = 0.108; p = 0.399$	$r = 0.078; p = 0.546$	$r = 0.111; p = 0.386$
Satisfaction with Life	$r = -0.231; p = 0.069$	$r = -0.177; p = 0.168$	$r = -0.209; p = 0.101$

Table 5 presents the association between SWB indicators and the delta of the outcomes investigated with the personality factors. A significant positive association was found between the score on the PA scale with the personality factors of extraversion and conscientiousness. In contrast, a significant inverse association was revealed between the PA scale and neuroticism. Moreover, a significant positive association was found between the score of NA and neuroticism and a significant inverse association between SWL and neuroticism. This score was also significantly associated with extraversion. No statistically significant association was observed between the BFP and BHEI-R or anthropometric variables.

Table 5 – Association between the variables assessed and the personality factors of patients with metabolic syndrome according to the Pearson correlation coefficient, Porto Alegre, Brazil (n = 63).

Variables	Neuroticism	Extraversion	Agreeableness	Conscientiousness	Openness
<i>Scales</i>					
Positive affects	-0.298*	0.471**	0.24	0.387**	0.031
Negative affects	0.523***	0.046	-0.198	-0.128	-0.067
Satisfaction with Life	-0.294*	0.479**	0.247	0.234	0.144

BHEI-R data

Initial	0.031	-0.113	-0.053	-0.013	0.031
Final	-0.236	-0.063	0.212	0.186	-0.070
Difference (Δ)	-0.238	0.052	0.237	0.177	-0.092
Δ BMI	0.068	0.055	-0.009	0.043	0.034
Δ WC	-0.022	-0.067	-0.241	-0.127	-0.080
Δ weight	0.056	0.066	0.004	0.055	0.016

*p < 0.05; **p < 0.01; ***p < 0.001

The variables with p-value below 0.20 in the bivariate analysis with the variation in BHEI-R were added to a multivariate linear regression model with backward elimination criterion. The results of the statistically significant variables are shown in Table 6. When adjusted for confounding factors, the variables that remained associated with the change in BHEI-R scores were PA, age, years of education, and variation in WC. Patients with scores above 36 points on the PA scale scored 5.77 more points in BHEI-R values between T1 and T2. One more year of age led to a mean increase by 0.27 points in the total BHEI-R score between T1 and T2. Similarly, one more year of education led to a mean increase by 0.95 points in the BHEI-R delta. Finally, for every reduction by 1 cm in WC, a mean increase by 0.94 points in BHEI-R score delta was found (Table 5). The variables BMI, WC, and weight did not remain statistically significant after the multivariate model was applied.

Table 6 – Multivariate linear regression analysis using backward elimination to independently assess factors associated with variations in BHEI-R.

Variables	Regression	CI 95%	B	P
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coefficient – b				
<i>BHEI-R variation*</i>				
Positive affects < 36 points	5.77	0.29 to 11.3	0.27	0.039
Age	0.27	0.07 to 0.48	0.36	0.011
Years of education	0.95	0.16 to 1.75	0.33	0.020
Δ WC	-0.94	-1.57 to -0.32	-0.39	0.004

* Variables excluded from the final model: scores of neuroticism and agreeableness, BDI-II, sex, physical exercise, DM, SHBP, and variation in BMI.

DISCUSSION OF RESULTS

This study pioneers in associating SWB and personality factors in the context of MetS. Among the main results are findings that relate diet quality of patients seen at a MetS outpatient clinic to anthropometric, sociodemographic, and psychological characteristics.

Diet Quality and Anthropometric and Sociodemographic Data

The sample evaluated had mean BHEI-R scores of 68.4 ± 10.4 and 69.0 ± 10.2 at T1 and T2, respectively, with a non-significant improvement. This result matches the findings by Silva, Prata and Cunha (2011) [40], who assessed the BHEI-R score of a sample of 38 patients with MetS in a city of Brazil and found an even lower mean value of 53.5 (31.2 – 78.1). Such data confirm the relationship between MetS and poor diet quality.

Just as BHEI-R scores did not change significantly between before and after the nutritional counseling, neither did the anthropometric parameters. According to Robertson, Davies & Winefield (2015) [41] despite the multidisciplinary efforts, the resistance against

weight loss among overweight and obese patients is still high, which suggests the clinical approaches have been insufficient and that traditional psychology has been relatively ineffective in managing the issue, with shortcomings regarding both interventions and researches on the subject[41]. Faith et al. (2003) attribute such difficulties to the fact most studies in the area explore “simple associations” between weight and psychological characteristics in a cross-sectional and correlational manner despite the potential to advance the knowledge on the subject through other investigation methods, as was the goal of conducting the present research in a longitudinal manner[42].

The results also indicate that the level of schooling and the diet evaluation method contributed to changing diet quality and, consequently, the anthropometric factors of the subjects. Indeed, the literature suggests that schooling is proportional to the comprehension of dietary counseling [43] and that the perception of being in an environment for nutritional counseling may lead the subjects to omit the intake of nutritionally poor foods or to overestimate the intake of healthy foods. Furthermore, studies have also shown that obese individuals tend to systematically overestimate their dietary intake [44]. Aligned with that, a recent review suggested that MetS and its components exert independent synergic effects on brain structures, speeding up brain ageing and cognitive decline, which might impact the comprehension of dietary counseling [45].

Diet Quality and Subjective Well-Being Indicators

The results suggested that the subjects with more PA had statistically significantly higher BHEI-R scores in the return visit. Positive affects represent the emotional assessment of SWB since, overall, it is a tripartite structure. One of them concerns the cognitive judgment of SWL. The other two correspond to the affective components of PA and NA [46]. Although some studies assess the factors by themselves and others investigate well-being as a whole,

the results generally show similar results when health outcomes are evaluated regarding MetS [47]. For instance, when [22] evaluated a representative sample of middle-aged individuals in the United States, cross-sectional and longitudinal associations were found between hedonic well-being and MetS components (waist circumference, systolic and diastolic blood pressure, triglycerides, HDL cholesterol, and fasting glycemia) and the results showed that MetS ($p = 0.005$) and PA ($p = 0.009$) predicted fewer MetS components and lower odds of meeting diagnostic criteria in fully adjusted models [22]. The results did not change after adjusting for depressive symptoms nor were moderated by age, sex, race, or socioeconomic status. The associations were stronger between SWB and WC, HDL cholesterol, and triglycerides. Thus, according to those authors, body composition and diet may be the most relevant targets of SWB interventions.

However, specifically concerning PA, the association with a healthy diet corroborated international researches, such as the one by Ford et al. (2011) [48], who described a significant positive association between a healthy diet and positive affects when investigating the relationship between affects and the intake of typical Mediterranean foods *versus* Western diets among 9,255 Americans. Another study on the same line evaluated the relation between PA and NA and the dietary intake of 281 New Zealander adults for 21 days using a food journal and concluded that the intake of more portions of fruits and vegetables was positively related to a higher PA score [49].

It is noteworthy that the association of PA with the improvement in diet quality remained even after correcting for confounding factors. The variables that remained associated with the change in BHEI-R scores were PA, age, years of education, and reduction in WC. Such results confirm that the subjects with more positive affects obtained higher scores between BHEI-R assessments and highlight the importance of taking schooling into account when planning interventions. Nonetheless, the positive association between age and

diet quality was surprising since the literature indicates older persons tend to be more resistant to change [43]. Although the reduction in WC between the evaluation times was not significant, the association with the improvement in BHEI-R must be taken into account since WC is an important indicator in the context of MetS [1].

No significant association was found between SWL and BHEI-R or anthropometric factors. Grant, Wardle and Steptoe (2009) [50] when investigating the relation between SWL and seven health habits (smoking, physical exercise, alcohol consumption, sun protection, fruit intake, fat intake, and dietary fiber intake) in an intercultural study developed with 17,246 young adults, concluded that cultural differences impact this relationship. In the aforementioned study, although SWL was positively associated with health habits (except concerning the consumption of alcohol and dietary fibers) when the overall sample was considered, the sub-sample of the USA and Western Europe ($n = 10,603$) showed no association between fruit intake and SWL, matching the results of the present research. Since the Brazilian diet tends to resemble the patterns of diets in the USA, with an increase in consumption of ultra-processed food and growing overweight and obesity [51], the data found indicate that dietary habits have little relation with how satisfied the individuals are with their lives, perhaps even because of the lack of awareness of the deleterious effects of an inadequate diet. That reinforces the relevance of preventative educational campaigns that point out the importance of a balanced diet, particularly for persons with little schooling, as is the case of the present sample.

Although no association with diet improvement could be shown, it is believed that food is considered one of the important life domains that impact SWL and, therefore, both SWL and PA must be taken into account in nutritional interventions. Based on this assumption, a measure for SWL related to foods was created, called satisfaction with food-related life (SWFoL) [52], which is defined as the overall evaluation of a person in relation to

his or her diet and dietary habits. Ever since, researches have been developed showing the importance of SWL on dietary habits, especially by a group of investigations in Chile on different age groups [53, 54, 55]. One of the studies more globally evaluated a sample of 1,277 subjects from major Chilean cities and assessed SWL, SWFoL, and a health-related quality of life index. The subjects were asked, among other topics, about their dietary habits both at home and on the street and time available for meals at home. The authors concluded that SWL in the sample was related to aspects associated with health, family, and diet and that family interaction associated with diet could play a major role in overall SWL.

Diet Quality and Personality Data

The five personality factors (BFF) assessed were not significantly associated with an improvement in BHEI-R or with anthropometric factors. Thus, the association of PA with improved BHEI-R seems not to be explained by personality factors, although associations between positive affects and personality factors have been confirmed. The factors extraversion and consciousness were associated with PA ($r = 0.471$ and 0.387), both with $p < 0.01$, while neuroticism was inversely associated ($r = -0.298$, $p > 0.05$). Such findings corroborate data in the Brazilian literature derived from studies that specifically assessed affects and the BFF [56, 57, 58]. Moreover, as expected, since neuroticism and extraversion have been reported as the strongest predictors of SWL [17, 13], these factors were associated with aspects of SWB evaluated in the present study. Neuroticism was negatively associated with both PA and SWL and positively associated with NA. Extraversion was positively associated with both PA and SWL. A third factor, consciousness, was positively associated with PA.

The relationship between SWB and personality has been well documented in the literature: Meta-analysis studies have stated that extraversion has a higher correlation with

PA, whereas neuroticism has a higher correlation with SWL and NA [59, 16]. However, the results regarding diet and anthropometric parameters are still unclear. That matches a previous study of ours, which did not identify which personality factor is the most important in improving diet quality, but rather different factors as important in this context.

Extraversion is a human personality component that, in the BFF model, is related to the way people interact with others, indicating how communicative, talkative, active, assertive, responsive, and gregarious they are [28]. In turn, neuroticism has been considered, in the BFF model, as the factor most associated with emotional characteristics in people. It refers to the chronic level of adjustment and emotional instability of individuals and represents the individual differences that occur when people experience emotional patterns associated with psychological discomfort [60]. Both factors, besides their importance in SWB, were also associated with an adequate diet, along with openness to experiences and agreeableness, in the study by Möttus et al. (2013) [61]. The researchers, similarly to the factors evaluated in the present study, assessed associations between personality traits of the BFF model, dietary patterns, and BMI in a sample of 1,091 elderly persons of a Scottish cohort study. The dietary patterns were measured using a dietary frequency questionnaire and were separated into four types: Mediterranean diet, healthy diet, convenience diet, and sweet foods [61].

The diet associated with the most personality factors was the Mediterranean diet, characterized by the high intake of monounsaturated fats, particularly from olives and olive oil, and high daily intake of fruits, vegetables, whole grains, and low-fat dairy products, weekly intake of fish, poultry, nuts, and legumes; relatively low intake of red meat, and moderate alcohol consumption, normally with the meals. Several studies have indicated that a Mediterranean-like diet is associated with lower prevalence and progression of MetS, according to with the meta-analysis by Kastorini et al. (2011) [4]. Hence, the consumption of

foods that make up this diet must be incentivized among patients with MetS, such as the subjects in this study.

Furthermore, it is noteworthy that, in the study by Möttus et al. (2013) [61], the main personality factor associated with an overall adequate diet was openness, followed by consciousness. Openness refers to exploratory behaviors and to the recognition of the importance of having new experiences [28]. In turn, consciousness expresses, among others, the level of control, organization, and persistence of the individual [62], which studies have shown to be associated with obesity, as shown by Jokela et al. (2013a) [63] in a meta-analysis based on data from nine studies to examine whether personality traits predict the development and persistence of obesity. Personality was assessed by the BFF and it was found that high consciousness was associated with lower risk for obesity, an important disease in the development of MetS. Other personality traits were not associated with obesity in the joint analysis and substantial heterogeneity was found in the associations among the studies. The findings indicate that consciousness may be the single broad-level personality trait in the BFF model that is consistently associated with obesity. It should be pointed out that, although not directly associated with an improvement in BHEI-R or anthropometric factors, consciousness was associated with PA in the sample of the present study ($r = 0.387$, $p < 0.01$), whereas openness had no association.

Corroborating the aforementioned studies, a systematic review evaluated the literature regarding personality traits associated with body weight, the development of overweight, and obesity, as well as the efficacy of weight loss derived from interventions [64], similarly to the objectives of this study. Most population-based cross-sectional studies, longitudinal studies, and meta-analysis results have shown evidence that consciousness can be considered a protective factor against the development of overweight. Thus, the authors report that consciousness is a measure of regulation of internal impulses and self-discipline that is

able to, therefore, provide a potential source of control over reward-oriented impulsive behavior. In addition, they report results of the review and suggest that, within the context of therapeutic measures for weight loss, it is important to identify patient subgroups to whom specific treatment options must be developed, such as measures to strengthen self-control ability. In this way, it seems that, among the BFF, consciousness must be observed and considered along with PA in future nutritional intervention studies in the context of MetS.

Supporting this statement, consciousness was also associated with diseases often associated with MetS. Jokela et al. (2013b) [65] examined whether personality would be associated with risk for diabetes and the mortality related with it, using a similar methodology as the aforementioned study [63], in an investigation developed with 34,913 adults from the United States and United Kingdom who were free of diabetes at the beginning of the study. Over a mean follow-up time of 5.7 years, 1,845 subjects developed diabetes and, of the five personality dimensions, only low consciousness was associated with both high risk for diabetes and with high risk of mortality due to diabetes. Those authors concluded that low consciousness, a cognitive-behavioral disposition that reflects careless behavior and lack of self-control and planning, is associated with high risk for diabetes and diabetes-related mortality and that subjacent mechanisms likely involve health behaviors such as lack of weight control, physical inactivity, and non-adherence to medical recommendations.

Based on all these studies, it can be stated that different personality factors seem to be important in the context of MetS, although no association was identified in the sample evaluated between personality factors and the response to nutritional treatment among patients with MetS. However, the literature shows that each factor is important in specific aspects of the MetS treatment since it actually requires looking at the bigger picture, which is what the present study seeks to motivate in the reader. The literature lacks specific studies on the adherence to nutritional interventions, such as what was investigated in this study, which

hinders more robust discussions on the topic. However, an increase in such investigations can be noted, as well as concern of different areas towards the treatment of obesity and MetS. It is believed that studies that bring different areas together – such as joining psychology and nutrition, as was the goal of the present research – are crucial to enable more effective interventions in the treatment of this major health issue that is MetS.

