

Thèse doctorale

Stratégies d'application d'un programme de marche prouvé efficace auprès des personnes âgées atteintes d'arthrose du genou : Un essai randomisé contrôlé préliminaire

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« L'adhésion implique une participation active, volontaire et collaborative du patient dans un échange mutuellement acceptable avec le professionnel de la santé pour produire un résultat thérapeutique. »

Meichenbaum, D. & Tuck, C., 1987 (Traduction française)

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Liste des abréviations

ACFAS	Association francophone pour le savoir
APSA	Association des professionnels de la santé pour l'arthrite
BESO	Bourse des études supérieures de l'Ontario
ECR	Essai contrôlé randomisé
FRSQ	Fonds de recherche en santé du Québec
IRSC	Instituts de recherche en santé du Canada
LDC	Lignes directrices cliniques

OMS	Organisation mondiale de la santé
PLRS	Programmes locaux et régionaux de santé
SCR	Société canadienne de rhumatologie

Résumé

Problématique. L'arthrose du genou se manifeste davantage chez les personnes âgées de 40 ans et plus. De façon générale, ces personnes arthrosiques souffrent de sédentarité car, la plupart d'entre elles ont trois fois plus de difficulté à marcher et sont cinq fois plus limitées dans leurs activités. Il a été prouvé à maintes reprises que l'activité physique, telle que la marche, apportent de nombreux bienfaits pour contrer les symptômes de l'arthrose légère à modérée. Toutefois, la majorité des individus atteints de cette maladie chronique présument que l'activité physique accroît l'intensité de leur douleur. Ils tombent ainsi dans un cercle vicieux, étant donné que l'inactivité mène à une diminution de la mobilité et de l'endurance, ce qui réduit, par conséquent, leur qualité de vie.

Objectif. Le projet de recherche consistait à évaluer les stratégies d'application d'une nouvelle approche fondée sur la préférence des participants afin de les encourager à adopter un comportement sain soit, dans ce cas précis, d'améliorer leur adhésion à un programme de marche prouvé efficace chez des personnes âgées atteintes d'arthrose légère à modérée du genou, selon les lignes directrices cliniques du groupe d'experts et de méthodologistes formant le panel d'Ottawa. L'objectif de la thèse doctorale était de promouvoir l'adhésion à un programme de marche étalé sur neuf mois, en utilisant la préférence des participants comme moyen principal d'application des connaissances. Nous voulions donc identifier les facteurs personnels et externes qui semblerait influencer l'adhésion des participants à la marche et évaluer l'effet de la préférence sur l'adhésion et les mesures cliniques (obtention de la préférence, non-obtenue, aucune préférence).

Méthodologie. Il s'agissait d'un essai randomisé contrôlé préliminaire étalé sur six mois en plus d'une période de suivi de trois mois. Cet essai clinique à simple insu comportait trois phases de randomisation avec deux groupes parallèles pour chaque randomisation. Les participants sélectionnés ont été, de façon randomisée, affectés à un programme de marche supervisé ou non-supervisé; il convient de préciser que les deux programmes comportaient des paramètres identiques. L'adhésion au programme de marche ainsi que plusieurs autres mesures cliniques et comportementales ont été évaluées aux trois mois. L'identification des facteurs d'adhésion a également été performée. Les analyses statistiques des données comparatives se fondaient sur la comparaison entre les participants qui avaient une préférence et ont été assignés au programme de marche de leur choix, en comparaison avec ceux qui n'ont pas obtenu leur programme préféré.

Résultats. Au total, 69 participants qui ont reçu un diagnostic d'arthrose légère à modérée du genou ont été recrutés, dont 50 femmes et 19 hommes (âge moyen de 65,2 ans). Les résultats ont indiqué que les participants qui exprimaient une préférence, soit pour le programme supervisé ou soit pour le programme non-supervisé, et qui ont été assignés à leur programme de choix ont mieux adhéré au programme, et ce, de façon significative ($P < 0.05$), comparativement à ceux qui n'ont pas reçu leur programme préféré. Une amélioration des mesures cliniques a également été notée, soit au niveau de la perte de poids, de l'état fonctionnel et de l'anxiété, pour la même comparaison. Les résultats semblaient finalement montrer que la probabilité d'adhérer de façon adéquate au programme de marche était plus élevée si le participant était supervisé (trois fois plus élevée), s'il était soutenu par sa famille ou ses amis (quatre fois

plus élevée) et s'il n'était pas influencé par son état émotionnel (11 fois plus élevée). Les chances d'adhérer au programme de marche s'avéraient quatre fois plus faibles si le participant avait indiqué un changement dans sa consommation de médicaments et trois fois plus faibles s'il se considérait comme initialement moins actif physiquement (intervalle de confiance à 95%).

Conclusion. Cet essai randomisé contrôlé préliminaire a enrichi les écrits scientifiques en contribuant à la meilleure compréhension des principales stratégies visant à promouvoir l'adhésion à long terme aux programmes de marche communautaires, et en considérant la préférence des participants comme une approche novatrice d'application des connaissances. Cette étude exploratrice a permis d'identifier cinq principaux facteurs perçus par cette population pouvant potentiellement influencer l'adhésion, soit la supervision, soutien social, la consommation des médicaments ainsi que le niveau d'activité physique et l'influence émotionnelle. Les résultats semblaient aussi montrer que la préférence doit être considérée et respectée car cette population a tendance à mieux adhérer si elle 1) suit un programme de marche avéré efficace et 2) tout en respectant leurs préférences en termes de mode de supervision. Bref, cette stratégie a permis d'améliorer l'adhésion des personnes âgées atteintes de l'arthrose légère à modérée à un programme de marche avéré efficace, tout en assurant le maintien des avantages cliniques de la marche. Ces résultats pourront guider les professionnels de la santé dans leur pratique clinique afin de mieux identifier les influences positives et les obstacles à l'adhésion à une intervention physique, en adoptant une approche collaborative avec le client.

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Format de la thèse

La présente thèse doctorale est organisée sous forme d'articles. La première section de la thèse comprend une introduction générale qui expose le sujet de thèse (chapitre 1) et une compréhension théorique en lien avec le sujet de thèse (chapitre 2). La deuxième section de la thèse porte sur la présentation des résultats. Ainsi, le chapitre 3 décrit la méthodologie de l'étude sous forme d'un premier article publié sous forme anglaise. Le chapitre 4 présente les facteurs d'adhésion de l'étude, qui constituent le deuxième article publié sous forme anglaise. Le chapitre 5 se résume par le troisième article soumis en anglais pour publication, qui dévoile les résultats cliniques de l'étude. Enfin, une discussion globale de la thèse représente la troisième section de ce manuscrit, qui inclut le chapitre 6 qui englobe une synthèse ainsi qu'une conclusion. La dernière et quatrième section présente les références ainsi que les annexes se rapportant à la thèse doctorale. Inévitablement, certaines informations sur le contexte de l'étude se renouvellent en ce qui a trait aux trois articles. Les entrées bibliographiques rédigées dans une seule liste pour l'ensemble de la thèse sont conformes aux normes exigées par l'unité scolaire du programme de doctorat en sciences de la réadaptation.

SECTION I: INTRODUCTION

Chapitre 1 : Sujet de thèse

Ce chapitre commence par une brève description de la problématique, c'est-à-dire l'arthrose du genou, suivi d'une explication de la justification de l'étude, des définitions importantes ainsi que l'identification des buts et des questions de recherche concernant l'étude.

Problématique

L'arthrose s'avère une maladie chronique et est considérée comme la plus fréquente affection articulaire (Heidari, 2011). À l'heure actuelle, plus de 4,6 millions de Canadiens, soit un Canadien sur huit (13 % de la population générale), sont atteints de cette affection dégénérative (Bombardier, 2011). Le fardeau économique généré s'estime à 6,4 milliards de dollars canadiens, c'est-à-dire un tiers du coût total relatif à toutes les maladies du système musculo-squelettique (Public Health Agency of Canada, 2010). Sa prévalence s'accroît considérablement après l'âge de 40 ans compte tenu du vieillissement de la population mondiale (Klippel, 2008). Au niveau mondial, le bulletin de l'Organisation mondiale de la santé (OMS) a d'ailleurs confirmé qu'environ 9,6 % des hommes et 18,0 % des femmes âgés de plus de 60 ans présentent un diagnostic d'arthrose (WHO, 2010). De plus, l'arthrose représente l'une des cinq principales causes de la douleur articulaire et d'incapacité à long terme chez les personnes âgées (Bathia, 2013).

Les avancées scientifiques ont montré que l'activité physique améliore généralement, à court terme, les signes cliniques, l'état physiologique ainsi que la qualité de vie des individus souffrant de l'arthrose (Loew, 2012 : mémoire publié dans le cadre du diplôme de maîtrise professionnelle en physiothérapie de la candidate, à l'Université d'Ottawa.). Parmi toutes les activités physiques, la marche représente l'activité physique en aérobic la plus bénéfique auprès des personnes atteintes de l'arthrose légère à modérée des membres inférieurs, dont le genou (Fransen, 2014; Loew, 2012). Cette forme d'activité physique est sécuritaire, peu coûteuse et très accessible. Reconnue pour ne pas exacerber les dommages articulaires et accroître les symptômes typiques de l'arthrose (Fransen, 2014), la marche est fortement recommandée par les comités d'experts à travers le monde, puisqu'il a été démontré que cette activité physique d'intensité faible à modérée réduit la douleur ainsi que la raideur articulaire (Zhang, 2008). De plus, la marche améliore la mobilité, la force et, par conséquent, l'état fonctionnel et la qualité de vie des gens atteints de l'arthrose du genou (Loew, 2012). Malgré toutes ces preuves scientifiques sur l'efficacité de l'activité physique (Fransen, 2014; Loew, 2012; Zhang, 2008), les personnes âgées atteintes de l'arthrose légère à modérée du genou ont tendance à éviter de bouger (Dunlop, 2011), car elles sont persuadées que l'activité physique accentue leurs douleurs articulaires (Bhatia, 2013; Dobkin, 2006). En demeurant inactives, elles deviennent alors progressivement sédentaires (Dunlop, 2011). Par conséquent, l'inactivité réduit le niveau de l'endurance, la force musculaire des membres inférieurs ainsi que l'état fonctionnel de cette population fragile, ce qui affecte le niveau de qualité de vie (Bombardier, 2011; Messier, 2009; Pisters, 2010). Ces gens entrent dans un cercle vicieux en éprouvant trois fois plus de difficulté à marcher et vivant avec plusieurs autres limitations

fonctionnelles, telles que monter les escaliers et exécuter les activités de la vie quotidienne, que la population générale en santé (White, 2011).

Le manque d'activité physique représente un comportement malsain qui peut nuire à la santé, tout comme au bien-être physique et mental, d'un individu sédentaire (Glanz, 2008). Malgré l'intention initiale de participer à une activité physique, cela ne se traduit pas par le succès espéré de cette participation active et soutenue (Jancey, 2007). Étant donné que les activités physiques se révèlent efficaces seulement si l'adhésion est maintenue, cela indique que l'adhésion à un programme d'activité physique sain représente un élément clé de la réponse au traitement influençant les résultats de mesure (Jordan, 2010; WHO, 2003). De ce fait, la simple participation à ces interventions physiques recommandées ne garantit aucunement l'adhésion engagée, ni le maintien à plus long terme de cette adhésion. De plus, les personnes âgées ont tendance à arrêter de participer à une activité physique au cours des six premiers mois (Jancey, 2007) en raison de leurs attentes préconçues ainsi que de leur niveau de satisfaction concernant la pratique d'une activité physique. Cela confirme ainsi que les six premiers mois représentent une période très importante. Ces mois sont cruciaux puisqu'il faut soutenir et guider les personnes âgées vers l'initiation et la participation définitive à une activité physique. Si elles ne montrent pas une adhésion maintenue après six mois, le risque d'abandonner est plus élevé (Hawley-Hague, 2013). Le problème d'adoption d'un comportement sain, tel que l'adhésion à une activité physique, est perçu comme une tâche complexe à accomplir, notamment chez les individus atteints

d'une maladie chronique, tout comme l'arthrose du genou, qui désirent suivre une pratique régulière de l'activité physique (Martin, 2005).

Les scientifiques ainsi que les professionnels de la santé sont préoccupés par ces fausses convictions de la douleur aggravée par l'activité physique et tentent de comprendre comment appliquer efficacement les recommandations des lignes directrices cliniques (LDC) existantes concernant la pratique régulière de l'activité physique thérapeutique. Pour assurer l'adoption de ces LDC en pratique, les obstacles internes et externes perçus par la population ciblée doivent être pris en considération (Francke, 2008). Étant donné que les comportements sains ne sont avantageux que s'ils sont maintenus, le défi actuel consiste à élaborer des stratégies qui encourageraient les gens à adhérer à long terme à l'activité physique pour maximiser les bienfaits (Grave, 2011). Par conséquent, il est essentiel de comprendre pourquoi cette population choisit souvent de ne pas adhérer à une activité physique (Bombardier, 2011; Messier, 2009), même si elle est au courant des effets nuisibles de l'inactivité sur l'arthrose.

Afin de surmonter les défis associés à l'application d'un programme de marche, il est important que les participants aient un certain niveau de contrôle dans la prise de décision clinique, c'est-à-dire qu'ils puissent surveiller les facteurs modifiables qui influencent leur adhésion à une activité physique. Cette stratégie a pour but d'améliorer la participation à une activité physique montrée efficace. En fait, les données probantes mettent de plus en plus l'accent sur l'importance d'adopter une approche axée sur l'autonomisation des clients, car celle-ci leur permet de jouer un rôle plus actif dans la gestion de leur affection chronique et de collaborer avec leur

professionnel de la santé (Jordan, 2010; Miranda, 2009; Nicholas, 2015; Slade, 2009). Les personnes atteintes de maladies chroniques, telles que l'arthrose, préfèrent généralement choisir par elles-mêmes les interventions physiques qui correspondent le mieux à leurs perceptions au sujet de la maladie, leurs valeurs ainsi que leur style de vie personnel, puisqu'elles sont les seules à comprendre entièrement leur problème de santé. En devenant des décideurs plus indépendants, ces individus peuvent exprimer leurs préférences à propos des différentes approches thérapeutiques (Nicholas, 2015).

Justification du sujet de thèse

Une des préoccupations actuelles en recherche clinique est l'observation d'un faible taux d'adhésion auprès des personnes âgées atteintes de l'arthrose qui participent à des essais contrôlés randomisés (ECR) de courte durée portant sur un programme de marche. L'adhésion au traitement représente un problème multidimensionnel complexe qui ne devrait pas être seulement déterminé par les facteurs externes d'un individu (environnement, support social, etc.), mais aussi par les facteurs personnels qui caractérisent ce dernier, tels que ses préférences (Jordan, 2010; WHO, 2003). Les chercheurs des domaines de la santé et de la réadaptation qui visent particulièrement l'adoption d'un comportement sain, face à la participation à un programme de marche, doivent s'assurer que le participant est en mesure de participer de façon équitable à l'étape de la décision d'un plan de traitement afin d'accroître son niveau de confiance, selon son intention de changer et son style de vie. Le but ultime est d'encourager le participant à maintenir à long terme une habitude de vie ou un comportement sain. De nombreux chercheurs ont tenté à maintes reprises d'identifier les facteurs (facilitateurs et

obstacles) qui semblent influencer l'adhésion au traitement d'un individu, dans le contexte de l'arthrose (Lunsky, 2014; Poitras, 2010; Rosella, 2014). Toutefois, un consensus clair concernant lesquels des facteurs d'influence sont les plus prédominants et propices à améliorer ou détériorer l'adhésion n'a pas encore été établi.

Depuis plusieurs années, différentes stratégies comportementales, visant à améliorer l'adhésion à une intervention physique sur une longue période de temps, ont été évaluées auprès de la population atteinte d'un problème chronique (Marks, 2005). Les faits scientifiques ont confirmé que l'éducation des clients, le soutien social, la rétroaction positive ainsi que l'identification des objectifs personnels représentent les approches comportementales les plus communes pour accroître le niveau d'activité physique et la qualité de vie d'un individu (Marks, 2005). D'ailleurs, les études qui ont combiné une ou plusieurs de ces stratégies à une intervention physique ont obtenu des taux inférieurs au niveau de l'abandon des participants; l'adhésion aux interventions physiques était, par ailleurs, nettement meilleure (Loew, 2012).

Au cours des dernières années, il a été établi que les caractéristiques personnelles d'un individu contribuent à motiver ce dernier à adhérer à une activité physique (Medina-Mirapeix, 2009). D'ailleurs, la préférence en fait partie et représente le principal facteur influençant l'adhésion (Sirur, 2009). Depuis les dernières années, plusieurs auteurs (Jordan, 2010; Miranda, 2009; Slade, 2009) ont discuté de l'importance de prendre en considération les préférences des participants dans leurs études cliniques. Cependant, seuls quelques ECR ont rapporté l'impact de la préférence sur l'efficacité d'une intervention et n'ont analysé que des résultats cliniques, tels

qu'une réduction cliniquement importante de la douleur et du niveau d'incapacité ainsi qu'un faible taux d'abandon lorsque la préférence du participant est respectée (Klaber, 2005; Johnson, 2007; Salter, 2006; Tilbrook, 2008).

D'ailleurs, il est important de comprendre que la préférence est plus susceptible d'influencer les résultats d'un ECR et, par conséquent, l'efficacité d'une intervention particulière lorsqu'il est difficile ou même impossible de cacher la nature de l'intervention aux participants. Du moment que les participants connaissent les effets positifs d'une intervention physique proposée, ils manifestent rapidement une forte préférence à l'égard de l'intervention qui convient le mieux à leurs besoins et leur style de vie (Millat, 2005). Chaque personne est unique et le respect de sa préférence (McCormack, 2003) à un type d'activité physique représente un élément prometteur dans le contexte des approches comportementales.

Cela atteste la justification du sujet de thèse de considérer la préférence des participants comme une approche d'application des connaissances, puisqu'il s'agit d'une première de mesurer l'adhésion aux LDC sur les programmes de marche avérés efficaces auprès des personnes âgées atteintes d'arthrose du genou. L'adhésion à une intervention physique représente une mesure indispensable pour affirmer l'efficacité de l'application thérapeutique de tout programme d'activité physique, en termes de bienfaits cliniques, physiologiques ainsi que de la qualité de vie (Loew, 2012; Anderson, 2016; Grave, 2011). De ce fait, un ECR préliminaire a été performé afin de viser l'application d'une approche fondée sur la préférence des participants, en anticipant que cette stratégie d'application est bénéfique pour promouvoir l'adoption d'un comportement. L'ECR représente la forme scientifique la plus fiable et de plus importante valeur pour présenter les preuves scientifiques et montrer la faisabilité d'élaborer un ECR à plus grande échelle, suite à l'évaluation du

processus et du taux de recrutement des participants, de la conception d'un ECR, de la mise en place des interventions ainsi que des mesures de résultats sélectionnées.

Enfin, la prise en compte de la préférence des participants est une approche qui : 1) n'a pas encore été appliquée à un ECR promouvant la marche; 2) n'a pas été étudiée chez les personnes âgées souffrant d'arthrose légère à modérée, et enfin 3) n'a jamais été évaluée pour améliorer l'efficacité d'un traitement et confirmer la réussite de l'application des connaissances, en mesurant principalement le taux d'adhésion (Tilbrook, 2008). Bref, ces éléments montrent l'opportunité et la justification de la présente thèse doctorale. Ainsi, il est fort probable que la considération de la préférence des participants à un programme de marche structuré et fondé sur les données probantes offrira une voie innovante pour améliorer l'adhésion à long terme; elle semble donc nécessaire pour tirer des conclusions positives.

Définitions pertinentes et sommaire des écrits scientifiques

La présente section résume le cheminement de nombreuses réflexions sur les modèles et les théories existants qui m'ont permis de mieux comprendre les notions de base concernant l'adoption d'un comportement, l'adhésion à une intervention, la préférence à une activité physique ainsi que les fondements de l'application des connaissances en recherche.

Adopter un comportement sain

L'adoption d'un comportement sain se définit par le passage d'un état à un autre, en choisissant une action ou une façon de se comporter afin d'atteindre l'objectif d'admettre comme sien un comportement sain qui est souhaité. Il existe actuellement un manque de connaissances et de preuves scientifiques dans les écrits scientifiques concernant les types de personnes qui parviennent à changer leurs comportements malsains par rapport à ceux qui abandonnent avant même d'adopter un comportement approprié dans le domaine de la réadaptation (Jack, 2010). En effet, certains individus n'ont aucunement l'intention de changer leurs habitudes de vie, d'autres reconnaissent qu'il existe un problème et commencent sérieusement à penser au changement tandis que d'autres se trouvent à une étape de leur vie où ils montrent qu'ils sont prêts à adopter un comportement sain, dans un futur proche (Nigg, 2011). Souvent, l'adoption d'un comportement s'effectuera plus facilement si le client croit aux bienfaits du traitement à envisager dans la prise en charge de la maladie (Glanz, 2008).