SHORTCOMINGS, CONCLUSIONS, AND SUGGESTIONS FOR FUTURE RESEARCHES

The study has some shortcomings, primarily in regards to the small sample size, which prevented a broader variety of statistical tests and analyses by sex, among other measures. However, as it sought subjects submitted to the same nutritional treatment methodology, and considering the longitudinal nature of the study, a larger sample would make the study unfeasible regarding time. More dietary information, based on a higher number of 24RH, would also have provided more precise information on the dietary habits of the sample. Nevertheless, the authors understand that collecting such information in a way other than in person might have compromised the standardization of the data surveyed. Another shortcoming refers to the psychological scales employed, whose validations were, in general, performed with populations with more schooling than that of the sample in this study. In order to minimize this possible bias, the interviewer read each question aloud in an attempt to obtain better comprehension of the sentences by the respondents.

Beyond these shortcomings, however, it should be pointed out, as a conclusion, that the study showed the importance of the PA construct, which was associated with improvement in diet quality even after the analyses for several factors that unsettle researchers such as the relationship with BDI-II scores and interference of personality factors. This result

is promising since interventions on positive psychological attributes, such as PA, are possible and relatively simple to be carried out compared to interventions focusing on personality factors. Based on these attributes, it is believed to be possible, to some extent, to more actively involve the patient in the treatment, which may dramatically improve the results obtained, leading to better health and outlooks of longevity.

For future studies, investigations based on interventions regarding SWB in the context of metabolic syndrome are suggested and encouraged to test possible implementations in the prevention and treatment of this syndrome, which is characterized as a considerable risk factor for chronic diseases of difficult treatment after their onset. Intervention studies on positive psychology are still scarce and this study expects to motivate future interdisciplinary researches in that context.

AUTHORS' CONTRIBUTIONS:

CCS, FMB, and CTR contributed with the conception and design of the study, as well as with the collection, analysis, and interpretation of research data and with writing the paper. EM contributed with data collection, organization, and analysis.

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REFERÊNCIAS

[1] Alberti KG, Eckel RH, Grundy SM, Zimmet PZ, Cleeman JI, Donato KA et al. Harmonizing the metabolic syndrome: a joint interim statement of the International Diabetes Federation Task Force on Epidemiology and Prevention; National Heart, Lung, and Blood

Institute; American Heart Association; World Heart Federation; International Atherosclerosis Society; and International Association for the Study of Obesity. *Circulation*. 2009 Oct 20 120(16):1640-5. doi: 10.1161/CIRCULATIONAHA.109.192644.

[2] O'Neill S, O'Driscoll L. Metabolic syndrome: a closer look at the growing epidemic and its associated pathologies. *Obes Rev*. 2014 16, 1–12. doi: 10.1111/obr.12229

[3] Kaur J. A comprehensive review on metabolic syndrome. *Cardiol Res Pract*. 2014. doi: 10.1155/2014/943162.

[4] Kastorini CM, Milionis HJ, Esposito K, Giugliano D, Goudevenos JA, Panagiotakos DB. The effect of Mediterranean diet on metabolic syndrome and its components: a meta-analysis of 50 studies and 534,906 individuals. *J Am Coll Cardiol*. 2011 Mar 15 57(11):1299-313. doi: 10.1016/j.jacc.2010.09.073.

[5] Huffman JC, DuBois CM, Millstein RA, Celano CM, Wexler D. Positive Psychological Interventions for Patients with Type 2 Diabetes: Rationale, Theoretical Model, and Intervention Development. *J Diabetes Res Journal*. 2015. <https://doi.org/10.1155/2015/428349>.

[6] Santa-Helena ET, Nemes MIB, Eluf Neto J. Fatores associados à não-adesão ao tratamento com anti-hipertensivos em pessoas atendidas em unidades de saúde da família. *Cad. Saúde Pública* [online]. 2010 26(12): 2389-2398. <http://dx.doi.org/10.1590/S0102-311X2010001200017>. Brazilian.

[7] Stranges S, Samaraweera PC, Taggart F, Kandala NB, Stewart-Brown S. Major health-related behaviours and mental well-being in the general population: the Health Survey for England. *BMJ Open*. 2014 4. <http://dx.doi.org/10.1136/bmjopen-2014-005878>

- [8] Seligman MEP. Positive Health. *J Appl Psychol.* 2008 57: 3-18.
<https://doi.org/10.1111/j.1464-0597.2008.00351.x>
- [9] Ngamaba KH, Panagioti M, Armitage CJ. How strongly related are health status and subjective well-being? Systematic review and meta-analysis. *Eur J Public Health.* 2017 Oct : 27(5):879-85.
- [10] Giacomoni CH. Bem-estar subjetivo: Em busca da qualidade de vida. *Temas Psicol.* 2004 12(1): 43-50. Brazilian.
- [11] Ryff CD, Keyes CL. The structure of psychological well-being revisited. *J Pers Soc Psychol.* 1995 Oct 69(4):719-27.
- [12] Nunes CHS, Hutz CS, Giacomoni CH. Associação entre bem estar subjetivo e personalidade no modelo dos cinco grandes fatores. *Aval Psicol.* 2009 8(1): 99-108. Brazilian.
- [13] Woyciekoski C, Natividade JC, Hutz CS. As Contribuições da Personalidade e dos Eventos de Vida para o Bem-Estar. *Psic Teor e Pesq.* 2014 30 (4): 401-409. Brazilian.
- [14] Lucas RE, Diener E. Personality and subjective well-being. In John OP, Robins RW, Pervin LA (Eds.) *Handbook of personality-theory and research.* New York: The Guilford Press (2008):795-814.
- [15] Costa PT, McCrae R. Revised NEO Personality Inventory (NEO-PI-R) and NEO Five Factor Model (NEO-FFI) Professional manual. Odesa, FL; Psychological Assessment Center. 1992.
- [16] Steel P, Schmidt J, Shultz J. Refining the relationship between personality and subjective well-being. *Psychol Bull.* 2008 134(1):138 –161. doi: 10.1037/0033-2909.134.1.138.

- [17] Garcia D, Erlandsson A. The relationship between personality and subjective well-being: different association patterns when measuring the affective component frequency and intensity. *J Happiness Stud.* 2011 12:1023–1034
- [18] Nunes CHSS, Hutz CS, Nunes MFO. *Bateria Fatorial de Personalidade*. São Paulo: Casa do Psicólogo. 2010.
- [19] Natividade JC, Hutz CS. Escala Reduzida de Descritores dos Cinco Grandes Fatores de Personalidade: Prós e Contras. *Psico.* 2015 46(1): 79-89. Brazilian.
- [20] Strickhouser JE, Zell E, Krizan Z. Does personality predict health and well-being? A metasynthesis. *Health Psychol.* 2017 36(8):797-810. doi:<http://psycnet.apa.org/doiLanding?doi=10.1037/hea0000475>
- [21] Previdelli AN, Andrade SC, Pires MM, Ferreira SRG, Fisberg RM, Marchioni DM. A revised version of the Healthy Eating Index for the Brazilian population. *Rev Saúde Públ.* 2011 45(4).
- [22] Boylan JM, Ryff CD. Psychological Well-being and Metabolic Syndrome: Findings from the MIDUS National Sample. *Psychosom Med.* 2015 June 77(5): 548–558.
- [23] WHO - World Health Organization. *Physical Status: the use and interpretation of anthropometry*. WHO technical report series 854. Geneva: WHO, 1995.
- [24] Gomes-Oliveira MH, Gorenstein C, Neto FL, Andrade LH, Wang YP. Validação da versão brasileira em português do Inventário de Depressão de Beck-II numa amostra da comunidade. *Rev. Bras. Psiquiatr.* 2012 34(4): 389-394. <http://dx.doi.org/10.1016/j.rbp.2012.03.005>. Brazilian.
- [25] Zanon C, Bastianello MR, Pacico JC, Hutz CS. Desenvolvimento e validação de uma escala de afetos positivos e negativos. *Psico-USF* (2013a), 8(2), 193-202. doi:10.1590/S1413-

82712013000200003

- [26] Watson D, Clark LA. Introduction to the special issue on personality and psychopathology. *J Abnorm Psychol*. 1994 103: 3-5. <http://dx.doi.org/10.1037/h0092429>
- [27] Zanon C, Bardagi MP, Layous K, Hutz CS. Validations of Satisfaction with Life Scale to Brazilians: Evidences of Measurement Noninvariance Across Brazil and US. *Soc Indic Res*. 2013b. doi:10.1007/s11205-013-0478-5
- [28] Nunes CHSS, Hutz CS, Nunes MFO. Bateria Fatorial de Personalidade – BFP : Manual técnico. 2. ed. – São Paulo: Casa do Psicólogo, 2013.
- [29] Borralha SJP. Processos Cognitivos em Adultos com Depressão Major. Dissertação - Curso de 2o Ciclo em Psicologia, Aconselhamento e Psicoterapia, Universidade Lusófona de Humanidades e Tecnologias. 2011.
- [30] Galinha IC, Pereira CR, Esteves F. Versão reduzida da escala portuguesa de afeto positivo e negativo - PANAS-VRP: Análise fatorial confirmatória e invariância temporal. *Psicologia*. 2014 28(1): 50-62. Brazilian.
- [31] Snyder CR, Harris C, Anderson JR, Holleran SA, Irving LM, Sigmon ST. The will and the ways: Development and validation of an individual-differences measure of hope. *J Pers Soc Psychol*. 1991 60: 570-585.
- [32] Scheier MF, Carver CS, Bridges MW. Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A re-evaluation of the Life Orientation Test. *J Pers Soc Psychol*. 1994 67, 1063-1078.
- [33] Eid M, Diener E. Global Judgments of Subjective Well-Being: Situational Variability and Long-Term Stability. *Soc Indic Res*. 2004 65: 245-277. <http://dx.doi.org/10.1023/B:SOCI.0000003801.89195.bc>

- [34] Sbicigo JB, Bandeira DR, Dell’Aglío DD. Escala de Autoestima de Rosenberg (EAR): validade fatorial e consistência interna. *Psico-USF*. 2010 15(3): 395-403. Brazilian
- [35] Silva IB, Nakano TC. Modelo dos cinco grandes fatores da personalidade: análise de pesquisas. *Aval. psicol.* 2011 10(1): 51-62. Brazilian.
- [36] Bandura A. The evolution of social cognitive theory. In: Smith KG, Hitt MA. *Great minds in management*. Oxford University Press. 2005:9-35.
- [37] Sociedade Brasileira de Cardiologia (SBC), 2005. I Diretriz Brasileira de Diagnóstico e Tratamento da Síndrome Metabólica, *Arquivos Brasileiros De Cardiologia*, v.84, Suplemento I, Abril 2005.
- [38] Callegari-Jaques, SM. *Bioestatística: princípios e aplicações*. Porto Alegre: Artemed (2003), 255p.
- [39] Hutz CS. *Avaliação em Psicologia Positiva*. Porto Alegre: Artmed (2014), 151 p.
- [40] Silva KF, Prata A, Cunha DF. Frequency of metabolic syndrome and the food intake patterns in adults living in a rural area of Brazil. *Rev. Soc. Bras. Med. Trop.* 2011 44(4): 425-429 <http://dx.doi.org/10.1590/S0037-86822011000400005>. Brazilian.
- [41] Robertson S, Davies M, Winefield H. Why weight for happiness? Correlates of BMI and SWB in Australia. *Obes Res Clin Pract.* 2015 Nov-Dec 9(6):609-12. doi: 10.1016/j.orcp.2015.04.011.
- [42] Faith MS, Flint J, Fairburn JJ, Goodwin GM, Allison DB. Gender differences in the relationship between personality dimensions and relative body weight. *Obes Res.* 9 (2001) 647–650. doi:10.1038/oby.2001.86
- [43] Sousa AEC and Nunes RM. Avaliação da adesão terapêutica nutricional e sua relação com os modelos de mudança do comportamento alimentar. *HU Revista*. 2014, 40:221–9.
- [44] Fisberg RM, Marchioni DML, Colucci ACA. Avaliação do consumo alimentar e da

ingestão de nutrientes na prática clínica. *Arq Bras Endocrinol Metab.* 2009 53(5):617-24. Brazilian.

[45] Alfaro FJ, Gavrieli A, Saade-Lemus P, Lioutas V, Upadhyay J, Novak V. White matter microstructure and cognitive decline in metabolic syndrome: a review of diffusion tensor imaging. *Metabolism Clinical and Experimental*, 2018 78, 52 – 68. doi:10.1016/j.metabol.2017.08.009

[46] Diener W, Pressman SD, Hunter J, Delgadillo-Chase D. If, Why, and When Subjective Well-Being Influences Health, and Future Needed Research. *Appl. Psychol. Health Wellbeing*. 2017 9(2), 133–167. <https://doi.org/10.1111/aphw.12090>

[47] Steptoe A, Dockray S, Wardle J. Positive Affect and Psychobiological Processes Relevant to Health. *Journal of Personality*. 2009 77(6): 1747-1776. doi: 10.1111/j.1467-6494.2009.00599.x.

[48] Ford PA, Jaceldo-Siegl K, Lee JW, Youngberg W, Tonstad S. Intake of Mediterranean foods associated with positive affect and low negative affect. *J Psychosom Res.* 2013 Feb 74(2): 142–148. doi:10.1016/j.jpsychores.2012.11.002.

[49] White BA, Horwath CC, Conne TS. Many apples a day keep the blues away – Daily experiences of negative and positive affect and food consumption in young adults. *British Journal of Health Psychology* (2013), 18, 782–798.

[50] Grant N, Wardle J, Steptoe A. The relationship between life satisfaction and health behavior: a cross-cultural analysis of young adults. *Int J Behav Med.* 2009 16(3):259-68. doi: 10.1007/s12529-009-9032-x.

[51] Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de Vigilância de Doenças e Agravos não Transmissíveis e Promoção da Saúde. *Vigitel Brasil 2016: vigilância de fatores de risco e proteção para doenças crônicas por inquérito telefônico* :

estimativas sobre frequência e distribuição sociodemográfica de fatores de risco e proteção para doenças crônicas nas capitais dos 26 estados brasileiros e no Distrito Federal em 2016 / Ministério da Saúde, Secretaria de Vigilância em Saúde, Departamento de Vigilância de Doenças e Agravos não Transmissíveis e Promoção da Saúde. – Brasília: Ministério da Saúde, 2017. 160p.: il. ISBN 978-85-334-2479-1

[52] Grunert KG, Dean M, Raats MM, Nielsen NA, Lumbers M. A measure of satisfaction with food-related life. *Appetite*. 2007 49:486–493.

[53] Schnettler B, Lobos G, Orellana L, Grunert K, Sepúlveda J, Mora M, et al. Analyzing Food-Related Life Satisfaction and other Predictors of Life Satisfaction in Central Chile. *Span J Psychol*. 2015 18(38):1-14.

[54] Schnettler B, Miranda H, Lobos G, Orellana L, Sepúlveda J, Denegri M, et al. Eating habits and subjective well-being. A typology of students in Chilean state universities. *Appetite*. 2015 Feb:1-12

[55] Schnettler B, Miranda-Zapata E, Grunert KG, Lobos G, Denegri M, Hueche C. Life Satisfaction of university students in relation to family and food in a developing country. *Front Psychol*. 2017 8. Doi: 10.3389/fpsyg.2017.01522.