Dans le contexte actuel, un individu sédentaire atteint de l'arthrose pourrait par exemple adopter une pratique habituelle de la marche, prouvée efficace selon les LDC du groupe d'experts et de méthodologistes du panel d'Ottawa, après avoir compris qu'un mode de vie plus actif aurait plus de bienfaits (p. ex., la marche régulière lui permettrait de moins ressentir de douleur liée à l'arthrose) que de désavantages (p. ex., la sédentarité augmenterait ses symptômes), sans parler des bienfaits globaux sur sa santé générale. Selon les auteurs Prochaska, Norcross et DiClemente (2013), les comportements humains évoluent dans le temps, puisqu'une personne doit passer à travers différentes phases du comportement. De ce fait, cette disposition se présente sous la forme d'un processus cyclique (Boyatzis, 2006) qui regroupe chacune de ces phases, ordonnées chronologiquement (Prochaska, 2013). D'ailleurs, c'est seulement ensemble

qu'elles expliquent la façon dont un individu progresse d'une phase à l'autre pour atteindre le but ultime de changer son habitude problématique et, par conséquent, d'adopter définitivement un comportement approprié (Prochaska, 1992). La phase de maintien du comportement combine la prévention des récidives et la consolidation des gains obtenus. Plus cette phase est longue, plus le comportement sain sera maintenu à long terme. Bref, ces phases véhiculent des informations pertinentes, particulièrement sur les caractéristiques personnelles des gens, qui aident les professionnels de la santé et leurs clients à faire un choix éclairé quant au type d'intervention le plus adéquat (Prochaska, 2013).

Adhésion

L'adhésion est définie comme un engagement et une collaboration active et volontaire d'un individu en vue d'adopter un comportement sain particulier (Hoozeboom, 2012). Dans le contexte présent, l'adoption d'un comportement désigne l'adhésion à un programme d'activité physique. De ce fait, cela se réfère plus précisément à l'action de suivre, après maintes réflexions, une intervention qui a été recommandée et non exigée par un professionnel de la santé (Hoozeboom, 2012; Jordan, 2010; Loew, 2012) afin d'atteindre avec succès un résultat thérapeutique souhaité (Hoozeboom, 2012). Ainsi, lorsque l'on parle de l'adhésion régulière à l'activité physique, cela inclut deux composantes clés : 1) le niveau d'activité physique atteint lors d'un cycle d'intervention (durée/fréquence/intensité des exercices suivis d'après le niveau d'activité physique prescrit par le professionnel de la santé, et 2) le niveau d'activité physique maintenu, qui n'inclut pas nécessairement un suivi du professionnel de la santé, à plus long terme (Jordan,

2010). Il ne faut donc pas confondre avec le terme « abandon », qui se réfère plutôt à l'action de cesser un programme d'activité physique, en choisissant personnellement de se retirer complètement du programme avant la fin de la durée recommandée, indépendamment du niveau d'adhésion à l'intervention physique avant l'abandon (Stiggelbout, 2005). De ce fait, un participant qui ne semble pas adhérer de façon régulière à un programme ne veut pas dire qu'il abandonne l'intervention. De plus, il est important de distinguer le terme « adhésion » de celui d' « observance thérapeutique » qui a un sens différent, et qui ne représente donc pas un synonyme. En effet, l'observance thérapeutique se définit comme la mesure dans laquelle le comportement d'une personne coïncide avec un avis médical, puisque l'individu en question ne fait que suivre la thérapeutique prescrite sans coopérer. Dans de nombreuses études, les deux termes sont employés conjointement, mais aux fins de cette étude, le terme « adhésion » sera utilisé sur le fondement de cette distinction (Delamater, 2006).

De nombreuses théories ont été développées en grande partie grâce aux deux disciplines qui se sont le plus démarquées au cours des années, mais qui ont des perspectives différentes de l'adhésion : soit la sociologie et la psychologie. En effet, la sociologie accorde une importance majeure aux influences sociales et aux relations sociales qui entourent chaque personne (Lutfey, 2005). Comme décrit par Lutfey et al. (2005), la personne doit compter sur ses relations sociales qui l'entourent (p. ex., rétroaction, renforcement positif, soutien social, etc.). Les réseaux sociaux offrent ainsi différentes interactions pour l'individu, ce qui s'avère essentiel à l'adhésion.

Au contraire, la psychologie se fonde sur les différentes caractéristiques personnelles d'un individu, en considérant l'auto-efficacité et l'autodétermination comme deux importantes qualités qui améliorent l'adhésion à l'activité physique (Slovenic, 2007). Tout comportement humain se définit comme une interaction réciproque et dynamique entre les influences personnelles (cognitions, émotions, anatomie), comportementales et environnementales (Bandura, 1977 et 1986; Brawley, 2000). Selon Bandura (1986), il est primordial que chaque individu soit en mesure de prendre conscience de ses capacités à adhérer avec succès, car cela renforcera ses propres croyances en sa capacité de performer d'autres actions similaires. Si l'on se réfère à l'exemple de Brawley et al. (2000) sur l'adhésion à une activité physique, chez les personnes âgées, il faut comprendre que lorsqu'un individu souffre de l'arthrose du genou, il expérimentera des difficultés importantes à performer ses activités de la vie quotidienne. Ces incapacités peuvent détruire sa perception de son efficacité personnelle (auto-efficacité) pour accomplir différentes tâches physiques, ce qui peut l'inciter à continuer une vie sédentaire. Au contraire, il peut être encouragé et davantage motivé à s'engager de façon régulière à la marche, puisque c'est une activité physique simple et à faible intensité, ce qui augmente son auto-efficacité (Brawley, 2000).

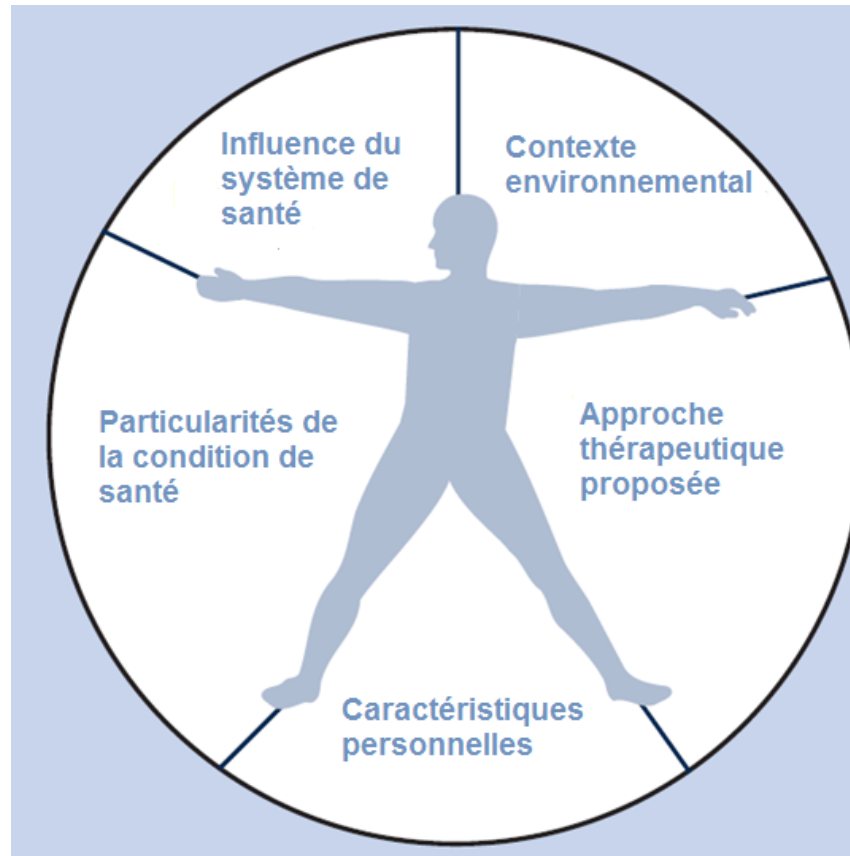
Enfin, autant les sociologues que les psychologues croient que l'individu lui-même joue un rôle important dans la prise de décision clinique, en considérant les caractéristiques personnelles et le degré de motivation pour initier un comportement et y adhérer de façon maintenue. Il est ainsi nécessaire d'appliquer ce point commun des deux disciplines, qui semble fondamental à la compréhension interdisciplinaire du phénomène de l'adhésion. D'ailleurs, d'autres chercheurs postulent que l'adhésion à un programme

d'activité physique est influencée non seulement par les croyances cognitives et environnementales, mais également par la stratégie motivationnelle (Deci, 2002; Glanz, 2008). En effet, chaque personne montre trois besoins psychologiques instinctifs qui sont tous essentiels à la motivation : 1) la compétence (capacité de suivre l'activité physique avec succès); 2) l'appartenance sociale (sentiment de connexion avec les autres), et 3) l'autonomie (intention d'agir en harmonie avec soi-même) (Deci, 2004; Fortier, 2007). L'influence réciproque entre l'individu, son comportement et le milieu dans lequel il vit se fait uniquement de façon interactive, ce qui l'incite à agir de façon active tout au long du processus (Glanz, 2008). Les écrits scientifiques ont d'ailleurs affirmé que puisque les influences sociales, émotionnelles et physiques peuvent se produire (Slovenic, 2007), l'individu tient souvent compte de ses préférences. De ce fait, ce dernier a d'abord besoin d'augmenter son niveau de confiance en l'efficacité personnelle afin d'adopter un comportement volontaire et autonome. On parle alors ici de la perception d'un locus interne de causalité. Cela lui permet de montrer une motivation supplémentaire sans influence externe, en présentant une plus grande autodétermination, c'est-à-dire la motivation la plus autodéterminée. Cela a pour but de maintenir l'adoption de ce comportement à plus long terme (Slovenic, 2007). Les influences externes ou sociales ne sont ainsi pas suffisantes pour influencer à elles seules le comportement humain, puisqu'elles sont perçues comme un locus externe de causalité non autodéterminé (Deci, 2004). Bref, les individus ont la capacité de prévoir, planifier et prendre des décisions rationnelles par eux-mêmes (Nieuwenhuijsen, 2006), en démontrant un niveau optimal d'auto-efficacité et d'intention désirée et voulue afin d'adopter un comportement (Davies, 2011). Du moment que la personne est motivée par ses préférences, elle montrera un niveau de détermination

plus élevé (Rothman, 2004) et poursuivra son action seulement si elle se sent satisfaite de ce qu'elle est en mesure d'accomplir (Charles, 1999).

Étant donné l'importance de tous ces concepts, un modèle a été conçu par l'OMS dans le but de résumer et faciliter la compréhension interdisciplinaire de l'adhésion au traitement. Veuillez consulter la figure 1.1 et l'annexe 12.1 pour obtenir de plus amples informations (WHO, 2003). Ce modèle d'intégration confirme que l'adhésion représente un problème multidimensionnel puisqu'elle est fondée sur divers facteurs qui peuvent l'influencer. En effet, l'adhésion ne se définit pas exclusivement par les facteurs personnels, mais aussi par tous facteurs environnementaux. Il est ainsi important de contrôler ces facteurs d'influence en les identifiant rapidement. Le modèle de l'OMS a reconnu les cinq plus éminentes composantes de l'adhésion, soit 1) les caractéristiques personnelles (*Patient-related factors*); 2) les particularités de la condition de santé (*Condition-related factors*); 3) l'influence du système de santé (*Health System factors*); 4) le contexte environnemental (*Social/Economic factors*), et 5) l'approche thérapeutique proposée (*Therapy-related factors*).

Figure 1.1 Les 5 composantes de l'adhésion à une intervention de longue durée



Légende : Traduction française avec permission de republier dans une thèse doctorale, obtenue par de l'OMS (WHO, 2003)

Ce modèle illustre de façon générale les composantes de l'adhésion en identifiant quelques-uns des facteurs potentiels de l'adhésion. Étant donné que les auteurs n'avaient pas identifié de facteurs spécifiques pour mieux décrire chacune des cinq composantes de l'adhésion et n'avaient pas validé ce modèle auprès d'une population arthrosique, il a fallu se référer aux écrits scientifiques afin de déterminer et d'opérationnaliser tous les facteurs pouvant avoir une influence sur l'adhésion. En effet, plusieurs études ont répertorié de nombreux facteurs qui influencent l'adhésion à l'activité physique, telle que la marche, auprès d'individus âgés souffrant d'une maladie chronique, comme l'arthrose du genou. Selon le modèle de l'OMS, tous les facteurs appuyés par les écrits scientifiques dans ce contexte et pour cette population ont été catégorisés d'après les cinq composantes de l'adhésion à une intervention de longue durée, comme suit :

Tableau 1.1 Identification des facteurs selon les cinq composantes de l'adhésion

- Ainsi, la première composante de l'adhésion à une intervention de longue durée représente les caractéristiques personnelles, soit des facteurs personnels qui incluent :

Identification des facteurs personnels – caractéristiques	Appui des écrits scientifiques
Préférence (<i>Preference</i>)	Corrigan, 2003; Crandall, 2013; Tilbrook, 2008
Niveau de motivation (<i>Level of motivation</i>)	Ehrlich-Jones 2011; Hendry, 2006; Hutton, 2010; Hurkmans, 2010; Lee, 2012
Détermination/Persévérance (<i>Determination/perseverance</i>)	Rothman, 2004; Slovenic, 2007
Habitudes (<i>Habits</i>)	Gifford, 2013
Confiance en soi (<i>Self-confidence</i>)	Gifford, 2013
Auto-efficacité (<i>Self-efficacy</i>)	Bandura, 1986; Hutton, 2010; Pisters, 2010

Interaction et comparaison avec les autres (<i>Comparison with others</i>)	Reinseth, 2011
Humeur générale (<i>General mood</i>)	Gifford, 2013
Energie matinale (<i>Morning attitude</i>)	Gifford, 2013; Pruneau, 2006
Intérêt (<i>Interest</i>)	Federal Interagency Forum on Aging, 2012
Influence émotionnelle/des émotions (<i>Emotional involvement</i>)	McArthur, 2014
Peur (c.-à-d. aggravation des symptômes - douleur, chute) (<i>Fear</i>)	Newson, 2007
Autogestion perçue des facteurs de risque (<i>Perceived personal control of the risk factors</i>)	Ehrlich-Jones, 2011; Lee, 2012

- Pour ce qui en est des particularités de l'état de santé (facteurs personnels), cela regroupe :

Identification des facteurs personnels – condition de santé	Appui des écrits scientifiques
Perception de la capacité physique ou du niveau d'activité physique (<i>Perceived physical fitness level</i>)	Alkerwi, 2015; Hendry, 2006
Attitude face à l'état de santé actuel (<i>Attitude toward actual health condition</i>)	Jin, 2008
Autres problèmes de santé/comorbidités (<i>Other health problems/comorbidities</i>)	Schoenberg, 2007
Douleur articulaire (<i>Joint pain</i>)	Federal Interagency Forum on Aging, 2012; Jin, 2008; Moore, 2003

Raideur articulaire (<i>Joint stiffness</i>)	Jin, 2008
Instabilité articulaire (<i>Joint instability</i>)	Jin, 2008
Niveau d'endurance (<i>Level of endurance</i>)	Allen, 2010; Hendry, 2006
Niveau d'énergie (<i>Level of energy</i>)	Chasens, 2007; Hendry, 2006
Vieillessement (<i>Aging</i>)	Allen, 2010; Dolansky, 2010
Bien-être psychologique (<i>Psychological wellbeing</i>)	Picorelli, 2014
Bien-être physique (<i>Physical wellbeing</i>)	Alkerwi, 2015
Perception face au contrôle du poids (<i>Weight control</i>)	Allen, 2010
Perception face à la qualité du sommeil (<i>Quality of sleep</i>)	Chasens, 2007

- En ce qui a trait aux facteurs externes pouvant influencer l'adhésion, il y a d'abord l'influence du système de santé qui inclut :

Identification des facteurs externes – système de santé	Appui des écrits scientifiques
Supervision (<i>Supervision</i>)	Reinseth, 2011; Schutzer, 2004
Rétroaction constante (<i>Constant feedback</i>)	Schutzer, 2004
Récompenses (<i>Incentives</i>)	Pruneau, 2006; Steg, 2009
Proximité (<i>Proximity</i>)	Hutton, 2010
Participation en groupe (<i>Group participation</i>)	Barlow, 2002; Reinseth, 2011

- Aussi, le contexte environnemental (facteurs externes) joue un rôle important en regroupant les influences suivantes :

Identification des facteurs externes – environnement	Appui des écrits scientifiques
Soutien social – famille/amis (<i>Social support - Family/Friend</i>)	Jack 2010
Contact social (<i>Social contact</i>)	Jack 2010
Type de voisinage (<i>Type of neighborhood</i>)	Allen, 2010; Hutton, 2010
Accès aux installations sécuritaires pour la pratique de l'activité physique (<i>Access to safe physical activity facilities</i>)	Allen, 2010
Responsabilités domestiques (<i>Domestic responsibilities</i>)	Gifford, 2013; Steg, 2009
Engagement au travail/bénévole (<i>Work/volunteering schedule</i>)	McArthur, 2014; Pan, 2009
Transport/déplacement – vacances/travail (<i>Traveling - vacation/work</i>)	McArthur, 2014; Pan, 2009
Heures de pointe (<i>Rush hours</i>)	Martin, 2012
Accès aux transports motorisés (<i>Easy access to motorized vehicles</i>)	King, 2001; Lox, 2006
Climat (<i>Weather</i>)	McArthur, 2014

- L'approche thérapeutique proposée (facteurs externes) représente la dernière composante de l'adhésion à une intervention de longue durée, incluant :

Identification des facteurs externes – approche thérapeutique	Appui des écrits scientifiques
Promotion des bienfaits thérapeutiques (<i>Knowing the therapeutic benefits</i>)	Ehrlich-Jones, 2011; Lee, 2012; Pruneau, 2006

Priorités/attentes liées à la santé (<i>Health purposes</i>)	Ehrlich-Jones 2011; Gifford, 2013; Hutton, 2010; Hurkmans, 2010; Lee, 2012
Niveau de satisfaction mesuré (<i>Level of satisfaction</i>)	Lee, 2008; Slovenic, 2007
Impact perçu de l'activité (<i>Perceived impact of the activity</i>)	Huberty, 2008; Seguin, 2010
Différence mesuré au niveau de la mobilité (<i>Difference in mobility</i>)	Hong, 2008; Seguin, 2010
Différence mesuré au niveau de l'équilibre (<i>Difference in balance control</i>)	Seguin, 2010
Différence mesuré au niveau de la qualité du sommeil (<i>Difference in quality of sleep</i>)	Chasens, 2007; Seguin, 2010
Perception différente des capacités physiques (<i>Different perception in physical abilities</i>)	Hong, 2008
Changement mesuré dans la prise de médicaments (<i>Change in medication use</i>)	Stineman, 2011

Préférence à l'activité physique

Tel que mentionné, les preuves scientifiques ont indiqué que la préférence représente le principal facteur qui contribue à augmenter la motivation d'une personne à adhérer à une activité physique, puisque cette approche comportementale promeut la participation active et s'associe à une plus grande satisfaction face à la pratique régulière de l'activité physique (Rothman, 2004, Sirur, 2009). Cette approche se fonde sur les récentes données probantes révélant que le respect de la préférence des participants évite un

découragement et un désir d'abandon de la part de ces derniers (Tilbrook, 2008). Cela permet d'accroître l'impact et l'efficacité de l'intervention, en augmentant le degré de motivation du client à adopter un comportement et à accomplir des progrès quant au maintien d'un comportement sain. En d'autres termes, si une personne est motivée par ses propres préférences, elle sera plus déterminée à adopter un comportement (Fortier, 2007; Rothman, 2004). De plus, en étant satisfaite face au respect de la préférence, la décision initiale d'avoir adhéré sera justifiée et ainsi la personne comprendra que l'effort de maintenir à plus long terme ce comportement désiré sera plus réalisable (Slovenic, 2007).

D'ailleurs, après l'utilisation respective du terme « adhésion », les auteurs Charles, Gafni et Whelan ont introduit pour la première fois l'approche de prise de décision partagée, axée sur le client (Barry, 2012; Charles, 1999; Elwyn, 2012). Le professionnel de la santé est responsable d'offrir son expertise et son savoir afin d'aider le client à faire un choix éclairé, tout en respectant les préférences ainsi que les intentions désirées et voulues par ce dernier (Lutfey, 2005; Nieuwenhuijsen, 2006). Ensuite, la préférence qu'une personne manifeste à l'égard d'une activité physique révèle son expression personnelle après avoir réfléchi de façon éclairée sur les avantages (bienfaits) et les inconvénients (risques) d'une ou de plusieurs interventions physiques proposées par le professionnel de la santé (Miranda, 2009). Cette stratégie de la prise de décision est idéale et s'avère utile pour améliorer l'autonomie et le niveau de confiance du client (Charles, 1997). Bref, la préférence du client représente l'élément le plus important à respecter pour guider le client vers l'adoption d'un nouveau comportement, tel que l'adhésion à un programme de marche (Spring, 2007).