[56] Noronha APP, Martins DF, Campos RRF, Mansão CSM. Relações entre afetos positivos e negativos e os cinco fatores de personalidade. *Estud Psicol*. 2015 20(2):92-101. doi: 10.5935/1678-4669.20150011. Brazilian.

[57] Noronha APP, Lamas KCA, Barros MVC. Afetos e personalidade: suas relações em estudantes universitários. *Psicol teor prat*. 2016 18(2): 75-88. doi.org/10.15348/1980-6906/psicologia.v18n2p75-88. Brazilian.

- [58] Zanon C, Bastianello MR, Pacico JC, Hutz CS. Relationships Between Positive and Negative Affect and the Five Factors of Personality in a Brazilian Sample. sep-dec. 2013, Vol. 23, No. 56, 285-292. doi:10.1590/1982-43272356201302
- [59] DeNeve KM, Cooper H. The happy personality: a meta-analysis of 137 personality traits and subjective well-being. *Psychol Bull.* 1998 Sep 124(2):197-229.
- [60] McCrae RR, John OP. An introduction to the five-factor model and its applications. *J Pers.* 1992 Jun 60(2):175-215.
- [61] Möttus R, McNeill G, Jia X, Craig LCA, Starr JM, Deary IJ. The associations between personality, diet and body mass index in older people. *Health Psychol.* 2013 32(4): 353–360. doi: 10.1037/a0025537
- [62] Hutz CS, Nunes CH, Silveira AD, Serra J, Anton M, Wieczorek LS. O desenvolvimento de marcadores para a avaliação da personalidade no modelo dos cinco grandes fatores. *Psicologia: Reflexão e crítica.* 11(2). Brazilian.
- [63] Jokela M, Hintsanen M, Hakulinen C, Batty GD, Nabi H, Singh-Manoux A. Association of personality with the development and persistence of obesity: a meta-analysis based on individual-participant data. *Obes Rev.* 2013 14: 315–32. doi: 10.1111/obr.12007
- [64] Gerlach G, Herpertz S, Loeber S. Personality traits and obesity: a systematic review. *Obes Rev.* 2015 16: 32–63. doi: 10.1111/obr.12235.
- [65] Jokela M, Elovainio M, Nyberg ST, Tabák AG, Hintsala T, Batty D et al. Personality and Risk of diabetes in adults: Pooled analysis of 5 cohort studies. *Health Psychol.* 2013. doi: 10.1037/hea0000003.

Artigo 4 – Submetido para Eating and Weight Disorders

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Porto Alegre, May, 2019.

Dear Editor,

On behalf of all authors, I am submitting the manuscript entitled “Relationship Between Diet Quality, Subjective Well-being, and Personality in Metabolic Syndrome” for your appreciation and also for editorial analysis by the Journal of Human Nutrition and Dietetics, as to the possibility of its publication as a Research Article.

The treatment and prevention of metabolic syndrome (MetS), a major clinical and public health issue, has been considered a challenge as they require multidisciplinary actions and individual motivations for adherence to treatment. Thus, the need arises of understanding the key components in controlling MetS. Evidence has shown that positive psychological attributes such as subjective well-being (SWB), which comprises the constructs of satisfaction with life, and positive and negative affects, whether or not determined by personality factors, can be important matters in this issue. Hence, the present study aimed to investigate the relationship between positive affects (PA) and negative affects (NA) and satisfaction with life with the improvement in diet quality, analysed by Brazilian Healthy Eating Index Revised

(BHEI-R) and anthropometric parameters of patients with MetS, in addition to whether personality factors were associated with SWB, BHEI-R, or anthropometric factors.

The study sample included 63 patients with MetS seen at the Nutrition Outpatient Clinic of a public hospital in southern Brazil. The study was carried out by applying two clinical/nutritional instruments and four psychological scales and the analyses were performed in the software SPSS 21.0. The results indicated a significant positive association between PA and BHEI-R. No significant association was found between satisfaction with life and BHEI-R or anthropometric factors. Furthermore, the five personality factors assessed were not significantly associated with an improvement in BHEI-R or with anthropometric factors. Thus, the association of PA with improved BHEI-R seems not to be explained by personality factors, although associations between PA and personality factors have been confirmed. In face of the results, it is believed that studies that bring different areas together, such as psychology and nutrition, are crucial to enable more effective interventions in the treatment of MetS.

None of the material in the manuscript is included in another manuscript, has been published previously, or is currently under consideration for publication elsewhere. Ethical guidelines were followed by the investigator in performing studies and each author has participated sufficiently in the work to take public responsibility for the content of the paper and also for approve of the manuscript final version approval.

If requested, the authors will provide the data or will cooperate fully in obtaining and providing the data on which the manuscript is based for examination by the editors or their assignees. It does not have conflict of interest. We agree to assign exclusive copyright to the Journal of Human Nutrition and Dietetics, if and when the manuscript is accepted for publication.

Yours sincerely,



Cecilia Cesa Schiavon

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Aspects of subjective well-being and its measuring instruments in obesity: A systematic review

Subjective well-being and obesity: A systematic Review

Abstract

Obesity is determined by many factors, among them genetic, nutritional, and psychological. The latter has appeared in recent publications, especially with the growth of positive psychology, which intend to act in addition to baseline levels of healthy functionality, evaluating, for example, individuals' subjective well-being (SWB). SWB can be defined with two elements, an emotional (negative and positive affects) and a cognitive (satisfaction with life). The aim of this review is to present whether research in obesity may offer further insight with regard to SWB and its constructs. The data was searched in PsycINFO, Scopus, Pubmed and Web of Science electronic databases, using the word "obesity" and combining it with the components related to subjective well-being and its elements. Out of 278 articles, a definitive selection of 23 articles has been done for the review (n=23). Most of the studies had findings of negative association between obesity and SWB (n=17), which was predicted. The general findings support that there is a relationship between SWB and obesity, however, it is not always mediated by Body Mass Index, but rather the health and social problems and functional limitation it brings. This highlights the importance of further studies, so that one can consider its relevance in the public sphere.

Keywords: Subjective well-being, Obesity, Positive Psychology, Satisfaction with Life, Positive Affects, Negative Affects.

1. Introduction

1.1 Rationale

The discussion of obesity as a chronic disease accompanied by multiple pathological consequences, has been featured in many academic studies [1], as has the increase in the number of affected demographic groups. Obesity is currently one of the most serious threats to public health according to the World Health Organization (WHO) [2] it is a multifactorial

disease whose etiology includes genetic, endocrine, behavioral, psychological and other factors [3]. In regard to psychological factors, obesity is often associated with mental disorders. On the other hand, good mental health has recently been found to be an important predictor of overall health and longevity. More than the mere absence of mental illness or psychiatric pathology, good mental health means "feeling good" and includes subjective well-being, optimism, resilience and other aspects [4]. These constructs are studied by the Positive Psychology (PP) movement, which takes a different approach from traditional psychology, that studies symptoms following a pathological focus [5].

Subjective well-being (SWB) is one of the most studied aspects of Positive Psychology and, according to Diener, can be defined in two areas: the affective and the cognitive. The affective component is emotional and is related to the balance of negative and positive affects while the cognitive component is related to the subjective evaluation of one's satisfaction with life in general [6]. Both components have been applied in clinical studies to define SWB [7]. Thus, SWB is an individual's subjective evaluation of his/her satisfaction with life and his/her happiness [6]. Steptoe et al. analyzed several ways that SWB can influence health and mortality and concluded that health behaviors (e.g., a healthy diet, regular exercise and adequate sleep) are the main mediators of this influence [8].

Studies investigating only obese individuals have shown a negative relationship between subjective well-being and obesity, which appears to be mediated by social skills, social support and health behaviors (Dierk et al., 2006; Magallares et al., 2014, Vilhena et al., 2014) [9-11]. Moreover, research conducted with overweight, normal weight and underweight individuals have also somehow shown this negative association (Roberts et al., 2002; Stutzer et al., 2007; Wegener et al., 2008; Saloumi & Plourde, 2010; Böckerman et al, 2013; Velten et al., 2014; Jackson et al. 2015) [12-18]. However, other studies have reported a positive association between both that emerges after adjusting for factors such as physical illness (e.g., Jorm et al, 2003; Carr. D et al, 2007) [19,20], which according to Jorm et al. may be due to the physical health consequences of obesity, and others moreover have found no significant association (e.g., Faith et al., 2001 [21]; Istvan Zavela, & Weidner, 1992 [22]; Pearl & Puhl, 2016 [23]).

Unfortunately, the problems involved with dietary treatments commonly used with obese patients are real and include the difficult task of maintaining long-term weight loss and adherence to dietary treatments [23]. Therefore, weight loss through a low-calorie diet should not be the sole objective of obesity treatment. As there is insufficient evidence to explain the relationship between SWB and obesity, this systematic review highlights the importance of

studying these factors to support healthcare professionals in promoting physical and psychological health, preventing illness and treating affected individuals.

1.2 Research objectives and question

The aim of the study was to provide a systematic review that explores what the current literature shows about the relationship between obesity and subjective well-being, as a better understanding of this relationship can help to develop effective interventions for obese patients. Furthermore, this review also focused on determining which instruments and elements were used to measure SWB in the studies. Moreover, consistent with previous evidence, this systematic review hypothesizes that obese individuals have low SWB scores. this systematic review hypothesizes that individuals with obesity have low SWB scores, based in the comorbidities associated with the disease and not weight and BMI classification, therefore, the level of comorbidities and their severity present would mediate this relationship.

2. Material and methods

2.1 Search strategy

A literature review was conducted by searching the more comprehensive databases in indexed journals: Scopus, Pubmed, Web of Science and PsycNET to identify pertinent articles in English, Portuguese and Spanish. The search was based in three word combinations, which were used in all of the databases. The standard term combinations used were: “subjective well-being AND obesity AND well-being”; “positive affect AND negative affect AND obesity”; and “satisfaction with life AND obesity”.

The research found a total of 278 articles before applying the filters, which were published until 2016. All of the databases showed relevant results: 76 in Pubmed, 105 in Scopus, and 95 in Web of Science. Two articles were found in PsycNET 2 without applying the filters. Thus, 278 articles in total were found (Figure 1).

2.2 Inclusion and exclusion criteria

2.2.1 Participants

In order for an article to be included in this review, its study sample was required to be composed exclusively or in part of participants who had been diagnosed with obesity using

the Body Mass Index (BMI) (weight divided by the height squared), in which a BMI of ≥ 30.0 kg/m² indicated obesity. The sample age range of the studies could be broad, but not exclusively composed by adolescents, since their psychopathological approaches involve particularities.

2.2.2 Study types

The following types empirical studies were included: multicenter, cohort, longitudinal, cross-sectional and stratified two-stage cluster sampling. Normal-weight comparison groups were included in most of the studies, as well as overweight individuals (appearing when the objective is to correlate SWB with BMI).

Regarding the variables that guided the search, the independent variable was obesity and the dependent variable was SWB. However, since this cause-effect relationship is not clear, and may even be contrary, this review presents an observational view.

Peer-reviewed studies were included in this review if they associated SWB constructs with obesity or an increase/decrease in BMI. In addition, they needed to be well-evaluated according to the STROBE Checklist [25].

2.3 Data sources, study selection and data extraction

For the present systematic review, first, duplicated article in different databases (n=145) were excluded. Then, the articles' titles and abstracts were first read and analyzed. If an article did not met the inclusion criteria and if it was a review or animal model study it was excluded (n=81). Two reviewers independently analyzed the titles and abstracts and reviewed its full text, extracted its data using the standard data extraction protocol and made their selections according to the eligibility criteria.

Figure 1 shows the process for the final number of studies included. After applying the filters based on the inclusion criteria and a final inspection, articles were excluded if they were not related to the subject (n=29). At the end of this process, 23 articles were chosen.

3. Results

3.1 Study selection and characteristics

Initially, 278 articles were found using the search strategy, which used three word combinations that included obesity associated to each of the constructs of subjective well-being, positive affect, negative affect, satisfaction with life and well-being itself.

After the selection process 26 studies were selected. However, three other studies were excluded because their samples did not meet the requirements (one sample included only adolescents, one included patients with spinal cord injuries and one study was a review). Thus, 23 articles were selected to be part of this systematic review (Figure 1).

With respect to the standard term combinations, eight of the articles included in this review were found using the search terms "obesity AND positive affect AND negative affect" while only four were found using the words "obesity AND satisfaction with life" and nine articles were found using "obesity AND well-being AND subjective well-being".

3.2 Synthesized findings

Regarding the SWB constructs related to obesity, their approach was carried out in its 3 aspects: positive and negative affects (n=8), satisfaction with life (n=6) and subjective well-being itself (n=9). The ranges age of the individuals included in the study samples can be divided into: studies involving only the elderly (n=1), studies involving the elderly and adults (n=3), studies involving adults only (n=13), studies involving young adults and adults (n=5) and all age groups (n=1). It was observed that, in addition to the SWB constructs, the following factors were also associated with obesity: eating disorders (n=3), mental disorders (n=3), social skills and support (n=5), personality or mood (n=1), limited self-control (n=1), quality of life (n=1), health risk factors (n=2), body dissatisfaction (n=2) and physical functioning (n=3).

In general, the studies that will be presented below indicate that the relationship between SWB and obesity is often mediated by factors, among them physical problems, such as limited functional capacity, poor health status and psychological problems, such as body dissatisfaction, a higher level of discrimination, lack of support and social skills and limited self-control. Some studies suggested that it is not obesity itself that causes lower SWB, but rather the limited functional capacity and unfavorable effects it causes, as the negative relationship between SWB and obesity completely disappeared after controlling for the health and physical capacity of the individuals studied. Therefore, considering that these psychological factors lead to physical diseases and the opposite also happens, it is necessary to reflect on the importance of the global vision that a multifactorial disease such as obesity requires.

3.3 Measuring Subjective Well-being

The database search showed different ways of assessing SWB and its relationship to obesity. Most of these involved only one of the SWB constructs, which was assessed in patients using specific scales. However, a few studies (n=3) evaluated SWB without its satisfaction with life and affect constructs (Table 1).

The scale most commonly used to assess affects (n=9) was the Positive and Negative Affect Scale (PANAS; Watson et al., 1988) [26]. The positive affect (PA) subscale consists of 10 positive mood terms (e.g., excited, enthusiastic) whereas the negative affect (NA) subscale consists of 10 negative mood terms (e.g., distressed, upset). Participants indicate how often they have felt these moods in the last 2 weeks on a 5-point Likert-type response scale. Each affect score is the sum of the ten items and ranges from 10 to 50, with higher scores reflecting more frequent experiences of positive or negative emotions. The PANAS has high validity, internal consistency and test-retest reliability [26]. In a study by Jansen et al. [27], the PANAS was used to assess affects (classifying them into high and low negative affect profiles) and it had high internal consistency (PA: $\alpha=0.88$, NA: $\alpha=0.88$, as expected. Other more recent articles indicate that the PANAS scale is an effective tool for evaluating positive and/or negative affects, as well as affective balance (Pasco et al., 2013 [28], Magallares et al., 2014 & 2015 [10,29]).

Bradaric et al. [30] have used the Scale of Positive and Negative Experience, which assesses experiences the subject has had during the previous four weeks. It consists of 12 items: six to assess positive feelings and six to assess negative feelings on the scale of 1 (very rarely or never) to 5 (very often or always). The study used the subscale only to evaluate positive feelings and it demonstrated excellent reliability ($\alpha=.92$) [11]. In contrast, Carr et al. [20] used the Affect Balance Scale, which is a specific scale developed for use in the National Survey of Midlife Development in the United States (MIDUS) (Bradburn, 1969) [31]. The scale consists of questions about negative and positive affects, each of which has six response options, with higher scores reflecting more frequent positive or negative affects. The scales were standardized for ease of interpretation and comparability of coefficients; standardized scores had a mean of 0 and standard deviation of 1.

Regarding the "satisfaction with life" construct, the most commonly used scale (n=10) was the Satisfaction With Life Scale (SWLS, Diener, et al., 1985) [32], which is a self-report scale developed to assess an individual's satisfaction with his/her life as a whole. It consists of 5 items to be rated on a 7-point Likert scale (e.g., "My life is close to ideal in most ways"). Dierk et al. [9], Jackson et al. 2014 & 2015 [33,18], Magallares et al. 2014 & 2015 [10,29]

and Robertson et al. [32] used the SWLS to assess satisfaction with life as the cognitive component of SWB. In contrast, Velten et al. intended to assess only satisfaction with life, as did Dominy et al. [34]. The SWLS scale showed high reliability in the Brdaric study ($\alpha = .88$) [30].

On the other hand, other measures were also used. For example, in a study by Li et al. [35], a Life Satisfaction Questionnaire was developed to assess respondents' level of satisfaction with life using the question, "In general, how satisfied are you with your life?" The response options were: very satisfied, satisfied, dissatisfied, and very dissatisfied. In the analysis, respondents were classified only as being either satisfied or dissatisfied with life [35]. On the other hand, Katsaiti et al. [36] used a self-reported life satisfaction scale to address both happiness and satisfaction with life as well as levels of well-being due to the fact that life satisfaction levels are reported but there is no clear existing alternative variable that could be used as a proxy for happiness.

More diverse methods have been used to assess subjective well-being, such as the General Well-Being Schedule (Fazzio, 1977) [37]. Carr et al. [20], Linna et al. [38] chose to assess subjective well-being using the General Health Questionnaire (GHQ-20), which is designed to screen for psychological distress and uses a 20-item scale with a total score that ranges from 20 to 80, with higher scores indicating an elevated level of psychological distress. The Health 2000 Survey contains only one SWB measure, which Böckerman et al. [16] used to assess SWB. It uses the following question: "All things considered, how satisfied have you been with your life as a whole during the past 30 days?" to measure SWB on a scale from 0 to 10, in which 0 is anchored as the poorest possible quality of life and 10 as the best. On the other hand, in the study by Carr et al. [20], subjective well-being was assessed using eight questions from the Bern Questionnaire of Subjective Well-Being [39], whose main analysis uses a composite score based on the eight items. In addition, responses to the statement "I enjoy my life" were evaluated separately.

3.4 Progress of research on SWB in obesity over the years

The studies included were published from 2002, with a certain frequency gap, to 2011 (n=11), when publications about the subject became more common. In fact, after "Positive Health" was published by Seligman in 2008 [40], a great increase in interest was observed as well as in the number of publications in the field. The rest of the articles were published after 2011 (n=12), becoming increasingly common to the present date.

The database search found different ways of discussing SWB and its relationship to obesity. Most of the articles deal with only one SWB construct, for example, associating obesity with positive affects, and only few studies (n=9) address SWB itself in relation to obese individuals. As we know, the constructs (negative and positive affects, satisfaction with life) are considered distinct parts to evaluate a single domain: subjective well-being. It is seen that the authors of the field surveys measure them in different ways, for example, use only one of the constructs as a synonym of the SWB, or, in other cases, neglect the existence of this tripartite structure. This fact should be praised, so that future research in the area will examine the structure of the SWB.

For this reason, three different tables are presented so that the reader understands that there may be different results and different tools used, depending on the author's choice to measure subjective well-being (Tables 2.1, 2.2 and 2.3).

3.5 Assessment of methodological quality

Due to its design, the STROBE Checklist's guidelines were used to verify the quality of the studies included in the present review. This tool is configured as a checklist to assess the quality of the reports of cohort, case-control and cross-sectional studies (Elm et al, 2007) [25]. In regard to the studies' titles and abstracts, it can be considered that all of the included studies adequately explain their designs and provide clear and concise abstracts. In addition, all of the studies presented adequate theoretical references that clearly referred to their objectives. All of the included studies presented their participant selection criteria and methods. Only two studies (with a longitudinal design) highlighted follow-up participants (Velten J., 2014 [17]; Jackson S., 2015 [18]).

According to the analysis performed by the two evaluators, all of the studies adequately highlighted their outcomes, possible limitations and diagnostic criteria used as their basis. Potential sources of bias were described and qualitative and quantitative data analyses were performed, including detailed statistical methods. All of the studies included the number of participants and their characteristics, enabling the survey to be compared. All of the studies presented clear outcomes in terms of the study's results and the initial objectives outlined by each author, and all were cautious in their findings and generalizations.

4. Discussion

According to Seligman, good health is a potential predictor of longevity, health costs, mental health in aging and prognosis when illness occurs. SWB has been strongly associated

with physical health and research has revealed that this relationship interferes with the immune system and cardiovascular health, as well as health behaviors (Diener et al., 2017) [43]. Although the association between SWB and inflammatory markers is interesting with respect to obesity, few studies have specifically related them. Therefore, this relationship is still unclear, nor is it clear whether it is due to associated comorbidities (e.g., social skills, health, physical capacity), biological factors (e.g., neuroendocrine, immune, cardiovascular) or to an increased Body Mass Index (BMI).

4.1 Obesity and Affects

Positive and negative affects represent the emotional dimension of the definition of subjective well-being and affect itself can be understood as the frequency and intensity at which individuals experience positive and negative emotions. It is known that, despite being opposites, positive and negative affects are interdependent measures. For example, an individual may have a high positive affect but not necessarily a low negative affect. Due to this fact, studies that choose to use an individual's affective balance (between positive and negative) to assess his/her SWB can present serious methodological problems. The following are the results of studies that used only positive or negative affects to evaluate SWB.

Vilhena et al. (2014) [11] evaluated the mediating role of stigma in the relationship between positive and negative affects (separately) and subjective well-being and quality of life in a population of obese individuals aged 17 and older. The results indicated that negative affects were a negative predictor of physical and mental health in obesity. On the other hand, it was observed that individuals with higher positive affects had better physical and mental health compared to individuals with lower positive affects. Therefore, both positive affects and negative affects had an influence on the physical health of the obese individuals evaluated.

However, a study by Jorm et al. (2003) [19] conducted with 6919 adult and elderly individuals on the relationship between obesity and SWB (evaluated through affects) found that obesity only had a slight association with lower SWB scores in women and no association in men. The authors explain that these results may be due to the dynamic-equilibrium model of well-being and psychological distress (in which a person's SWB and psychological distress levels tend to be stable over time and are influenced by personality traits). Jansen et al. (2008) [41], using the same age group, tested whether there was a subtyping between individuals from categories with high negative affects and low negative affects to relate them to the BMI. The result was that there was no difference between the two

categories in terms of weight and that the only relationship observed was body-related concern, which was the only predictor of negative affect in the individuals with obesity. In addition to negative affect, it is not actually body weight, binge eating, or dieting that distinguishes the two groups, but rather body-related worries and concerns.

A study by Carr et al. (2007) [20] also showed a surprising result in a significant sample ($n = 3353$) of individuals from all BMI classes (underweight, normal weight, obesity classes 1, 2 and 3), in which the individuals in obesity classes 1 and 2 had more frequent positive affect scores and lower negative affect scores. The study concluded that, after controlling for potential pathway variables, individuals with obesity have better psychological health than thinner people. On the other hand, Pasco et al. (2013) [28] observed a smaller sample ($n = 272$) of people in all BMI classifications in the same age group and found no correlation when associating positive affects with BMI. However, negative affects were higher in obese women and physical illness explained this association, as was found in the study by Jorm et al. Even so, the authors consider obesity to be a risk factor for physical illness, although the direction of the relationship between obesity and physical illness in this group of women is unclear.

Wegener et al. (2008) [14], made a general reflection on affective processes and said that these were reduced in the obese adult subjects in their study, whose sample consisted of individuals who participated in a weight loss program. The obese individuals who did not react to stimuli tended to react to weight gain without negative affects, while the opposite occurred without positive affects, making them more likely to remain obese. However, as Diener explains, it is known that evaluating affects as a set and not as interdependent structures can cause considerable loss of information available in the variables.

From another perspective, in a study titled “Are the Fat more Jolly?”, which had a significant sample ($n = 1739$), Roberts et al. (2002) [12] clarified that no protective effect against obesity had been observed for any of the eight mental health outcomes analyzed (happiness, mental health perception, life satisfaction, positive affect, negative affect, optimism, etc.). Therefore, the answer to the question in the study title’s would be “no”.

In regard to this topic, the articles generally conclude that there is a negative association between obesity and positive/negative affects. This relationship occurs mostly in women and in negative affects. When the association between affects and obesity was positive, the authors attributed it to controlling for moderating effects such as physical health.

4.2 Obesity and Satisfaction with Life (SWL)

Satisfaction with life is the cognitive component of the definition of SWB and can be understood as the level of enthusiasm and pleasure present in a person's life according to his/her perception of what is satisfactory or not (level of discontent and suffering). It is known that satisfaction with life can be explained in large part by personality traits, especially factors such as neuroticism and extraversion. In addition, genetics, ease of recalling positive or negative events, hope and optimism also have a great influence on levels of satisfaction with life.

The studies presented in this review that assessed well-being through satisfaction with life, or that evaluated only satisfaction or satisfaction with life, presented different conclusions. A study by Saloumi & Plourde (2010) [15] examined various psychological variables and their relationships with body weight, including life satisfaction, in 25,246 individuals aged 15-29. The results showed that obesity is associated with lower SWL levels in women, but not in men.

On the other hand, another study by Li et al. (2009) [35] that used an even larger sample ($n = 341140$) estimated the prevalence of life dissatisfaction and its association with chronic diseases and some risk factors in people aged 18 and over and found that obesity and other chronic diseases are associated with greater dissatisfaction with life. Velten J. (2014) [17] studied a representative sample ($n = 7937$) and also reported lower SWL levels in obese and overweight individuals compared with individuals of normal weight and found that healthy behaviors are predictors of SWL.

Dominy et al. (2010) [34], in turn, conducted a study solely with obese and overweight women. They compared two groups: women who had binge eating disorder (BED) and those who did not. They then related this condition with satisfaction with life. The results showed that obese women with BED presented lower SWL than non-obese women without BED. In addition, the fact that the BED group's scores were lower (albeit not significantly) than those of the obese group without BED indicates that the decrease in satisfaction was not simply a result of obesity.

The group of studies that evaluated subjective well-being through SWL includes two studies published by Jackson et al. in 2014 [18] and 2015 [33]. The first was a cohort study of the psychological changes that weight loss can cause in obese and overweight adults ($n = 1979$). It compared individuals who had lost weight with those who had maintained or gained weight and found that those who had lost weight had lower SWL scores. The second study had a significantly larger sample ($n = 5056$) and longitudinally observed whether the adverse

effects of obesity on well-being could be explained by weight discrimination. It found that obese individuals presented lower SWL levels and that weight discrimination explains part of this association.

In general, the studies included in this section showed a negative association between obesity and life satisfaction, which were exalted in women and related to factors such as discrimination, eating disorders and a lack of healthy habits. Although they were in the minority, positive associations appeared to be associated with weight loss.

4.3 Obesity and Subjective Well-Being

It is known that each of the three SWB components (SWL, positive affects and negative affects) are empirically differentiated, since they often carry three distinct factors in factorial analyses (Diener et al., 1999) [44], which is one of the main explanations for the inadequate use of SWB as a unique construct in research in this field. Researchers should at least try to measure and report the three SWB components separately in order to understand their distinct implications so that the relationships between each component and the latent SWB variable and other variables are described.

Few studies ($n = 6$) in this review evaluated SWB with two or more of its constructs, considering the importance that this choice confers on the quality of the evidence. Virtually all of these studies used the same versions of the Positive and Negative Affect Scale (PANAS) and the Satisfaction with Life Scale (SWLS). One example of this is a study by Dierk et al. (2006) [9], which associated BMI with SWB and social skills and support and showed that BMI is not the main determinant of low SWB in obesity, but rather a lack of social skills and support. A similar finding occurred in a study by Böckerman et al. (2014) [16] (who also used the three SWB constructs), in which limited functional capacity and poor health status were shown to further explain the negative relationship between SWB and obesity.

Regarding the studies that used the three constructs to measure SWB, a study by Brdaric et al. (2015) [30] found that body dissatisfaction significantly moderated the negative relationship between SWB and obesity. Robertson et al. (2015) [42] found correlations between BMI and SWB and observed that a higher BMI was associated with lower positive affects, and that low SWB may contribute to BMI conservation or irregularization. In addition, Magallares et al. (2014 & 2016 [10, 29]) conducted follow-up studies that discussed the relationship between discrimination that obese individuals suffer and their SWB. The results showed that discrimination acts as a mediating variable between physical health and

SWB in obesity and that a higher level of discrimination contributes to worse physical and psychological health.

On the other hand, some studies assessed SWB with specific scales that only use the term SWB. Katsaiti M. (2011) [36] conducted a study in three countries (Germany, the U.K. and Australia) with a large sample of more than 60,000 individuals. It was found that obesity had a negative effect on SWB in all three countries and that BMI had a significantly negative relationship with life satisfaction in Germany and Australia. A study by Stutzer et al. (2007) [13] had a different focus and addressed the impact that limited self-control has on obese patients. It was found that its presence causes a decrease in SWB. On the other hand, obese individuals who have full control over what they eat did not appear to have reduced SWB.

Finally, Linna et al. (2013) [38] also decided to evaluate SWB as a single construct using the General Health Questionnaire (GHQ-20) to measure it in individuals. The study was conducted with twin siblings ($n = 5240$) and investigated whether the relationship between BMI and SWB could be described by a non-linear (U-shaped) trend. It was found that this trend is applicable only to young men. Low weight and obesity were both associated with lower SWB in young men.

With respect to the latter topic, most of the studies showed a negative relationship between obesity and SWB. However, this relationship is associated with factors such as body dissatisfaction, lack of support and social skills, limited functional capacity and limited self-control.

4.4 Mediating Factors

As previously discussed, many studies have elucidated the negative relationship between SWB and obesity through mediating factors, and linear regression models have been corrected to evaluate their possible mediating effects in this relationship. These results contribute to a better understanding of obesity complexity and its association with mental health.

For example, a study by Böckerman et al (2014) [16] found that it is not obesity itself that causes lower SWB, but rather the limited functional capacity and unfavorable effects it causes, as the negative relationship between SWB and obesity completely disappeared after controlling for the health and physical capacity of the individuals studied. In addition, Dierk et al., (2006) [9] also showed that BMI is not the main determinant of low SWB in individuals with obesity. In a sample of 226 individuals with obesity SWB was found to be more related to social support and social skills than to BMI after controlling for the health components.

Jorm A. et al. (2003) [19] showed that bad physical health plays a mediating role in the relationship between weight and mental health since, after controlling for some factors, women with higher weight tended to have better mental health than those with lower weight [22]. Moreover, another study (n = 3353) showed practically the same result: that obesity in combination with physical and social stressors can adversely affect an individual's mood. After controlling for a range of factors, individuals with obesity were actually found to have better psychological health than people of lower weight [6].