Application des connaissances

L'application des connaissances (*Knowledge Application or Implementation*) est une série d'activités ordonnées ayant pour objectif de promouvoir l'adoption de résultats spécifiques de la recherche scientifique, en identifiant et en surpassant les barrières à l'application des connaissances (Straus, 2013). Cette approche se résume par l'identification d'une intervention reconnue la plus efficace, dans un contexte particulier, en se fondant sur les LDC actuelles, soit la création des connaissances par les chercheurs. Cela permet ensuite aux utilisateurs, tels que les clients, d'intégrer de façon appropriée les recommandations émises dans cesdites LDC, par l'adoption d'interventions d'application des connaissances (Straus, 2013). Elle guide ainsi les utilisateurs vers une performance, une innovation, un changement ou une amélioration particulière (Landry, 2006). Par exemple, cette interaction directe avec les chercheurs (Graham, 2003) permet aux clients de rester à l'affût des avancées constantes dans les connaissances et d'opter pour un style de vie fondé sur les données probantes, dans le but de devenir plus actifs dans la prise de décision et dans l'autogestion de leur problème de santé (Grimshaw, 2001).

Dans le contexte présent de l'étude, une trousse d'application a été conçue en fonction des lignes directrices cliniques du groupe d'experts et de méthodologistes du panel d'Ottawa, afin que les participants de l'étude souffrant de l'arthrose légère à modérée du genou s'engagent à suivre les recommandations émises par le panel d'Ottawa concernant l'application d'un programme de marche avéré efficace, selon deux modes de supervision:

- 1) Programme de marche supervisé sur une période de progression de 6 mois où les participants étaient invités à marcher au club de marche du centre d'achat *Billings Bridge* (horaire fixe) sous supervision par un professionnel de la santé, à chaque séance de marche (prises de mesures cliniques et adhésion, identification des objectifs personnels et suivi téléphonique).

- 2) Programme de marche non-supervisé sur une période de progression de 6 mois où les participants étaient invités à marcher librement à n'importe quel endroit sauf au centre d'achat *Billings Bridge* (horaire libre) sans supervision par un professionnel de la santé, dont les participants devaient noter par eux-mêmes les mesures cliniques et l'adhésion de façon seule dans le journal de bord

Il faut noter que la période de suivi de 3 mois permettait à tous les participants de marcher librement selon leur préférence. Les deux groupes ont reçu les mêmes interventions comportementales, combinées à la marche. Le contenu des interventions comportementales a été fondé sur le programme éducatif développé par la société de l'arthrite intitulé : *Stay Active/Manage your OA pain*. Ce programme comportait : 1) détermination des objectifs à court et à long terme, 2) soutien moral/encouragements/rétroaction positive et 3) identification des barrières et des stratégies/facilitateurs pour pallier aux obstacles de l'adhésion. Le contenu était identique pour les deux groupes parallèles, toutefois les participants du groupe supervisé ont suivi ces interventions comportementales à chaque semaine et ceux du groupe non-supervisé aux 3 mois.

Buts et questions de recherche

L'objectif principal de cette thèse doctorale était de présenter une compréhension approfondie concernant les stratégies d'application ainsi que l'identification des facteurs promouvant l'adhésion à un programme de marche étalé sur neuf mois, prouvé efficace selon les recommandations du groupe d'experts et de méthodologistes du panel d'Ottawa (Loew, 2012), et ce, auprès des personnes âgées entre 40 et 81 ans atteintes d'arthrose légère à modérée du genou, en évaluant la préférence des participants comme moyen principal d'application. Pour ce faire, un ECR préliminaire a été élaboré dans le but d'examiner les trois principales questions de recherche suivantes :

- 1) Quels ont été les facteurs personnels et externes qui sembleraient influencer l'adhésion des participants au programme de marche?
- 2) Parmi les participants qui ont exprimé une préférence initiale pour le mode de supervision du programme de marche (soit supervisé ou non-supervisé) et qui ont été aléatoirement affectés à leur programme préféré, est-ce que ces derniers ont mieux suivi les recommandations émises? Cela s'est-il traduit par une amélioration de leur adhésion à la marche et, par conséquent, ont-ils obtenu de meilleurs résultats cliniques, comparativement à ceux qui n'ont pas obtenu leur programme préféré, neuf mois suivant le début de l'intervention?
- 3) Parmi les participants qui n'ont pas exprimé une préférence initiale pour l'un des deux programmes de marche (supervisé ou non supervisé), est-ce que ceux qui ont été aléatoirement affectés au programme de marche supervisé ont mieux adhéré à la marche, et donc ont démontré des améliorations cliniques, par rapport à ceux qui ont suivi le programme de marche non supervisé, neuf mois suivant le début de l'intervention?

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Chapitre 2: Compréhension théorique

Le chapitre 2 aborde la compréhension théorique par l'application du cadre théorique intitulé « Processus des connaissances à la pratique » en lien avec le sujet de thèse. Une explication détaillée est présentée afin d'identifier et de mieux comprendre les deux phases du cadre théorique, soit la création des connaissances ainsi que l'application du sujet de thèse.

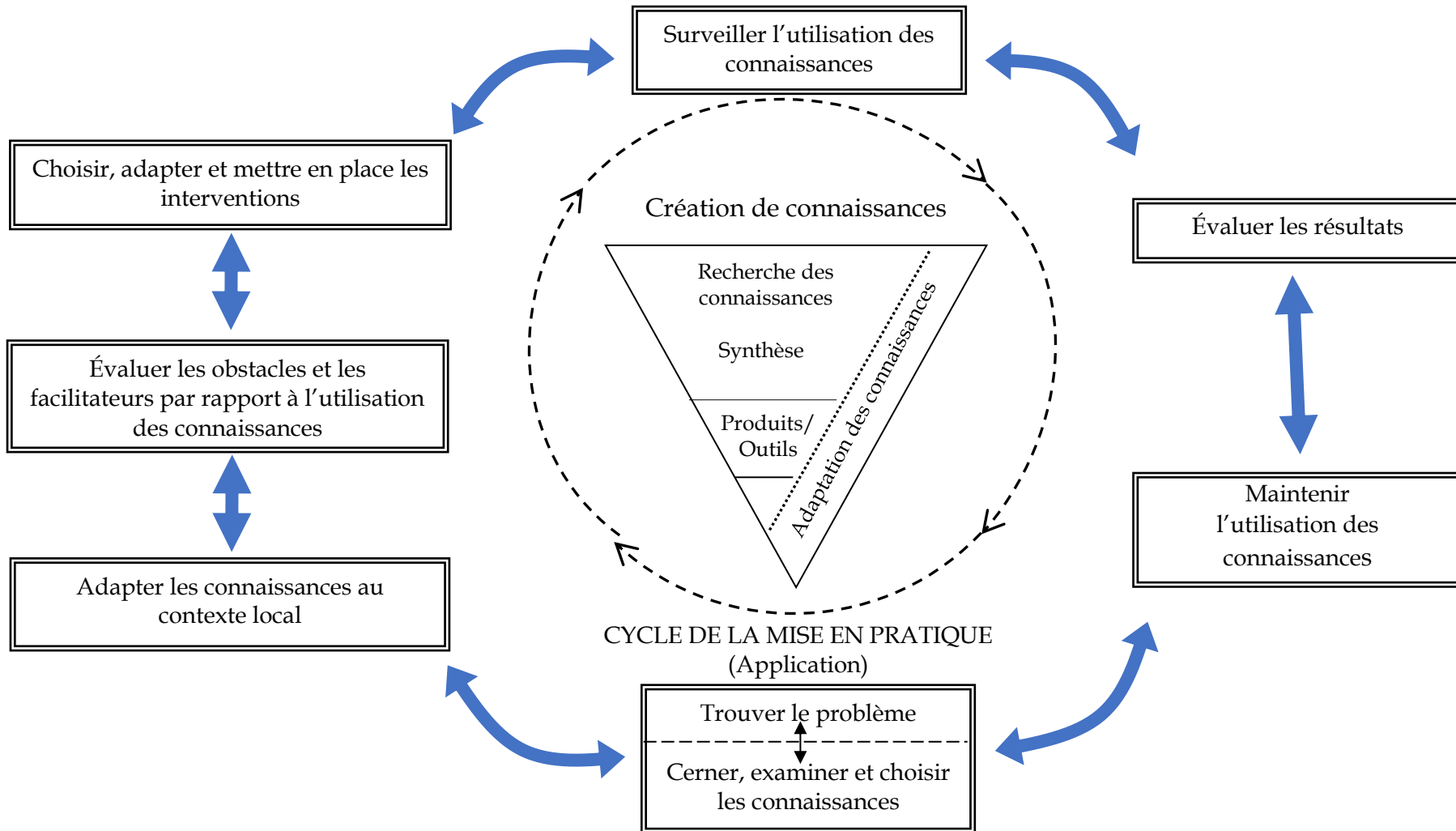
Processus des connaissances à la pratique

Un grand nombre de cadres théoriques ont été publiés afin de conceptualiser les stratégies d'application des connaissances pour l'application dans un contexte particulier d'une intervention prouvée efficace. Un récent cadre théorique intitulé « Processus des connaissances à la pratique » (figure 2.1 et annexe 12.2), mieux connu sous l'appellation anglaise *Knowledge-To-Action Framework*, a été conçu par Graham et al. (2006) et mise à jour en 2013 (Straus, 2013). Il a d'ailleurs été traduit en français, en 2012, par les IRSC afin de promouvoir cette application des connaissances découlant de la recherche scientifique. Fondé sur 31 théories pertinentes, ce cadre d'orientation permet de mieux comprendre le concept d'application des connaissances ainsi que d'identifier les stratégies d'utilisation de ces connaissances pour encourager l'application des connaissances scientifiques (Straus, 2013).

Le « Processus des connaissances à la pratique » (figure 2.1) se divise en deux phases importantes : 1) la création des connaissances, et 2) le cycle de la mise en pratique (application) des connaissances. Chacune des phases peut se suivre de façon séquentielle ou simultanée (Straus, 2013).

La première phase permet de rechercher et d'identifier les connaissances provenant d'études individuelles afin de résumer ces résultats de recherche. Cela permet ensuite de créer des produits ou des outils promotionnels qui présentent les connaissances de façon plus concise, claire et appropriée, dans le but de faciliter l'application des connaissances. Une fois les connaissances adaptées, la deuxième phase peut débuter, soit l'application des connaissances dans la pratique. Cette deuxième phase se résume par plusieurs sous-concepts, tels que la détermination du problème en question en cernant, examinant et sélectionnant les connaissances, l'adaptation des connaissances à un contexte particulier et l'évaluation des obstacles et facilitateurs qui influencent l'utilisation de ces connaissances. Finalement, le choix, l'adaptation et l'application des stratégies ou interventions d'application sont entamés afin de surveiller l'utilisation des connaissances ainsi que son impact sur les résultats, dans le but de maintenir cette utilisation des connaissances dans le futur (Straus, 2013).

Figure 2.1 Processus des connaissances à la pratique



Légende : Version française adaptée du modèle avec permission de republier dans une thèse doctorale, obtenue par D^r. Ian Graham (Straus, 2013).