Other mediating factors have been reported to be related (usually negatively) to SWB and obesity, including Binge Eating Disorder [34]; weight discrimination [10, 18]; physical functioning and distressed interpersonal interactions [20]; [16]; internalization condition [23]; limited self-control [13]; and body dissatisfaction [30].

Furthermore, it is important to highlight the influence of personality on the divergent results found. Since personality is more associated with SWB than with life circumstances, like obesity, or other chronic disease, in many instances. This can be explained by the fact that individual temperament and characteristics can influence one's feelings and assessment of his/her life, and also that an individual's emotions are an inherent part of his/her personality [11].

Finally, studying SWB in different age groups, standardizing assessment terms and reflecting on the influence of mediating factors on SWB and obesity will bring more clarity when considering the influence of this important factor to preventing and treating obesity and its comorbidities.

4.5 Limitations

This study has some limitations. For example, it was not limited to randomized clinical trials, though this is due to the lack of literature available in the area. Furthermore, this evaluation was important to provide an overview of this recent field of investigation.

4.6. Conclusion

To conclude this review, it can be observed that SWB is an important attribute of Positive Psychology and plays an important role in chronic diseases. From the results found, it is clear that, since SWB is a tripartite concept, it should be evaluated through its constructs (life satisfaction, positive affects and negative affects) and that clear and robust results were found in studies that evaluated it in this manner.

Finally, it is important to note that, although many studies have demonstrated that it is not BMI itself that results in lower SWB but rather factors related to obesity such as body dissatisfaction, physical functioning, discrimination, social support and others, SWB interventions in the treatment of obesity should be studied further. Thus, it will be possible to examine whether the consequences of obesity can be minimized. Since obesity is a public health problem in many countries, investigating interventions through multidisciplinary methodologies can be a means of reducing costs, mediating the longevity of obese patients and improving their prognoses.

Therefore, further research evaluating SWB interventions and treatment protocols (based on its three constructs) for obese individuals may represent a major step towards achieving the outcomes cited above and thus the true meaning of positive psychology can be fulfilled. That is, human flourishing can be possible for people who suffer from obesity.

Non-standard abbreviations

Binge Eating Disorder (BED)
 Negative Affects (NA)
 Positive Affects (PA)
 Positive Psychology (PP)
 Satisfaction with Life (SWL)
 Subjective Well-being (SWB)

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Conflict of interest

All of the authors declare that they have no conflicts of interest.

5. References

1. G. Eknoya. A History of Obesity, or How What Was Good Became Ugly and Then Bad. *Adv. Chronic Kidney Dis.* 13 (2006) 421-427.

2. World Health Organization. Obesity: Preventing and managing the global epidemic: report of a WHO consultation. WHO Technical Report Series 894. Geneva, 2000.
3. A. Marti, M.J. Moreno-Aliaga, J. Hebebrand, J.A. Martínez. Genes, lifestyles and obesity. *International Journal of Obesity* 28 (2004) 29-36.
4. S. Strangers, P.C., Samaraweera, F. Taggart, N.B. Kandala, S. Stewart-Brown. Major health-related behaviours and mental well-being in the general population: the health survey for England. *BMJ Open* 4 (2014) 1-9.
5. A. Ghosh, A. Deb. Positive psychology interventions for chronic physical illnesses: a systematic review. *Psychological Studies*. 62 (2017) 1-20.
6. E. Diener, S. Oishi, R. E. Lucas. Personality, culture and subjective well-being. *Emotional and Cognitive Evaluations of Life*. 54 (2013) 403-425.
7. R.M. Ryan, E.L. Deci. On happiness and human potentials: a review of research on hedonic and eudaimonic well-being. *Annual review of psychology*, 52 (2001) 141-166.
8. Steptoe A , O'Donnell K , Badrick E , *et al.* Neuroendocrine and inflammatory factors associated with positive affect in healthy men and women: the Whitehall II study. *Am J Epidemiol* 2008;167:96–102
9. J. Dierk, M. Conradt, E. Rauh, P. Schlumberger, J. Hebebrand, W. Rief. What determines well-being in obesity? Associations with BMI, social skills, and social support. *Journal Of Psychosomatic Research* 60 (2006) 219-227.
10. A. Magallares, P.A.B. De Valle, J.A. Irles, I. Jauregui-Lobera. Overt and subtle discrimination, subjective well-being and physical health-related quality of life in an obese sample. *Span J Psychol*. 17 (2014).
11. E. Vilhena, J.L. Pais-Ribeiro, I. Silva, H. Cardoso, D. Mendonça. Predictors of quality of life in Portuguese obese patients: A structural equation modeling application. *Journal of Obesity* (2014) 1-10.
12. R.E. Roberts, W.J. Strawbridge, S. Deleger, G.A. Kaplan. Are the fat more jolly? *Ann Behav Med*. 24 (2002) 169-80.
13. A. Stutzer, A.N. Meier. Limited self-control, obesity and the loss of happiness. *Health Econ*. 25 (2016) 1409-1424.
14. I. Wegener, A. Wawrzyniak, K. Imbierowicz, R. Conrad, J. Musch, F. Geiser, F. Wermter, R. Liedtke. Evidence for attenuated affective processing in obesity. *Psychological Reports*, 103 (2008) 35-47.

15. C. Saloumi, H. Plourde. Differences in psychological correlates of excess weight between adolescents and young adults in Canada. *Psychol Health Med* 15 (2010) 314–325.
16. P. Böckerman, E. Johansson, S.E. Saarni, S.I. Saarni. The negative association of obesity with subjective well-being: is it all about health?. *Journal of Happiness Studies* 15 (2014) 857-867.
17. J. Velten, K.L. Lavalley, S. Scholten, A.H. Meyer, X.C. Zhang, S. Schneider, j. Margraf. Lifestyle choices and mental health: a representative population survey. *BMC psychology* 2 (2014) 1-11.
18. S.E. Jackson, A. Steptoe, R.J. Beeken, H. Croker, J. Wardle. Perceived weight discrimination in England: a population- based study of adults aged ≥ 50 years. *Int J Obes* 39 (2015) 858–864.
19. A.F. Jorm, A.E. Korten, H. Christensen, P.A. Jacomb, B. Rodgers, R.A. Parslow. Association of obesity with anxiety, depression and emotional well-being: a community survey. *Australian and New Zealand Journal of Public Health*, 27 (2003) 434-40.
20. D. Carr, M.A. Friedman, K. Jaffe. Understanding the relationship between obesity and positive and negative affect: the role of psychosocial mechanisms. *Body Image* 4 (2007) 165-77.
21. M.S. Faith, J. Flint, C.G. Fairburn, G.M. Goodwin, D.B. Allison. Gender differences in the relationship between personality dimensions and relative body weight. *Obes Res.* 9 (2001) 647–650.
22. J. Istvan, K. Zavela, G. Weidner. Body weight and psychological distress in NHANES I. *International journal of obesity and related metabolic disorders: journal of the International Association for the Study of Obesity*, 16 (1992) 999-1003.
23. R.L. Pearl, R.M. Puhl. The distinct effects of internalizing weight bias: an experimental study. *Body Image* 17 (2016) 38-42.
24. S.B. Heymsfield, J.B. Harp, M.L. Reitman, J.W. Beetsch, D.A. Schoeller, N. Erondur, A. Pietrobelli. Why do obese patients not lose more weight when treated with low-calorie diets? A mechanistic perspective. *Am J Clin Nutr.* 85 (2007) 346-354.
25. E. von Elm, D.G. Altman, M. Egger, S.J. Pocock, P.C. Gøtzsche, J.P. Vandenbroucke. Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *Journal of Clinical Epidemiology* 335 (2008) 344-349.

26. D. Watson, L.A. Clark, A. Tellegen. Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, 54 (1988) 1063-1070.
27. A. Jasen, R. Havermans, C. Nederkoorn, A. Roefs. Jolly fat or sad fat? Subtyping non-eating disordered overweight and obesity along an affect dimension. *Appetite* 51 (2008) 635-640.
28. J.A. Pasco, L.J. Williams, F.N. Jacka, S.L. Brennan, M. Berk. Obesity and the relationship with positive and negative affect. *The Australian and New Zealand journal of psychiatry* 47 (2013) 477–482.
29. A. Magallares, B. Luna, M. Garriga, J.I. Botella-Carretero, J.F. Morales. Subtle discrimination and subjective well-being in obese patients: The personal/group discrimination discrepancy. *Stigma & Health*, 1 (2015) 156–165.
30. D. Brdarić, V. Jovanović, V. Gavrilov-Jerković. The relationship between body mass index and subjective well-being-the moderating role of body dissatisfaction. *Med Pregl.* 68 (2015) 316-323.
31. N.M. Bradburn. *The Structure of Psychological Well-Being*. Aldine Publishing Company, Chicago, 1969.
32. E.D. Diener, R.A. Emmons, R.J. Larsen, S. Griffin. The satisfaction with life scale. *Journal of Personality Assessment* 49 (1985) 71-75.
33. S.E. Jackson, A. Steptoe, R.J. Beeken, M. Kivimaki, J. Wardle. Psychological changes following weight loss in overweight and obese adults; a prospective cohort study. *PLoS One* 9 (2014) 1-8.
34. N.L. Dominy, W.B. Johnson, C. Koch. Perception of parental acceptance in women with binge eating disorder. *J Psychol.* 134 (2000) 23–36.
35. C. Li, E.S. Ford, G. Zhao, A.H. Mokdad. Associations of health risk factors and chronic illnesses with life dissatisfaction among U.S. adults: the behavioral risk factor surveillance system. *Prev Med.* 49 (2006 2009) 253–259.
36. M.S. Katsaiti. Obesity and happiness. *Applied Economics*, 44 (2012) 4101–4114.
37. A.F. Fazzio. A concurrent validation study of the NCHS general well-being schedule. Wisconsin, Estados Unidos, 1977.
38. M.S. Linna, J. Kaprio, A. Raevuori, E. Sihvola, A. Keski-Rahkonen, A. Pissanen. Body mass index and subjective well-being in young adults: a twin population study. *BMC Public Health*, 13 (2013) 1-9.
39. A. Grob, R. Lüthi, F.G. Kaiser, A. Flammer. *The Bern Subjective Well-Being*

- Questionnaire for Adolescents (BFW). *Diagnostica*, 37 (1991) 66-75.
40. M.E.P. Seligman. Positive Health. *International Association os Applied Psychology* 57 (2008) 3-18.
 41. A. Jansen, A. Vanreyten, T. van Balveren, A. Roefs, C. Nederkoorn, R. Havermans. Negative affect and cue-induced overeating in non-eating disordered obesity. *Appetite*, 51 (2008) 556-562.
 42. S. Robertson, M. Davies, H. Winefield. Why weight for happiness? Correlates of BMI and SWB in Australia. *Obesity Research & Clinical Practice* 9 (2015) 609-612.

Table 1. Evaluation of SWB

Aspect Assessed	Scale	Study
Positive and Negative Affects	Positive and Negative Affect Scale (PANAS)	Jorm et al., 2003 Dierk et al., 2006 Jansen et al., 2008 Pasco et al., 2013 Magallares et al., 2014 Magallares et al., 2015 Vilhena et al., 2014 Robertson et al., 2015 Pearl & Puhl, 2016
	Affect Balance Scale	Carr et al., 2007
	Scale of Positive and Negative Experience (SPANE)	Bradaric et al., 2015
Satisfaction with Life	Satisfaction With Life Scale (SWLS)	Dierk et al., 2006 Dominy et al., 2010 Velten et al., 2014 Magallares et al., 2014 Magallares et al., 2015 Jackson et al., 2014 Jackson et al., 2015 Bradaric et al., 2015 Robertson et al., 2015
	Self-reported life satisfaction index	Katsaiti et al., 2011
	Life Satisfaction Questionnaire	Li et al., 2009
Subjective Well-being	General Well-Being Schedule	Carr et al., 2007
	Bern Questionnaire of Subjective Well-Being	Stutzer et al., 2007
	General Health Questionnaire (GHQ-20)	Linna et al., 2013
	Health 2000 Survey	Bockerman et al., 2014

Table 2.1 Subjective well-being (SWB) itself.

Author and year	Sample	BMI measurement	n	Country	Study Design	Objective	Scales to measure SWB	Main Findings
Dierk, JM, et al. (2006) [9]	19-74 years old. Obese adults from general German population	Self-reported weight and height	226	Germany	Cross-sectional	To elucidate the associations between BMI, social skills, social support and SWB in obesity.	Positive and Negative affect Scale (PANAS); Satisfaction With Life Scale (SWLS)	BMI is not the main determinant of low SWB in obesity, instead of this, it is associated principally with social skills and social support.
Stutzer A. et al. (2007) [13]	>15 years old. People with all BMI categories from the Swiss Health Survey 2002	Self-reported weight and height	19,471	Switzerland	Multicentric	To study the impact of limited self-control (LSC) on obesity and happiness (using SWB as definition)	Bern Questionnaire of Subjective Well-Being;	It has been found that obesity decreases the SWB of individuals reporting LCL, but people who are in control of their diet seem to have no decrease in their SWB.
Katsaiti M., (2011) [36]	15-100 years old. Individuals data were from German Socio-economic Panel (GSOP), British Household Panel Survey (BHPS) and Household, Income	Self-reported weight and height	GSOP n=11000 ; HILDA n=17000; BHPS about n=22000	Germany, UK and Australia	Multicentric	Examine whether there is a statistical evidence on the impact of BMI on SWB	Self-reported life satisfaction index;	In all of three countries obesity has a negative effect on the SWB. For Germany and Australia, BMI has additionally, negative and significant relationship with satisfaction with life.

	and Labour Dynamic s in Australia (HILDA) Survey							
Bocker man et al., (2013) [16]	30-54 years old Individuals representative of Finnish population with all classifications of BMI.	Weight and height measured	2245	Finland	Stratified two-stage cluster sampling	Examine whether health status and functional capacity explains the lower levels of SWB in obese individuals	Positive and Negative Affect Scale (PANAS); Satisfaction With Life Scale (SWLS);	Limited functional capacity and poor health status the main explanations for the negative relationship between obesity and SWB.
Linna M. et al., (2013) [38]	22-28 years old. Individuals data from FinnTwin16 (cohort study of health behaviors in twins and their families).	Self-reported weight and height	5240	Finland	Cohort	Investigate whether a nonlinear (U-shaped) trend would better describe the relationship between BMI and SWB in obese individuals.	General Health Questionnaire (GHQ-20)	Evidence was found for the negative U-shaped relationship between BMI and SWB in men. Both low weight and obesity are associated with low SWB in young men.
Magallares A. et al. (2014) [10]	Mean age: 44 years old Obese outpatients from the a Spanish hospital, with $BMI \geq 30 \text{ kg/m}^2$	Weight and height measured	111	Spain	Cross-sectional	Investigate how subtle and overt discriminations are related to SWB (disturbing the affects balance and satisfaction with life) and physical health	Positive and Negative affects Scale (PANAS), Satisfaction with Life Scale (SWLS)	Obese individuals who suffered social discrimination showed less variation in affects and satisfaction with life. In addition, overt discrimination appears

						related to quality of life and SWB.		as a mediating variable in the relation between physical health and and SWB.
BRDAR IĆ, D. et al. (2015) [30]	Mean age: 28.93 years old From the Province of Vojvodina who belong to various online social groups	Self-reported weight and height	731 (11,2% of men and 4% of women were obese)	Serbia	Cross-sectional	Investigate the moderating effect of body dissatisfaction on the relationship between BMI and SWB.	Satisfaction with Life Scale (SWLS); Scale of Positive and Negative Experience (SPANE);	Body dissatisfaction in both genders presents a significant moderator of the relationship between BMI and indicators of SWB.
Robertson S. et al. (2015) [42]	18-65 years old. Individuals who participated of an online survey method on Facebook.	Self-reported weight and height	260 (31,5% obese, 36% overweight and 32% normal BMI)	Australia	Cross-sectional	Find out the correlation of BMI with the SWB in obese and overweight people.	Satisfaction with Life Scale (SWLS), Positive and Negative affect Scale (PANAS);	The higher the BMI (obese class 2 and 3), the lower the PA. Results provide preliminary support for the hypothesis that lack of SWB may contribute to maintaining or making BMI irregular.
Magallares A., et al., (2015) [29]	18-65 years old. Obese outpatients of a Spanish University Hospital seeking to lose	Weight and height measured	72	Spain	Cross-sectional	Describe how the Personal/Group Discrimination Discrepancy may be related to obese individuals' SWB	Positive And Negative affects Scale (PANAS); Satisfaction With Life Scale (SWLS);	A higher level of discrimination contributes to a worse psychological and physical health in obese participant'

	weight.					(affects balance and satisfaction with life).		s. BMI does not correlate with measures because no control group was recruited to compare.
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Table 2.2 Positive Affects (PA) and Negative Affects (NA)