Création des connaissances

La création des connaissances représente la première phase du processus des connaissances à la pratique (Figure 2.1). Cela est entamé par l'identification d'une question de recherche à résoudre en explorant l'ensemble des connaissances actuelles sur le sujet, publiées dans les écrits scientifiques, selon le contexte choisi, la population à étudier ainsi que le domaine ou le champ de pratique et l'environnement de recherche. Une fois les connaissances identifiées, elles sont toutes regroupées dans une synthèse sous forme d'une recension systématique ou d'une méta-analyse des données afin de constater les convergences et divergences. Les connaissances sont alors de plus en plus raffinées, telle l'allusion d'un entonnoir. Ensuite, des outils ou produits des connaissances synthétisées, tels que des LDC, sont présentés pour en faire la promotion et les rendre accessibles aux utilisateurs (cliniciens et leurs clients) (Straus 2013).

Utilisé dans le contexte de ces travaux doctoraux, le produit de la création des connaissances est les LDC intitulées: *Ottawa Panel evidence-based clinical practice guidelines for walking programs in the treatment of osteoarthritis* (Loew, 2012) (voir annexes A et 12.3). Ces LDC avaient déjà été élaborées lors d'un mémoire dans le cadre du diplôme de maîtrise professionnelle en physiothérapie, à l'Université d'Ottawa. L'objectif consistait à concevoir une recension systématique examinant l'efficacité de différents programmes de marche, étalés sur une période d'au moins 1 mois, contre les symptômes de l'arthrose légère à modérée du genou, auprès des individus âgés de plus de 18 ans. Cela a permis d'analyser de nombreux ECR portant sur un programme de marche axé sur l'arthrose légère à modérée du genou. Pour ce faire, une recension systématique a été menée d'abord sur toutes les études qui portaient sur les programmes de marche et l'arthrose légère à modérée du genou, en utilisant plusieurs mots-clés pertinents (voir annexe 2). Cela a permis de choisir

719 études potentiellement admissibles. Ensuite, deux pairs de réviseurs ont été chargés d'évaluer les 719 études afin de sélectionner les plus pertinentes, soit 85 articles choisis. Enfin, chaque réviseur a par la suite créé une liste des études à inclure et à exclure. Les réviseurs se sont consultés, suite à leurs résultats personnels, pour décider des articles pouvant être sélectionnés pour l'extraction des données. Si ces articles présentaient des incertitudes, les réviseurs étaient invités à consulter un troisième évaluateur. Au total, 18 articles ont été inclus et 67 études ont dû être exclues (Loew, 2012).

Les critères d'inclusion se résumaient par :

- 1) Devis des études : Études comparatives soit des ECR, des essais cliniques contrôlés ou des études cas-témoins.
- 2) Population : Participants âgés de 18 ans et plus souffrants de l'arthrose légère à modérée du genou, présentant ou non un embonpoint ou de l'obésité.
- 3) Intervention(s) : Marche seule ou combinée à un programme d'exercices (renforcement et/ou étirement) et/ou éducation et/ou perte de poids, avec ou sans supervision.
- 4) Comparaison(s) : Groupe d'interventions comparé à un groupe témoin (traitement conventionnel ou séances éducatives seulement).

- 5) Mesure des résultats : Symptômes de l'arthrose (douleur, œdème, raideur articulaire, amplitude articulaire), état fonctionnel (travail, activités de la vie quotidienne), qualité de vie, équilibre, fonction cardiopulmonaire, coordination, fatigue, flexibilité, patron de marche, circonférence de taille, processus inflammatoire, imagerie articulaire, prise de médicaments, mobilité, force/endurance/puissance musculaire, satisfaction, posture, effets secondaires, taux d'adhésion, taux d'abandon, nombre de pas, monter/descendre les escaliers et longueur de pas.
- 6) Temps : Période de temps pour mesurer l'effet ou non de l'intervention (programme de marche) s'étalant sur au moins un mois, avec ou non présence d'une période de suivi.

Les critères d'exclusion comportaient :

- 1) Devis des études : Études non comparatives (telles que des séries de cas/rapports de cas ou des études de cohorte non contrôlées), taille de la population de moins de cinq participants par groupe, ratio d'abandon des sujets de plus de 20 %, articles publiés dans une autre langue que le français ou l'anglais.
- 2) Population : Participants présentant toutes affections concurrentes à l'arthrose qui entraînent un problème fonctionnel (p. ex., cancer, problèmes pulmonaires, etc.), sauf l'obésité.

- 3) Intervention(s) : Programmes d'intervention qui ont une composante chirurgicale (de tous les membres inférieurs et du dos), thérapie cognitivo-comportementale ou en lien avec la médication ou la perte de poids.
- 4) Comparaison(s) : Aucune comparaison ou comparaison à un programme de marche combiné à une intervention de perte de poids.
- 5) Mesure des résultats : Mesures biomédicales et psychosociales, mesures des marqueurs biologiques et perte de poids.
- 6) Temps : Période d'interventions inférieure à un mois.

La qualité méthodologique de chaque étude a été évaluée grâce à l'échelle validée de Jadad, telle qu'elle est utilisée par la méthodologie de la Collaboration Cochrane (<http://www.cochrane.org/>). Suite à la recension systématique, une ébauche du projet a été préparée par le groupe méthodologique d'Ottawa afin d'être présentée au groupe d'experts et de méthodologistes du panel d'Ottawa en vue d'obtenir un consensus en ce qui a trait à l'approbation de chaque recommandation émise ainsi que la qualité des études sélectionnées. L'analyse statistique des données collectées a été rapportée en se fiant aux méthodes de la Collaboration Cochrane. Un système de cotation des recommandations, élaboré par le panel d'Ottawa, a été choisi afin de définir l'importance significative de chaque intervention, en accordant une lettre (Loew, 2012) :

Tableau 2.1 Système de cotation des recommandations

A	Niveau de preuves scientifiques statistiquement significatif et cliniquement important (différence minimale cliniquement importante de > 15 %) de la part d'une ou de plusieurs études randomisées et contrôlées
B	Niveau de preuves scientifiques statistiquement significatif et cliniquement important (différence minimale cliniquement importante de > 15 %) de la part d'une étude non-randomisée
C+	Niveau de preuves scientifiques cliniquement important (différence minimale cliniquement importante de > 15 %), mais non statistiquement significatif
C	Mesure des résultats adéquatement évaluée, dans une étude qui satisfait aux critères d'inclusion, mais dont aucune différence significative et cliniquement importante entre les groupes n'a été notée (l'intervention n'est pas plus efficace que le groupe témoin)
D+	Aucun niveau de preuves scientifiques statistiquement significatif et cliniquement important n'est démontré, mais le groupe témoin est favorisé
D	Niveau de preuves scientifiques cliniquement important, mais non statistiquement significatif, qui favorise le groupe témoin
D-	Niveau de preuves scientifiques statistiquement significatif et cliniquement important qui favorise le groupe témoin

Le groupe d'experts et de méthodologistes du panel d'Ottawa a élaboré des recommandations en résumant sept études comparatives contrôlées de qualité supérieure (ayant obtenu un score de 3/5 ou plus sur l'échelle de Jadad [Jadad, 1996]) parmi les 18 études présélectionnées (Kovar, 1992; Peterson, 1993; Peloquin, 1999; Dias, 2003; Penninx, 2001; Talbot, 2003; Messier, 2004). Parmi les études retenues, la durée des programmes de marche variait entre deux et six mois. Ainsi, les LDC créées par le Panel d'Ottawa indiquent que la marche, pratiquée en combinaison ou non avec un programme d'exercices d'étirements et de renforcement, est

fortement recommandée afin de gérer les symptômes de l'arthrose légère à modérée du genou. Combinée à des séances éducatives et des approches comportementales, la marche est considérée comme efficace pour le soulagement de la douleur articulaire, l'endurance, l'état fonctionnel ainsi que la qualité de vie de ces personnes (Loew, 2012). D'ailleurs, les écrits scientifiques suggèrent que la promotion de l'autogestion par la rétroaction positive ainsi que l'éducation sur les avantages de la marche représentent d'importantes stratégies comportementales à utiliser en combinaison avec la pratique de la marche (Messier, 2009). Le Panel d'Ottawa a ainsi conclu que la pratique régulière de la marche doit être effectuée pendant au moins 25 minutes (en augmentant graduellement de cinq minutes chaque mois pour atteindre un maximum de 45 minutes) à un niveau d'intensité modérée, soit au-delà de l'intensité requise pour performer des activités quotidiennes normales, et à une fréquence minimale de trois fois par semaine (Loew, 2012). Toutes les recommandations émises ont montré autant une importance clinique (c.-à-d. une différence minimale cliniquement importante entre les deux groupes comparés) qu'une signification statistique ($P < 0,05$), par conséquent, elles ont toutes obtenu un grade de niveau A. D'autres améliorations ont été notées en ce qui concerne notamment la raideur articulaire, la force musculaire des membres inférieurs ainsi que la mobilité (p. ex., escaliers, nombre de pas par séance de marche). Cependant, même si ces recommandations ont obtenu un niveau de preuves scientifiques cliniquement important, l'amélioration n'était pas considérée comme étant statistiquement significative (Loew, 2012).

En effet, la marche, comme toute autre activité physique, est considérée comme la plus importante approche thérapeutique non pharmacologique à suivre, puisqu'elle produit un effet analgésique qui induit progressivement une diminution de douleur (Lim, 2009; Williams, 2010). Ces changements positifs sur la santé générale sont aussi attribués à une réduction de stress sur l'articulation du genou ainsi qu'à une amélioration de la stabilité articulaire, la fonction neuromusculaire, la condition cardiovasculaire et l'endurance à l'activité ainsi que le contrôle de poids et l'amélioration du sommeil. Par conséquent, les personnes souffrant d'arthrose légère à modérée deviennent plus fonctionnelles dans la vie quotidienne, en améliorant leur qualité de vie (Ottawa Panel, 2005, 2011; Loew; 2012). L'effet sur la qualité de vie peut également se rapporter à une diminution de la fatigue et de l'anxiété, ce qui permet de garder une certaine motivation et une bonne santé mentale grâce à la pratique régulière de la marche (Macht, 2006). Après une analyse poussée des études incluses dans la recension systématique, les auteurs de Loew et al. (2012) ont réalisé que même après avoir confirmé les bienfaits cliniques des programmes de marche, les individus atteints de l'arthrose légère à modérée qui ont participé à ces essais cliniques à court terme ont toutefois présenté une adhésion faible à la marche ainsi qu'un taux d'abandon élevé (Loew, 2012).