Author and year	Sample	BMI measurement	n	Country	Study Design	Objective	Scales to measure SWB	Main Findings
Roberts R. et al. (2002) [12]	≥50 years old. Sample of adult population obtained from a longitudinal study (Alameda County Study).	Weight and height measured	1739	United States	Cross-sectional	To find out if obesity affects mental health (by eight indicators, among them: satisfaction with life, PA and NA).	Questionnaire elaborated by authors.	For none of the eight mental health outcomes analyzed (happiness, mental health perception, life satisfaction, positive affect, negative affect, optimism, etc.) a protective effect for obesity was observed
Jorm A. et al. (2003) [19]	20-64 years old. From a large community survey concerned with the health and well-being, the PATH Through Life Project.	Self-reported weight and height	6919	Australia	Cross-sectional	To investigate the association of obesity with anxiety, depression and well-being (PA and NA).	Positive and Negative affect Scales (PANAS)	Obesity has an association with lower SWB in women but not in men. When some factors were controlled, obese women tend to have a better mental health than the normal weight group.
Carr D. et al. (2007) [20]	25-74 years old American adults with BMI classified in: normal, overweight	Self-reported weight and height	3353	United States	Cross-sectional	To examine the relationship between BMI and PA and NA, and to assess whether it is mediated by physical	Affect Balance Scale; General Well-Being Schedule	When a range of factors were controlled, obese people obtained a better psychological health than thinner people. Obese I persons reported more frequent PA and less NA, as well

	ht, obesity type 1,2 and 3. Data comes from the National Survey of Midlife Development in the U.S.					health, as well as the role of weight on physical functioning and distressing interpersonal interactions.		as obese II persons.
Janse n A. et al. (2008) [41]	21-60 years old. Overweight and obese women without eating disorders and with a BMI between 26 and 51 kg/m ²	Self-reported weight and height	195	The Netherlands	Cross-sectional	Test if non-eating disordered overweight and obese people can be subtyped into high and low negative affect profiles (HNA and LNA) and its roles about body worrying .	Positive and Negative affect Scale (PANAS);	There were no differences in BMI between the two subtypes (HNA and LNA). But body-related worrying appeared related to the HNA group.
Wege ner, I. et al. (2008) [14]	Mean age: 48; Obese and normal weight participants in a weight-loss program.	Weight and height measured	55	Germany	Cross-sectional	Demonstrate the hypothesis that affective processes play a role in the development and maintenance of obesity. And they are attenuated in obese individuals.	Affective priming Paradigm (Fazio et al., 1986)	Affective process was reduced in obese participants. Individuals who don't show affective reactions to stimuli tend to react to weight gain without NA, and weight loss without PA, therefore become more susceptible to remain obese.
Pasco, J.A., et al. (2013) [28]	24-89 years old. Normal BMI, overweight and obese women enrolled in Geelong Osteoporosis Study.	Weight and height measured	273	Australia	Cross-sectional	Examine the cross-association between overweight and obesity and positive and negative affects.	Positive and Negative affect Scales (PANAS)	A higher score of NA was observed for obese women (increased BMI) and this association is attenuated by physical illness. No association was detected between BMI and PA scores.
Vilhena , E. et	≥17 years old	Self-reported	215	Portugal	Cross-sectionio	To examine the mediating role	Positive and	PA has a positive impact on all

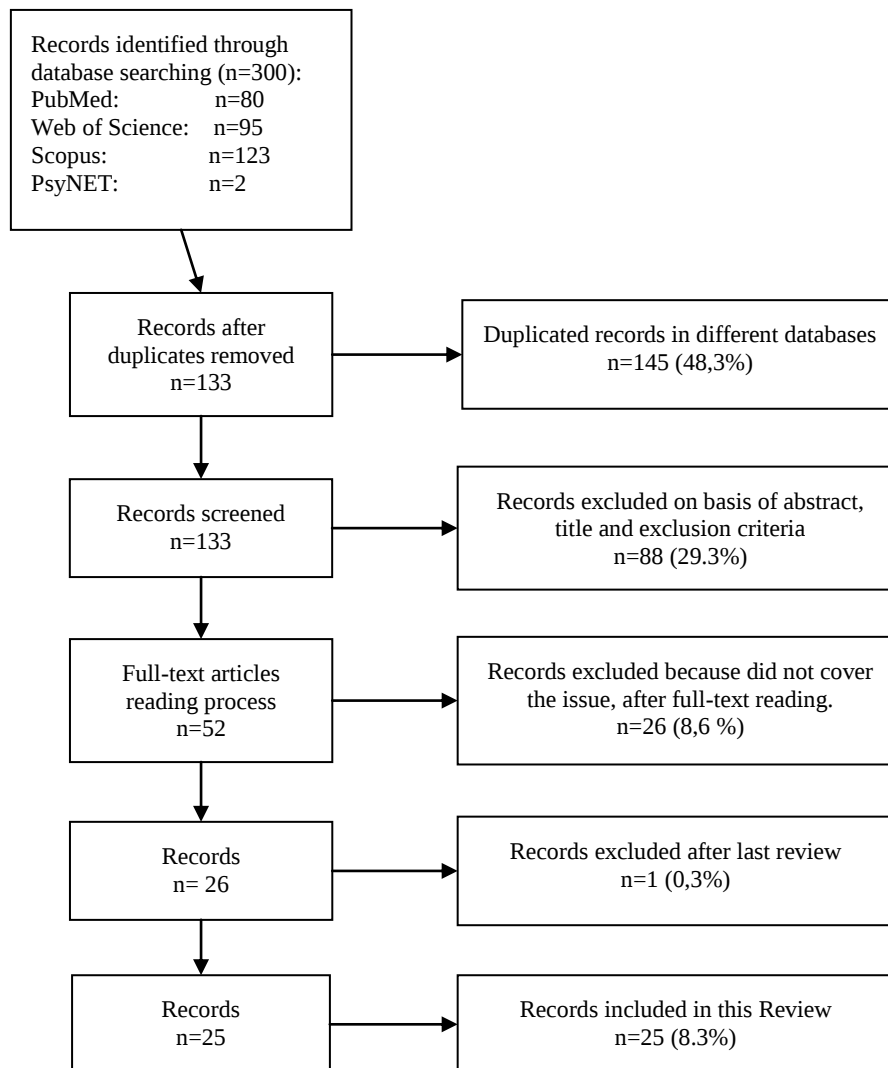
al. (2014) [11]	Obese patients selected from the main hospitals in Portugal.	weight and height			nal	of stigma in the relationship between PA/NA and quality of life (QoL).	Negative affect Scales (PANAS)	components of QoL. Obese with higher PA have a better SWB and a better physical and mental health. NA behaves like a negative predictor of physical and mental health.
Pearl R. & Puhl R. (2016) [23]	mean age: 34,64) Adults recruited for an online study, 69,6% of the sample has obesity.	Self-reported weight and height	260 (Internalization condition (n=129) and Experience condition (n=131))	United States	Cross-sectional	Differentiate the effects of weight predisposition on emotional responses and psychological well-being (PA and NA).	Positive and Negative affect Scales (PANAS)	The internalization condition led to greater NA, lower PA, and lower self-esteem than the experience condition. BMI
Smith et al. (2017)	women with a mean age of 58.46 years (SD = 4.87) and a mean weight of 95.58 kg (SD = 17.22)	Self-reported weight and height	36	Mexico	Preliminary Randomized Controlled Trial	Examine the efficacy of the mindful eating and living (MEAL) intervention developed to reduce obesity and its adverse effects on physical health in obese post-menopausal women.	Positive and Negative affect Scales (PANAS)	This study suggests that a mindfulness-based eating intervention may have various health benefits in post-menopausal women who are obese.
Pearson et al. (2018)	mean BMI was 40.3 kg/m ² (SD = 8.5) and the mean age was 43.0 years (SD = 11.9).	Self-reported weight and height	50	United States	Cross-sectional	Provide the first empirical examination of this state-based, self-control theory of binge eating in a sample of adults with obesity.	Positive and Negative affect Scales (PANAS)	higher momentary levels of negative affect and restraint (e.g., a depleted state) increase risk for binge eating only when there is a greater momentary expectancies that eating will make one feel better.

Table 2.3 Satisfaction with Life (SWL)

Author and year	Sample	BMI measurement	n	Country	Study Design	Objective	Scales to measure SWB	Main Findings
C. Saloumi and H. Plourde (2010) [15]	15-29 years old. From Canadian Community Health Survey (CCHS)	Self-reported weight and height	25.246	Canada	Cross-sectional	To examine some psychological variables, such as SWL, among young adults and the role of weight and age with these variables.	CCHS - questionnaire.	Obesity and excess of weight is associated with less SWL and with the way the body looks in women. But in men, SWL associated with age only.
Li C., et al., (2009) [35]	≥ 18 years old) Adults from the Behavior Risk Factor Surveillance System in 2006	Self-reported weight and height	341.140	United States	Multicentric	To estimate the prevalence of life dissatisfaction and to evaluate its associations with health risk factors and chronic diseases in adults.	Life satisfaction questionnaire;	Obesity, health risk factors or chronic illnesses were associated with life dissatisfaction independently of self-rated health and other established correlates.
Dominy, N. et al. (2010) [34]	≥18 years old. Women from a private medical clinic.	Self-reported weight and height	113 (83 obese, 30 nonobese)	United States	Cross-sectional	To compare obese/normal weight patients with and without BED (Binge Eating Disorder) and their SWL..	Satisfaction with Life Scale (SWLS)	The BED obese group showed lower SWL and higher levels of depression than the obese group without BED.
Velten J. (2014) [17]	18-99 years old. From representative community	Self-reported weight and height	7.937	Germany	Cross-sectional and longitudinal	To examine the combined associations of lifestyle behaviours with mental	Satisfaction with Life Scale (SWLS)	Lower levels of SWL were observed in underweight and obese individuals

	sample in Germany (BOOM-studies)					health and SWL within a representative sample.		compared to normal weight group. Healthy lifestyle behaviours are predictors of SWL.
Jackson, S. et al. (2014) [33]	≥50 years old. Overweight and obese adults participants in the English Longitudinal Study of Ageing (ELSA)	Weight and height measured	1979	United Kingdom	Cohort	To examine associations between changes in weight and changes in mood and SWL in obese and overweight adults free from depression and serious illness at baseline.	Satisfaction with Life Scale (SWLS)	The weight loss group had more low SWL than the groups who were weight stable or gained weight.
Jackson S., et al (2015) [18]	≥ 50 years old. Individuals data from the English Longitudinal Study of Ageing (ELSA)	Weight and height measured	5056	England	Longitudinal	Examine whether the adverse effect of obesity on psychological well-being can be explained by the weight difference.	Satisfaction with Life Scale (SWLS)	Obese individuals showed poorer well-being (and satisfaction with life). Weight discrimination explains a proportion of the association between obesity and psychological well-being.

Figure 1. Study selection flow chart



Anexo A - Termo de Consentimento Livre e Esclarecido**TERMO DE CONSENTIMENTO LIVRE E ESCLARECIDO**

Versão 1

Projeto: Atributos da psicologia positiva em pacientes com síndrome metabólica: relação com a qualidade da dieta e adesão a intervenção nutricional

A síndrome metabólica (SM) é um conjunto de fatores que levam à doença do coração e ao diabetes. Esses fatores incluem dislipidemia, aumento da pressão arterial, níveis de triglicérides elevados, obesidade, entre outros. Nesse contexto, estudos vêm demonstrando que além da dieta ser uma das causas, fatores psicológicos também apresentam um importante papel no desenvolvimento e evolução dessas doenças, podendo contribuir para um maior engajamento ao tratamento. No entanto, como essa área de pesquisa ainda é muito nova, percebe-se a necessidade de que mais estudos sejam desenvolvidos.

Sendo assim, convidamos o (a) Sr (a) para participar da pesquisa chamada “Atributos da psicologia positiva em pacientes com síndrome metabólica: relação com a qualidade da dieta e adesão a intervenção nutricional”, sob a responsabilidade da pesquisadora Prof^a Dr^a Caroline Tozzi Reppold e da doutoranda Cecilia Cesa Schiavon, a qual pretende avaliar dados psicológicos e a relação destes com a qualidade da sua alimentação e o seguimento da dieta que será proposta neste ambulatório. Espera-se com os resultados desta pesquisa, refletir sobre a importância da psicologia no atendimento de pacientes que necessitam melhorar seus hábitos alimentares.

Sua participação é voluntária, sendo que o (a) Sr (a) não terá nenhuma despesa e também não receberá nenhuma remuneração, e acontecerá por meio do preenchimento e resposta aos questionários aplicados e uso dos dados coletados na consulta com a nutricionista. Além disso, pedimos sua autorização para avaliar seus exames já realizados, disponíveis em seu prontuário. Destacamos que seus dados pessoais não serão revelados a ninguém além da equipe de pesquisa, sendo que o só será publicado os dados gerais de todo o grupo de participantes. Caso não aceite participar, nada afetará o seu atendimento no ambulatório. Se depois de aceitar assinar este termo o (a) Sr (a) desistir de participar da pesquisa, tem o direito e a liberdade de retirar seu consentimento em qualquer fase da pesquisa, independente do motivo e sem nenhum prejuízo a sua pessoa.

Você irá responder os questionários na primeira consulta, tempo médio de 50 minutos, e em seu segundo retorno mais um questionário, tempo médio de 30 minutos. É possível que você sinta algum desconforto emocional com o preenchimento dos questionários. Favor comunicar qualquer problema.

Para outras informações, o (a) Sr (a) poderá entrar em contato, a qualquer momento, com a pesquisadora no endereço da Universidade Federal de Ciências da Saúde de Porto Alegre (UFCSPA), Rua Sarmento Leite, 245 - Porto Alegre, Rio Grande do Sul, Brasil - CEP 90050-170, sala 117 do prédio anexo, fone (51) 3303-9000, ou (51) 9785-0503 ou no Comitê de Ética em Pesquisa da UFCSPA, fone (51) 3303-8804. Em caso de dúvida sobre questões da pesquisa, direitos dos pacientes envolvidos ou problemas decorrentes da pesquisa fale com o próprio Comitê de Ética em Pesquisa da Santa Casa de Misericórdia de Porto Alegre – sob coordenação Dr. Cláudio Telöken, telefone (51) 3214-8571.