Étant donné que la recension systématique a été menée de janvier 1966 à mai 2012, une mise à jour a donc été performée pour évaluer toutes études publiées après mai 2012, et ce, jusqu'à juillet 2016. Les mêmes mots-clés utilisés lors de la version précédente de la recension des écrits ont permis de répertorier 42 articles potentiellement admissibles. À cette liste, approuvée par une bibliothécaire

de l'Université d'Ottawa, aucune nouvelle étude n'a pu être ajoutée après une évaluation approfondie de chaque article selon les mêmes critères d'inclusion et d'exclusion mentionnés ci-haut. En effet :

- Dix-neuf études n'évaluaient pas un programme de marche (Yildiz, 2015; Rampazo-Lacativa, 2015; Zeng, 2015; Cuesta-Vargas, 2015; Clausen, 2014; Kraus, 2014; Jimenez, 2014; Villadsen, 2014; Park, 2014; Marra, 2014; Bennell, 2014; Yazigi, 2013; Rabago, 2013; Messier, 2013; Pinto, 2013; Kim, 2013; Takacs, 2013; Fench, 2013; Assa, 2013);
- Seize articles ne présentaient pas le devis d'étude approprié (neuf recensions systématiques ou méta-analyses [Waller, 2014; Barker, 2014; Harada, 2014; Juhl, 2014; Desveaux, 2014; Di Monaco, 2013; Romeo, 2013; Gaught, 2013; Hagen, 2012] et sept protocoles de recherche [Kloek, 2014; Foster, 2014; de Rooij, 2014; Osteras, 2014; Bennell, 2012 et 2015; Walsh, 2013]);
- Sept études portaient sur une composante chirurgicale (Skou, 2015; Umpierres, 2014; Abdel, 2014; Villadsen, 2014; Vuorenmaa, 2014; Wegrzyn, 2013; Brown 2012).

Application (mise en pratique) des connaissances

Lorsqu'il est temps d'entamer la deuxième phase du « Processus des connaissances à la pratique » (figure 2.1), l'application des connaissances peut être engagée, soit l'application des LDC sur les programmes de marche efficaces auprès des personnes âgées atteintes d'arthrose du genou, précédemment expliquées comme produit de la création des connaissances. Tout d'abord, il est essentiel

de déterminer le problème à résoudre en cernant, examinant et sélectionnant les connaissances, ce qui représente le premier sous-concept de cette phase (Straus, 2013).

Cerner, examiner et sélectionner les connaissances

En tant que point de départ de l'application (mise en pratique) des connaissances, l'identification d'un problème méritant une attention particulière est soulevée. La recherche de connaissances actuelles sur ce problème est alors entamée, suivie d'une analyse critique pour déterminer l'utilité des connaissances trouvées. L'application des connaissances utiles et valides peut alors débuter dans le but de résoudre le problème en question (Straus, 2013). Dans le contexte présent, l'interrogation suivante se pose afin de se familiariser avec les concepts d'application des connaissances et de promouvoir des stratégies novatrices en ciblant la population en question, soit les personnes âgées souffrant de l'arthrose légère à modérée du genou : La préférence des participants quant à leur supervision ou non comme stratégie d'application des LDC sur un programme de marche adapté et avéré efficace serait-elle prometteuse auprès d'individus souffrant des symptômes de l'arthrose légère à modérée du genou, suite à une adhésion de neuf mois au programme?

En effet, la première lacune à cerner et examiner consiste à mieux pallier le problème d'adhésion à la marche pour cette population ciblée. Tel qu'il est mentionné dans le chapitre 1, les chercheurs sont unanimes pour montrer que même si les connaissances affirment que la pratique régulière de la marche offre de nombreux bienfaits cliniques pour composer avec l'arthrose légère à modérée du genou, les personnes atteintes de cette affection chronique évitent toutefois d'adopter cette activité physique et deviennent sédentaires. Il s'agit d'un cercle vicieux puisque les participants n'adhèrent pas aux programmes de marche et ainsi, ils ne peuvent pas

bénéficier adéquatement des bienfaits de la marche prouvée efficace. La préférence à l'égard de la supervision représenterait une piste de solution en tant que stratégie d'application des connaissances. En effet, le respect de la préférence augmente le niveau de satisfaction face à l'activité physique pratiquée convenant le mieux aux besoins et au style de vie du participant et réduit ainsi que le risque que les facteurs internes et externes du participant influencent son adhésion.

La deuxième lacune en recherche clinique est l'utilisation plutôt rare de stratégies d'application des connaissances prenant en compte la préférence des clients pour les traitements ou interventions en santé (Klaber, 2005; Tilbrook, 2008; Johnson, 2007; Salter, 2006) afin de contrer les symptômes d'une affection chronique. En effet, les connaissances actuelles montrent que cette approche de considérer la préférence améliore les résultats cliniques au traitement ou à une activité physique en prévenant le désir d'abandon des participants. Pour l'instant, elle n'a d'ailleurs jamais été : 1) appliquée à un ECR promouvant la marche; 2) étudiée chez les personnes âgées souffrant d'arthrose légère à modérée, et enfin 3) évaluée pour améliorer l'efficacité d'un traitement et confirmer la réussite de l'application des connaissances (Tilbrook, 2008).

Adapter les connaissances au contexte local

Le deuxième sous-concept relate l'importance d'adapter toute connaissance présélectionnée sur les LDC du groupe d'experts et de méthodologistes du panel d'Ottawa des programmes de marche aux conditions cliniques et locales, soit dans un contexte de recherche précis, afin d'assurer la pertinence et la faisabilité du projet. De ce fait, une fois que les connaissances utiles et valides ont été identifiées et sont accessibles, il est important d'évaluer le contexte dans lequel elles sont utilisées. Cela permet de déterminer si certaines

adaptations sont nécessaires afin d'assurer l'application de ces connaissances dans la pratique (Straus, 2013). Pour la présente thèse doctorale, les LDC ont été adaptées au contexte en question en développant un programme de marche communautaire tenant compte des meilleures preuves scientifiques analysées dans le cadre de la recension systématique examinant l'efficacité de différents programmes de marche rédigée par Loew, 2012. De ce fait, deux modes de supervision (supervisé ou non supervisé) ont été considérés et la durée, la fréquence ainsi que l'intensité de la marche ont été ajustées sachant que les participants recrutés pour la présente étude étaient tous âgés de plus de 40 ans et diagnostiqués avec l'arthrose au genou. Le programme a été mis en pratique dans un club de marche déjà existant intitulé *The Pacesetters Walking Club*, situé au centre commercial *Billings Bridge* (Ottawa, Ontario, Canada), en respectant les heures d'ouverture du club.

Le programme de marche a été adapté pour cette population particulière puisque la progression était mois par mois. En effet, les participants étaient invités à suivre les recommandations émises des LDC en adaptant le dit programme selon leurs propres objectifs personnels, leurs préférences, tout en respectant leurs limites de douleur ainsi que leur capacité physique. Donc, il fallait trouver le bon dosage en ayant un programme progressif et réaliste afin de laisser le temps au participant de s'adapter. Chaque participant avait ainsi 1 mois pour s'ajuster et atteindre le prochain objectif du mois suivant, tant que le participant arrivait à la phase de maintien.

Évaluer les obstacles et les facilitateurs par rapport à l'utilisation des connaissances

Par la suite, il a été nécessaire d'évaluer les obstacles ainsi que les facilitateurs afin de surmonter adéquatement ces obstacles et de faciliter l'utilisation des connaissances de ces LDC au niveau clinique (Straus, 2013). L'adoption d'un comportement sain dans la vie quotidienne représente un élément clé pour atteindre un bien-être désiré. En fait, il est primordial de mieux cerner et prendre en considération les différents facteurs personnels et situationnels qui influencent l'adoption d'un comportement sain (Nieuwenhuijsen, 2006) soit, dans ce cas-ci, l'adhésion à long terme à un programme structuré d'activité physique, dont la marche. De façon générale, de nombreux facteurs interdépendants nuisent à l'adhésion. Les plus communs sont : les caractéristiques de l'individu, les particularités de sa maladie chronique, la relation étroite créée avec son professionnel de la santé, le type d'intervention suggérée pour modifier le comportement malsain en question ainsi que le contexte environnemental (Jordan, 2010; WHO, 2003).

Dans le cadre de cette thèse doctorale, la préférence des participants a été considérée dans le but de d'appliquer des stratégies promouvant l'adhésion à un programme de marche étalé sur neuf mois, prouvé efficace auprès des personnes âgées atteintes d'arthrose légère à modérée du genou. Ainsi, le coordonnateur de l'étude a agi comme un facilitateur, lors de la première visite, en adoptant un processus de prise de décision partagée qui se résumait comme suit : (1) développer une relation de confiance avec le participant; (2) transférer les informations concernant les deux interventions proposées (soit le programme de marche supervisé et celui non supervisé),

et (3) encourager le participant à exprimer ses préférences afin d'assurer que la décision finale repose sur le respect de ses valeurs, ses besoins et son mode de vie.

Tous les facteurs identifiés dans les écrits scientifiques, susmentionnés dans le chapitre 1, ont été intégrés dans un document afin d'élaborer un sondage détaillé sur tous les facteurs personnels et situationnels de l'adhésion. De plus, les participants de l'étude ont aussi été invités à remplir une évaluation initiale en identifiant tout obstacle qui limitait leur participation actuelle à l'activité physique dans leur vie quotidienne et tout facilitateur qui les aidait à adopter une activité physique (avant de participer à la présente étude). Les réponses initiales des participants ont été ainsi ajoutées à la liste des facteurs appuyés par les écrits scientifiques, lors de la création du sondage. Par la suite, tous les facteurs ont été classés dans le sondage, en considérant les cinq composantes clés de l'adhésion : caractéristiques personnelles, particularités de la condition de santé, influence du système de santé, contexte environnemental et approche thérapeutique proposée. Après trois mois de participation à l'étude, chaque participant a été invité à répondre à ce sondage en identifiant chacun des facteurs comme un obstacle ou un facilitateur à leur adhésion au programme de marche. Les résultats de ce sondage ont été récemment publiés (voir chapitre 4 pour de plus amples informations ou annexe 10).

Choisir, adapter et mettre en place les interventions

Le quatrième sous-concept du « Processus des connaissances à la pratique » se résume par le choix, l'adaptation ainsi que l'application de stratégies ou d'interventions qui encouragent l'application des connaissances. Ces interventions doivent d'abord être

adaptées au contexte en question pour éviter tout obstacle précédemment identifié. Elles doivent également cibler une ou plusieurs parties prédéterminées, soit les personnes âgées souffrant de l'arthrose légère à modérée du genou, pour le contexte présent.