Consentimento Pós-Informação:

Ao assinar abaixo, você confirma que leu as afirmações contidas neste termo de consentimento, que foram explicados os procedimentos do estudo, que teve a oportunidade de fazer perguntas, que está satisfeito com as explicações fornecidas e que decidiu participar voluntariamente deste estudo. Uma via será entregue a você e outra será arquivada pelo investigador principal”.

Nome do Sujeito de Pesquisa (letra de forma)

Data:

Assinatura do Sujeito de Pesquisa

Nome do Pesquisador (letra de forma)

Data:

Assinatura e Carimbo do Pesquisador

Anexo B - Aprovação no Comitê de Ética em Pesquisa da UFCSPA

UNIVERSIDADE FEDERAL DE CIÊNCIAS DA SAÚDE DE PORTO ALEGRE	
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PARECER CONSUBSTANCIADO DO CEP

Elaborado pela Instituição Coparticipante

DADOS DO PROJETO DE PESQUISA

Título da Pesquisa: ATRIBUTOS DA PSICOLOGIA POSITIVA EM PACIENTES COM SÍNDROME METABÓLICA: RELAÇÃO COM A QUALIDADE DA DIETA E ADEÇÃO À INTERVENÇÃO NUTRICIONAL

Pesquisador: Caroline Reppold

Área Temática:

Versão: 2

CAAE: 30946914.4.3001.5345

Instituição Proponente: Irmandade da Santa Casa de Misericórdia de Porto Alegre - ISCMPA

Patrocinador Principal: Financiamento Próprio

DADOS DO PARECER

Número do Parecer: 2.078.133

Apresentação do Projeto:

Atributos psicológicos positivos parecem estar associados com maior engajamento em comportamentos adequados, como alimentação saudável, e parecem estar relacionados a respostas biológicas protetoras da saúde. No entanto, não se sabe ao certo quais destes atributos são mais relevantes.

Atualmente, o tema primordial que emerge nas pesquisas da psicologia positiva é a saúde positiva, ou seja, a relação da psicologia positiva com a saúde física. Sendo assim, neste projeto, propõe-se avaliar atributos da psicologia positiva e sua relação com a qualidade da dieta e com a adesão a uma intervenção nutricional em pacientes com síndrome metabólica.

Objetivo da Pesquisa:

Objetivo Primário:

Avaliar bem-estar subjetivo, otimismo, esperança e autoestima, e a relação destes com a qualidade da dieta e com a adesão a uma intervenção nutricional em pacientes com síndrome metabólica.

Objetivo Secundário:

- Analisar a relação entre bem-estar subjetivo, otimismo, esperança e autoestima, e a qualidade da dieta de pacientes com síndrome metabólica.

Endereço: Rua Sarmento Leite, 245 Bairro: Sarmento UF: RS Telefone: (51) 3303-8804	Município: PORTO ALEGRE CEP: 90.050-170 E-mail: cep@ufcspa.edu.br
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PORTO ALEGRE



Continuação do Parecer: 2.078.133

- Analisar a relação entre bem-estar subjetivo, otimismo, esperança e autoestima, e a qualidade da dieta de pacientes com síndrome metabólica.
- Analisar a relação entre bem-estar subjetivo, otimismo e esperança, e a adesão a uma intervenção nutricional ambulatorial em pacientes com síndrome metabólica por meio da melhora na qualidade da dieta.
- Analisar a relação entre bem-estar subjetivo, otimismo e esperança, e a adesão a uma intervenção nutricional ambulatorial em pacientes com síndrome metabólica por meio da melhora no índice de massa corporal (IMC), peso corporal e circunferência abdominal.
- Avaliar a personalidade com base no modelo dos Cinco Grandes Fatores de Personalidade e relacionar com o BES.

Avaliação dos Riscos e Benefícios:

Riscos:

Desconforto emocional leve.

Benefícios:

Educação nutricional para melhores hábitos alimentares e reflexão sobre novas formas de abordagem ao paciente

Comentários e Considerações sobre a Pesquisa:

Trata-se de uma emenda para prolongar o cronograma em virtude da licença maternidade da aluna de doutorado, e para incluir 2 alunas de graduação na equipe de pesquisa que irão realizar seus TCC vinculados ao projeto.

Considerações sobre os Termos de apresentação obrigatória:

Foram apresentados quando da primeira submissão e aceite.

Novo cronograma foi apresentado nesta emenda, ampliando a pesquisa até o 2o trimestre de 2018.

Conclusões ou Pendências e Lista de Inadequações:

Emenda aprovada.

Considerações Finais a critério do CEP:

De acordo com o parecer do Relator.

Este parecer foi elaborado baseado nos documentos abaixo relacionados:

Tipo Documento	Arquivo	Postagem	Autor	Situação
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Endereço: Rua Sarmento Leite ,245

Bairro: Sarmento

CEP: 90.050-170

UF: RS

Município: PORTO ALEGRE

Telefone: (51)3303-8804

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Continuação do Parecer: 2.078.133

Informações Básicas do Projeto	PB_INFORMAÇÕES_BÁSICAS_888483 E2.pdf	24/03/2017 17:24:10		Aceito
Cronograma	Novo_Cronograma.docx	24/03/2017 17:22:26	Cecilia Cesa Schiavon	Aceito
Outros	Emendaaoprojeto.pdf	02/02/2017 16:25:56	Cecilia Cesa Schiavon	Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	TERMO DE CONSENTIMENTO LIVRE E ESCLARECIDO revisado.docx	08/07/2014 12:57:29		Aceito
Outros	BFP.pdf	08/07/2014 12:52:25		Aceito
Outros	Teste Otimismo (LOT-R).pdf	08/07/2014 12:51:15		Aceito
Outros	Escala satisfação de Vida.pdf	08/07/2014 12:50:06		Aceito
Outros	Escala de Esperança.pdf	08/07/2014 12:48:18		Aceito
Outros	Escala de Autoestima de Rosenberg.pdf	08/07/2014 12:47:11		Aceito
Outros	Escala de Afetos.pdf	08/07/2014 12:43:36		Aceito
Outros	BDI II.pdf	08/07/2014 12:41:59		Aceito
Outros	QUESTIONÁRIO SOCIOECONÔMICO.docx	08/07/2014 12:39:47		Aceito
Outros	Declaração Riscos e Benefícios.pdf	08/05/2014 14:12:30		Aceito
Outros	ISCOMPA Declaração de autorização da chefia responsável.jpg	29/04/2014 17:47:25		Aceito
Outros	Declaração de custos.jpg	29/04/2014 17:40:17		Aceito
Outros	UFCSPA Formulário.jpg	29/04/2014 17:38:14		Aceito
Outros	UFCSPA Termo de compromisso de entrega de relatório.jpg	29/04/2014 17:37:59		Aceito
Outros	ISCOMPA Termo de compromisso para utilização de dados e prontuários.jpg	29/04/2014 17:37:21		Aceito
Outros	ISCOMPA Formulário de inscrição de projeto de pesquisa.jpg	29/04/2014 17:36:59		Aceito
Outros	ISCOMPA Declaração de uso e publicação dos dados (1).jpg	29/04/2014 17:36:39		Aceito
Outros	ISCOMPA Declaração de uso de dados e materiais (1).jpg	29/04/2014 17:36:18		Aceito
Outros	ISCOMPA Declaração de isenção de onus da instituição (1).jpg	29/04/2014 17:35:57		Aceito
Outros	ISCOMPA Declaração de	29/04/2014		Aceito

Endereço: Rua Sarmento Leite ,245

Bairro: Sarmiento

CEP: 90.050-170

UF: RS

Município: PORTO ALEGRE

Telefone: (51)3303-8804

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Continuação do Parecer: 2.078.133

Outros	confidencialidade do sujeito no estudo (1).jpg	17:35:33		Aceito
Projeto Detalhado / Brochura Investigador	Projeto CEP Cecilia Cesa Schiavon.docx	29/04/2014 17:34:59		Aceito
Folha de Rosto	Folha de rosto.jpg	29/04/2014 17:10:33		Aceito

Situação do Parecer:

Aprovado

Necessita Apreciação da CONEP:

Não

PORTO ALEGRE, 23 de Maio de 2017

Assinado por:

Julia Fernanda Semmelmann Pereira Lima
(Coordenador)

Endereço: Rua Sarmiento Leite ,245

Bairro: Sarmiento

CEP: 90.050-170

UF: RS

Município: PORTO ALEGRE

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Anexo C - Aprovação no Comitê de Ética em Pesquisa da ISCMPA

IRMANDADE DA SANTA CASA DE MISERICORDIA DE PORTO ALEGRE - ISCMPA



Continuação do Parecer: 2.002.210

Considerações Finais a critério do CEP:

Após a avaliação da solicitação a emenda da inclusão de co-investigador referente ao estudo acima descrito, o presente Comitê não encontrou óbices quanto à implementação das mesmas.

Este parecer foi elaborado baseado nos documentos abaixo relacionados:

Tipo Documento	Arquivo	Postagem	Autor	Situação
Informações Básicas do Projeto	PB_INFORMAÇÕES_BÁSICAS_888483 E2.pdf	24/03/2017 17:24:10		Aceito
Cronograma	Novo_Cronograma.docx	24/03/2017 17:22:26	Cecilia Cesa Schiavon	Aceito
Outros	Emendaaoprojeto.pdf	02/02/2017 16:25:56	Cecilia Cesa Schiavon	Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	TERMO DE CONSENTIMENTO LIVRE E ESCLARECIDO revisado.docx	08/07/2014 12:57:29		Aceito
Outros	BFP.pdf	08/07/2014 12:52:25		Aceito
Outros	Teste Otimismo (LOT-R).pdf	08/07/2014 12:51:15		Aceito
Outros	Escala satisfação de Vida.pdf	08/07/2014 12:50:06		Aceito
Outros	Escala de Esperança.pdf	08/07/2014 12:48:18		Aceito
Outros	Escala de Autoestima de Rosenberg.pdf	08/07/2014 12:47:11		Aceito
Outros	Escala de Afetos.pdf	08/07/2014 12:43:36		Aceito
Outros	BDI II.pdf	08/07/2014 12:41:59		Aceito
Outros	QUESTIONÁRIO SOCIOECONÔMICO.docx	08/07/2014 12:39:47		Aceito
Outros	Declaração Riscos e Benefícios.pdf	08/05/2014 14:12:30		Aceito
Outros	ISCMPA Declaração de autorização da chefia responsável.jpg	29/04/2014 17:47:25		Aceito
Outros	Declaração de custos.jpg	29/04/2014 17:40:17		Aceito
Outros	UFCSPA Formulário.jpg	29/04/2014 17:38:14		Aceito
Outros	UFCSPA Termo de compromisso de entrega de relatório.jpg	29/04/2014 17:37:59		Aceito
Outros	ISCMPA Termo de compromisso para	29/04/2014		Aceito

Endereço: R. Profª Annes Dias, 295 Hosp. Dom Vicente Scherer

Bairro: 6º andar - Centro

CEP: 90.020-090

UF: RS

Município: PORTO ALEGRE

Telefone: (51)3214-8571

Fax: (51)3214-8571

E-mail: cep@santacasa.tche.br

**IRMANDADE DA SANTA CASA
DE MISERICORDIA DE PORTO
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Continuação do Parecer: 2.002.210

Outros	utilização de dados e prontuários.jpg	17:37:21		Aceito
Outros	ISCMPA Formulário de inscrição de projeto de pesquisa.jpg	29/04/2014 17:36:59		Aceito
Outros	ISCMPA Declaração de uso e publicação dos dados (1).jpg	29/04/2014 17:36:39		Aceito
Outros	ISCMPA Declaração de uso de dados e materiais (1).jpg	29/04/2014 17:36:18		Aceito
Outros	ISCMPA Declaração de isenção de onus da instituição (1).jpg	29/04/2014 17:35:57		Aceito
Outros	ISCMPA Declaração de confidencialidade do sujeito no estudo (1).jpg	29/04/2014 17:35:33		Aceito
Projeto Detalhado / Brochura Investigador	Projeto CEP Cecilia Cesa Schiavon.docx	29/04/2014 17:34:59		Aceito
Folha de Rosto	Folha de rosto.jpg	29/04/2014 17:10:33		Aceito

Situação do Parecer:

Aprovado

Necessita Apreciação da CONEP:

Não

PORTO ALEGRE, 05 de Abril de 2017

**Assinado por:
ELIZETE KEITEL
(Coordenador)**

Endereço: R. Profª Annes Dias, 295 Hosp. Dom Vicente Scherer
Bairro: 6º andar - Centro **CEP:** 90.020-090
UF: RS **Município:** PORTO ALEGRE
Telefone: (51)3214-8571 **Fax:** (51)3214-8571 **E-mail:** cep@santacasa.tche.br

Anexo D – Instrumentos de domínio público utilizados do estudo

- Questionário desenvolvido para a pesquisa

QUESTIONÁRIO SOCIOECONÔMICO, CLÍNICO E ANTROPOMÉTRICO “Atributos da psicologia positiva em pacientes com síndrome metabólica: relação com a qualidade da dieta e adesão à intervenção nutricional”	
Nome completo do entrevistado:	
Fones p/ contato:	
Data da entrevista: ____ / ____ / ____.	
Data de nascimento: ____ / ____ / ____ Idade: ____ anos	
Etnia : () 1: Branca () 2: Negra () 3: Parda () 4: Outra	
Qual a sua profissão?	
Estado civil: () 1: casada () 2: solteira () 3: viúva () 4: separada () 5: vive c/ comp	
Quantos anos você estudou? _____ Grau de escolaridade: 1: () analfabeto 2: () 1º grau incompleto 3: () 1º grau completo 4: () 2º grau incompleto 5: () 2º grau completo 6: () superior incompleto 7: () superior completo 8: () pós-graduação	
Você pratica atividade física? 1: () Sim 2: () Não	Há quanto tempo? _____
Se sim, qual (ou quais)?	
Quantas vezes por semana?	Quanto tempo por vez? _____
Você fuma? 1: () Sim 2: () Não	Se sim, há quanto tempo? _____
Quantos cigarros por dia você fuma?	
Você já fumou? 1: () Sim 2: () Não	
Se sim, por quanto tempo? _____	Quantos cigarros por dia você fumava? _____
Você ingere bebida alcoólica? 1: () Sim 2: () Não Se sim, com que frequência e quantos copos?	
Você já fez alguma dieta especial? () sim () não Se sim, que tipo? _____	
Você tem alguma doença atualmente, qual? _____	
Usa alguma medicação? () sim () não.	Com qual finalidade? _____
Que doenças você já teve?	
Cite doenças comuns em seus familiares mais próximos (pai, mãe, irmãos, avós, tios e primos - 1º grau)	
Você faz psicoterapia? () sim () não. Já fez? () sim () não	

- Questionário desenvolvido para a pesquisa - Continuação

Se sim, há quanto tempo está em psicoterapia? _____		
Você tem filho (s)? () sim () não. Se sim, quantos? _____		
Total de pessoas que residem em sua casa (incluindo você)		
a) () 01 a 02 pessoas.		
b) () 03 a 05 pessoas.		
c) () 05 a 08 pessoas.		
d) () 08 a 10 Pessoas.		
e) () Acima de 10 pessoas.		
Qual a renda mensal do seu grupo familiar?(soma do rendimento de todos que contribuem com a renda)		
a) () Menos de 1 Salário Mínimo.		
b) () De 01 a 03 Sal. Mínimos.		
c) () De 03 a 06 Sal. Mínimos.		
d) () De 06 a 10 Sal. Mínimos.		
e) () Mais de 10 Sal. Mínimos.		
Altura: _____ cm	Peso atual: _____ kg	Peso Retorno 2: _____ kg
	Cintura: _____ cm	Cintura Retorno 2: _____ cm

Pesquisador responsável: _____

- Escala de Satisfação com a Vida

Instruções

Abaixo você encontrará cinco afirmativas. Assinale na escala abaixo de cada afirmativa o quanto ela descreve a sua situação pessoal. Não há respostas certas ou erradas, mas é importante você marcar com sinceridade como você se sente com relação a cada uma dessas afirmativas.

1) A minha vida está próxima do ideal.

Discordo plenamente _1_2_3_4_5_6_7_ Concordo plenamente

2) Minhas condições de vidas são excelentes.

Discordo plenamente _1_2_3_4_5_6_7_ Concordo plenamente

3) Eu estou satisfeito com a minha vida.

Discordo plenamente _1_2_3_4_5_6_7_ Concordo plenamente

4) Até agora eu tenho conseguido as coisas importantes que eu quero na vida.

Discordo plenamente _1_2_3_4_5_6_7_ Concordo plenamente

5) Se eu pudesse viver a minha vida de novo eu não mudaria quase nada.

Discordo plenamente _1_2_3_4_5_6_7_ Concordo plenamente

- Escala de Afetos Positivos e Negativos

Esta escala consiste em um número de palavras que descrevem diferentes sentimentos e emoções. Leia cada item e depois marque a resposta adequada no espaço ao lado da palavra. Indique até que ponto você tem se sentido desta forma ultimamente.

1	2	3	4	5
Nem um pouco	Um pouco	Moderadamente	Bastante	Extremamente

1. Aflito _____
2. Amável _____
3. Amedrontado _____
4. Angustiado _____
5. Animado _____
6. Apaixonado _____
7. Determinado _____
8. Dinâmico _____
9. Entusiasmado _____
10. Forte _____
11. Humilhado _____
12. Incomodado _____
13. Inquieto _____
14. Inspirado _____
15. Irritado _____
16. Nervoso _____
17. Orgulhoso _____
18. Perturbado _____
19. Rancoroso _____
20. Vigoroso _____

*Os itens 1, 3, 4, 11, 12, 13, 15, 16, 18 e 19 referem-se a afetos negativos e os itens 2, 5, 6, 7, 8, 9, 10, 14, 17 e 20 referem-se a afetos positivos.

- Teste para Avaliar Otimismo (LOT-R)

Instruções

Abaixo você encontrará 10 frases. Assinale na escala o quanto você concorda ou discorda cada uma delas. A escala varia de 1 (Discordo Plenamente) a 5 (Concordo Plenamente). Não há respostas certas ou erradas. O importante é você responder com sinceridade como se sente com relação a cada uma das frases.

1	Diante de dificuldade, acho que tudo vai dar certo. Discordo plenamente _1_ _2_ _3_ _4_ _5_ Concordo plenamente
2	Para mim é fácil relaxar. Discordo plenamente _1_ _2_ _3_ _4_ _5_ Concordo plenamente
3	Se alguma coisa pode dar errado comigo, com certeza vai dar errado. Discordo plenamente _1_ _2_ _3_ _4_ _5_ Concordo plenamente
4	Eu sou sempre otimista com relação ao meu futuro. Discordo plenamente _1_ _2_ _3_ _4_ _5_ Concordo plenamente
5	Eu gosto muito dos meus amigos. Discordo plenamente _1_ _2_ _3_ _4_ _5_ Concordo plenamente
6	Eu considero importante me manter ocupado. Discordo plenamente _1_ _2_ _3_ _4_ _5_ Concordo plenamente
7	Em geral, eu não espero que as coisas vão dar certo para mim. Discordo plenamente _1_ _2_ _3_ _4_ _5_ Concordo plenamente
8	Eu não me incomodo com facilidade. Discordo plenamente _1_ _2_ _3_ _4_ _5_ Concordo plenamente
9	Eu não espero que coisas boas aconteçam comigo. Discordo plenamente _1_ _2_ _3_ _4_ _5_ Concordo plenamente
10	Em geral, eu espero que aconteçam mais coisas boas do que ruins para mim. Discordo plenamente _1_ _2_ _3_ _4_ _5_ Concordo plenamente

- Escala de Esperança Disposicional

Instruções

Leia com atenção e circule a opção que você acha a mais adequada.

1. Eu posso pensar em várias formas de lidar com situações difíceis. Totalmente Falsa _1_ _2_ _3_ _4_ _5_ Totalmente Verdadeira
2. Eu me esforço para atingir meus objetivos. Totalmente Falsa _1_ _2_ _3_ _4_ _5_ Totalmente Verdadeira
3. Eu me sinto cansado a maior parte do tempo. Totalmente Falsa _1_ _2_ _3_ _4_ _5_ Totalmente Verdadeira
4. Existem sempre muitas formas de resolver os problemas. Totalmente Falsa _1_ _2_ _3_ _4_ _5_ Totalmente Verdadeira
5. Eu sou facilmente derrotado em discussões. Totalmente Falsa _1_ _2_ _3_ _4_ _5_ Totalmente Verdadeira
6. Eu posso pensar em muitas formas de conseguir as coisas que são muito importantes pra mim. Totalmente Falsa _1_ _2_ _3_ _4_ _5_ Totalmente Verdadeira
7. Eu me preocupo com a minha saúde. Totalmente Falsa _1_ _2_ _3_ _4_ _5_ Totalmente Verdadeira
8. Mesmo quando os outros desistem, eu sei que posso encontrar alguma forma de resolver os problemas. Totalmente Falsa _1_ _2_ _3_ _4_ _5_ Totalmente Verdadeira
9. Minhas experiências no passado me prepararam para enfrentar o futuro. Totalmente Falsa _1_ _2_ _3_ _4_ _5_ Totalmente Verdadeira
10. Eu tenho tido sucesso na vida. Totalmente Falsa _1_ _2_ _3_ _4_ _5_ Totalmente Verdadeira
11. Frequentemente eu fico me preocupando com alguma coisa. Totalmente Falsa _1_ _2_ _3_ _4_ _5_ Totalmente Verdadeira
12. Eu atinjo os objetivos que estabeleço para mim. Totalmente Falsa _1_ _2_ _3_ _4_ _5_ Totalmente Verdadeira

- Escala de Autoestima de Rosenberg

Leia cada frase com atenção e faça um círculo em torno da opção mais adequada

1) Eu sinto que sou uma pessoa de valor, no mínimo, tanto quanto as outras pessoas.

(1) Discordo Totalmente (2) Discordo (3) Concordo (4) Concordo Totalmente

2) Eu acho que eu tenho várias boas qualidades.

(1) Discordo Totalmente (2) Discordo (3) Concordo (4) Concordo Totalmente

3) Levando tudo em conta, penso que eu sou um fracasso.

(1) Discordo Totalmente (2) Discordo (3) Concordo (4) Concordo Totalmente

4) Eu acho que sou capaz de fazer as coisas tão bem quanto a maioria das pessoas.

(1) Discordo Totalmente (2) Discordo (3) Concordo (4) Concordo Totalmente

5) Eu acho que eu não tenho muito do que me orgulhar.

(1) Discordo Totalmente (2) Discordo (3) Concordo (4) Concordo Totalmente

6) Eu tenho uma atitude positiva com relação a mim mesmo.

(1) Discordo Totalmente (2) Discordo (3) Concordo (4) Concordo Totalmente

7) No conjunto, estou satisfeito comigo.

(1) Discordo Totalmente (2) Discordo (3) Concordo (4) Concordo Totalmente

8) Eu gostaria de poder ter mais respeito por mim mesmo.

(1) Discordo Totalmente (2) Discordo (3) Concordo (4) Concordo Totalmente

9) Às vezes eu me sinto inútil.

(1) Discordo Totalmente (2) Discordo (3) Concordo (4) Concordo Totalmente

10) Às vezes eu acho que não presto para nada.

(1) Discordo Totalmente (2) Discordo (3) Concordo (4) Concordo Totalmente

Observação: Os itens 3, 5, 9 e 10 devem ser invertidos para calcular a soma dos pontos

Anexo E – Artigos publicados ao longo do período do Doutorado

REPPOLD, C. T.; GURGEL, L. G. ; SCHIAVON, C. C. Pesquisas em Psicologia Positiva: uma revisão sistemática da literatura. **Psico-USF (Impresso)**, v. 20, p. 275-285, 2015.

SCHIAVON, C. C. ; MARCHETTI, E. ; GURGEL, L. G. ; BUSNELLO, F.M. ; REPPOLD, C.T. . Optimism and Hope in Chronic Disease: A Systematic Review. **Frontiers in Psychology**, v. 7, p. 1-10, 2017.

CÓRDOVA, M. E.; SCHIAVON, C. C.; BUSNELLO, F. M.; REPPOLD, C. T. Nutritional and Neuropsychological Profile of the Executive Functions on Binge Eating Disorder in Obese Adults. **Nutricion Hospitalaria**, v. 34, p. 1448-1454, 2017.

Anexo F – Artigos aceito para publicação ao longo do período do Doutorado, aguardando publicação

SCHIAVON, C. C.; TEIXEIRA, L. P. ; GURGEL, L. G. ; MAGALHAES, C. R.; REPPOLD, C.T. Educação Positiva: Inovações em intervenções educativas baseadas na Psicologia Positiva. **Psicologia: Teoria e Pesquisa (online)**, 2018.

Anexo G – Artigos submetidos para publicação ao longo do período do doutorado,
aguardando retorno dos revisores

SCHIAVON, C. C.; LOEWE G.; AYALA, F. O.; BUSNELLO, F. M.; REPPOLD, C. T.
Aspects of subjective well-being and its measuring instruments in obesity: A systematic review.

SCHIAVON, C. C.; MARCHETTI, E.; AYALA, F. O.; BUSNELLO, F. M.; REPPOLD, C. T.
Positive Psychological Characteristics in Metabolic Syndrome Associated with Prospect Changes in Diet and Anthropometric Factors.

SCHIAVON, C. C.; MARCHETTI, E.; CESA, M. L.; BUSNELLO, F. M.; REPPOLD, C. T.
Relationship between diet quality, subjective well-being, and personality in metabolic syndrome.

Anexo H – Resumos Publicados em Anais de Congressos ao longo do período do doutorado

1. **SCHIAVON, C. C.** ; MARCHETTI, E. ; BURIN, J. ; BUSNELLO, F. M. ; REPPOLD, C. T. Otimismo e esperança na doença crônica: uma revisão sistemática. In: I Congresso Brasileiro de Psicologia Positiva, 2014, Porto Alegre. Revista eletrônica do I Congresso Brasileiro de Psicologia Positiva, 2014.
2. BUSNELLO, F. M.; **SCHIAVON, C. C.** ; MARCHETTI, E. ; REPPOLD, C. T. . Atributos psicológicos positivos na doença crônica: uma revisão sistemática sobre o otimismo e a esperança. In: XVI Congresso Brasileiro de Obesidade e Síndrome Metabólica, 2015, Rio de Janeiro. Revista eletrônica do XVI Congresso Brasileiro de Obesidade e Síndrome Metabólica, 2015.
3. BUSNELLO, F. M.; **SCHIAVON, C. C.** ; MARCHETTI, E. ; REPPOLD, C. T. . Comportamento alimentar e autoestima: uma revisão sistemática. In: XVI Congresso Brasileiro de Obesidade e Síndrome Metabólica, 2015, Rio de Janeiro. Revista eletrônica do XVI Congresso Brasileiro de Obesidade e Síndrome Metabólica, 2015.
4. **SCHIAVON, C. C.** ; MARCHETTI, E. ; KIDRICKI, I. J. B. ; Busnello, F.M. ; REPPOLD, C.T. A autoestima no comportamento alimentar. In: World Congress on Brain, Behavior and Emotions, 2016, Buenos Aires. Revista eletrônica do World Congress on Brain, Behavior and Emotions, 2016.
5. MARCHETTI, E. ; **SCHIAVON, C. C.** ; GURGEL, L. G. ; REPPOLD, C. T. ; BUSNELLO, F. M. . Atributos psicológicos positivos na doença crônica: o papel do otimismo e da esperança. In: World Congress on Brain, Behavior and Emotions, 2016, Buenos Aires. Revista eletrônica do World Congress on Brain, Behavior and Emotions, 2016.
6. **SCHIAVON, C. C.**; CORDOVA, M.E.; BUSNELLO, F.M.; REPPOLD, C.T. Nutritional e neuropsychological profile of the executive functions on Binge Eating Disorder in obese adults. In: World Congress on Brain, Behavior and Emotions, 2016, Buenos Aires. Revista eletrônica do World Congress on Brain, Behavior and Emotions, 2016.
7. **SCHIAVON, C. C.**; BAUER, J.; MARCHETTI, E.; BUSNELLO, F.; REPPOLD, C. Relação da autoestima com o comportamento alimentar: uma revisão sistemática. In: XXIV Congresso Brasileiro de Nutrição, 2016, Porto Alegre. Anais do XXIV Congresso Brasileiro de Nutrição: Revista da Associação Brasileira de Nutrição, 2016.

8. MARCHETTI, E.; BERTOLINO, C. O.; **SCHIAVON, C. C.**; KATO, S. K.; MENEZES, C. B.; REPPOLD, C. T. Adaptação e busca de evidências de validade e fidedignidade de uma escala de compaixão. 8º Congresso Brasileiro de Avaliação Psicológica, 2017, Santa Catarina. Revista eletrônica do 8º Congresso Brasileiro de Avaliação Psicológica, 2017.
9. MARCHETTI, E.; **SCHIAVON, C. C.**; LOEWE, G.; BAUER, J.; AYALA, F. O.; BUSNELLO, F. M.; REPPOLD, C. T. . Relação da autoestima com o comportamento alimentar: uma revisão sistemática. In: 8º Congresso Brasileiro de Avaliação Psicológica, 2017, Santa Catarina. Revista eletrônica do 8º Congresso Brasileiro de Avaliação Psicológica, 2017.
10. **SCHIAVON, C. C.**; LOEWE, G.; AYALA, F. O.; BUSNELLO, F. M.; REPPOLD, C. T. Aspectos do bem-estar subjetivo na obesidade: uma revisão sistemática. In: III Congresso Brasileiro de Psicologia Positiva, 2018, São Paulo. Revista eletrônica do III Congresso Brasileiro de Psicologia Positiva, 2018.
11. **SCHIAVON, C. C.**; AYALA, F. O.; BAUER, J.; CESA, M. L.; BUSNELLO, F. M.; REPPOLD, C. T. Características Positivas na Síndrome Metabólica: Associação com a Dieta e Fatores Antropométricos. In: III Congresso Brasileiro de Psicologia Positiva, 2018, São Paulo. Revista eletrônica do III Congresso Brasileiro de Psicologia Positiva, 2018.