Dans le cadre de la présente thèse doctorale, l'ECR préliminaire, qui a été élaboré, a ainsi visé l'application d'une nouvelle approche fondée sur la préférence des participants afin de pallier le problème d'adhésion à une intervention. Comme les besoins réels du participant sont satisfaits, ce dernier est plus motivé à atteindre à long terme une adhésion à long terme à une habitude de vie pour sa santé, en sachant que le coordonnateur de l'étude ainsi que le professionnel de la santé prennent en considération ses préférences. Par conséquent, cette approche augmente l'efficacité de l'intervention proposée pour l'adhésion (Nigg, 2011). Ainsi, le participant était invité à collaborer activement avec l'équipe de recherche dans les décisions méthodologiques. En fait, dès le premier contact avec chaque participant, l'approche utilisée visait à mieux comprendre la préférence initiale au traitement (Boote, 2006). La réponse obtenue influençait ensuite la détermination des objectifs à court et à long terme, le devis de l'étude, les résultats de mesure ainsi que les analyses de données, selon si le participant avait exprimé ou non une préférence et également selon si le participant avait obtenu ou non son programme de marche de préférence, suite à l'assignation aléatoire. Cette approche encourageait également chacun à discuter ouvertement avec le professionnel de la santé sur place ainsi que les membres de l'équipe de recherche afin de partager leurs

Tel qu'il est mentionné dans le chapitre 1, les écrits scientifiques ont affirmé que l'approche fondée sur la préférence des participants favorise l'adhésion à un programme de marche, à long terme. De ce fait, le questionnaire *Provider participatory Decision-Making (PDMstyle)* a été employé pour mesurer le niveau de participation initiale à la décision du participant, lors de la première visite, une fois les quatre concepts suivants discutés : 1) la proposition des interventions recommandées; 2) les avantages et les inconvénients

de ces interventions suggérées; 3) l'expression de la préférence initiale du participant ainsi que 4) le résultat de l'assignation aléatoire à l'intervention en fonction de la préférence et de la décision finale du participant concernant sa participation à l'étude (Makoul, 2006).

Surveiller l'utilisation des connaissances

Après le choix, l'adaptation ainsi que l'application d'interventions promouvant l'application des connaissances, il est ensuite important de déterminer comment et dans quelle mesure ces connaissances ont été adéquatement utilisées (Straus, 2013). L'objectif de cette thèse doctorale était de promouvoir l'adhésion à un programme de marche étalé sur neuf mois, avéré efficace selon les LDC du groupe d'experts et de méthodologistes du panel d'Ottawa, auprès des personnes âgées souffrant de l'arthrose légère à modérée du genou, en utilisant la préférence des participants comme moyen principal d'application des connaissances. De ce fait, la mesure instrumentale d'utilisation des connaissances se fondait sur l'adoption d'un comportement sain, soit le taux d'adhésion à un programme de marche. Durant l'étude, différentes mesures ont été prises afin de s'assurer que les participants suivaient adéquatement les recommandations émises par les LDC, soit de marcher trois fois par semaine, de 25 à 45 minutes, à une intensité modérée. Il était ainsi possible de mesurer l'adhésion hebdomadaire à la marche ainsi que la progression en termes de durée, de fréquence et de niveau d'intensité de la marche, après chaque séance de marche.

Évaluer les résultats

Après avoir surveillé l'utilisation des connaissances, il faut ensuite évaluer l'impact sur les résultats. Les stratégies d'évaluation des résultats suite à l'application des connaissances doivent employer des méthodes rigoureuses et explicites selon une approche

quantitative (mesures objectives) (Straus, 2013). Dans le cadre de cette thèse doctorale, l'ECR préliminaire a évalué l'impact sur les participants après qu'ils ont eux-mêmes utilisé les connaissances associées aux LDC du groupe d'experts et de méthodologistes du panel d'Ottawa, soit sur leur condition de santé (douleur, raideur articulaire et état fonctionnel, vitesse de marche, nombre de pas, équilibre, endurance, niveau d'activité physique) ou leur qualité de vie (influencée par l'autonomie à la marche, l'hygiène et les activités quotidiennes, la douleur, l'anxiété/la dépression) ainsi que l'impact sur leur satisfaction face à l'intervention proposée (préférence, identification des buts à court et long terme, facteurs d'influence à l'adhésion).

Maintenir l'utilisation des connaissances

La dernière phase du « Processus des connaissances à la pratique », mais non la moindre, encourage le maintien de l'application des connaissances, suite aux efforts préliminaires, en ce qui concerne la planification, l'application ainsi que l'évaluation de ces connaissances (Straus, 2013). Afin de maintenir l'utilisation de ces connaissances avec succès, il est essentiel de créer des liens stratégiques entre les chercheurs, les professionnels de la santé ainsi que la population impliquée. Pour favoriser l'intégration des connaissances en recherche dans une pratique efficace, il incombe au chercheur de créer et de faciliter ce lien stratégique et d'assurer une collaboration axée sur les solutions. Il synthétise également les connaissances pour assurer une pratique fondée sur les connaissances. Il emploie différentes méthodes rigoureuses pour chacune des étapes de planification organisationnelle ainsi que d'évaluation et d'application des LDC. Finalement, il fonde sa recherche sur un cadre conceptuel éminent afin d'appuyer l'application des connaissances.

Dans le cadre de cette thèse doctorale, l'ECR préliminaire a évalué l'adhésion à un programme de marche étalé sur neuf mois, avéré efficace selon les LDC du groupe d'experts et de méthodologistes du panel d'Ottawa, auprès des personnes âgées souffrant de l'arthrose légère à modérée du genou. Au-delà des neuf mois, un plan de maintien de l'utilisation des connaissances dans le futur a été élaboré, afin d'assurer la poursuite du maintien de l'utilisation des connaissances, se traduisant par le choix d'un lieu stratégique pour la mise en place du présent ECR préliminaire mais ne sera pas mesuré dans le cadre de la thèse doctorale. En effet, un programme de marche communautaire, structuré et fondé sur les preuves scientifiques, a été mis en pratique dans un club de marche déjà existant intitulé *The Pacesetters Walking Club*, situé au centre commercial *Billings Bridge* (Ottawa, Ontario, Canada). En plus de regrouper déjà un certain nombre de membres, ce club de marche se trouvait dans le même centre commercial que le bureau d'Ottawa de la société de l'arthrite. De ce fait, les projections futures au-delà des neuf mois d'application des connaissances, auront pour but :

- 1) de promouvoir une meilleure communication et une collaboration étroite entre la société de l'arthrite et le club de marche existant;
- 2) de permettre aux professionnels de la santé de la société d'arthrite de référer leurs clients intéressés par la marche au club de marche du même centre commercial;
- 3) d'accueillir les participants du présent ECR préliminaire et de les inviter à devenir membres du club de marche;
- 4) de mettre en place le même programme de marche communautaire, structuré et prouvé efficace, auprès des membres du club de marche.

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SECTION II : PRÉSENTATION DES RÉSULTATS

Chapitre 3 : Méthodologie

Ce premier article résume la méthodologie détaillée de ce projet de recherche, sous forme de protocole de recherche. Le manuscrit a été publié en anglais, dans le journal *British Journal of Medicine & Medical Research* le 7 avril 2014 suite à la soutenance du protocole le 12 avril 2013. De ce fait, le style et la mise en forme actuels sont conformes aux recommandations émises par le journal, à l'exception des tableaux et des figures qui sont illustrés ici séparément, à la fin de l'article.

Une copie de la version publiée du chapitre 3 sous forme d'article (annexe 3), de l'approbation du comité d'éthique de l'Université d'Ottawa (annexe 4), de la lettre d'information et du formulaire de consentement (annexe 5), du questionnaire d'éligibilité (annexe 6), des questionnaires utilisés pour les évaluations aux trois mois (annexe 7), du journal de bord (annexe 8), du lieu de mise en place du projet de recherche (annexe 9) ainsi qu'une copie des permissions obtenues de republier dans la présente thèse l'article: *The Implementation of an Effective Aerobic Walking Program Based on Ottawa Panel Guidelines for Older Individuals with Mild to Moderate Osteoarthritis: A Participant Exercise Preference Pilot Randomized Clinical Trial Protocol Design* (annexe 12.4) peuvent être consultées à la section IV sous « ANNEXES ».

Le présent article a été co-rédigé par la candidate au doctorat (LL), sous la supervision de ses co-directeurs, le D^r George A. Wells et D^{re} Lucie Brosseau, ainsi que le comité de thèse, formé de D^r Glen P. Kenny, D^{re} Natalie Durand-Bush et D^r Stéphane Poitras. La candidate au doctorat (LL) est la première auteure de cet article, après avoir été principalement responsable de 1) développer les questionnaires d'évaluation et d'obtenir l'autorisation éthique, 2) coordonner la saisie des données et l'analyse des données recueillies, de 3) produire les versions finales des rapports scientifiques ainsi que de 4) rédiger et publier cet article pour sa thèse doctorale. Ses co-directeurs (LB et GAW) ont supervisé chaque étape de la réalisation de ce protocole de recherche. Les membres du comité de thèse (GPK, NDB, SP) ont également fourni leurs précieux commentaires et assisté à l'élaboration ainsi que la défense du protocole de recherche. Tous les co-auteurs ont révisé la version finale de l'article rédigé.

Titre de l'article : *The Implementation of an Effective Aerobic Walking Program Based on Ottawa Panel Guidelines for Older Individuals with Mild to Moderate Osteoarthritis: A Participant Exercise Preference Pilot Randomized Clinical Trial Protocol Design*

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L'article publié inclut un tableau et trois figures.

Abstract

Aims: Osteoarthritis is the most common disabling disorder affecting particularly knees. A recent systematic review demonstrated the efficacy of walking programs for improving pain, functional status, endurance, and quality of life, in the management of knee osteoarthritis. Even though evidence suggests that walking provides numerous clinical benefits, older people diagnosed with osteoarthritis avoid physical activity. General objective is to evaluate the effect of participants' exercise preference. We expect to encourage osteoarthritis participants to adhere successfully to a proven effective walking program.

Study Design: This is a 9-month supervised walking program with a 3-month follow-up period using a preference trial design which consists of three single blind randomized clinical trials, based on a participant exercise preference model, to elicit preferences independently of randomization. **Place and Duration:** Indoor Walking Club in the City of Ottawa, Billings Bridge Shopping Centre, next door to The Arthritis Society Ottawa office.

Methodology: A total of 69 participants with a confirmed diagnosis of osteoarthritis of the knee will be recruited from the general public from the Ottawa area. We are implementing a knowledge translation strategy, in order to improve adherence and consequently ensure the maintenance of pain relief, functional status and quality of life, among older individuals diagnosed with mild to moderate osteoarthritis. This article summarizes the study protocol of the walking study, by explaining the methods and interventions selected and discussing on the need for this trial.

Conclusion: This proposed pilot randomized controlled trial will address a new knowledge gap by concentrating on questions of clinical and scientific importance to improve the understanding related to the efficacy of strategies to promote the adoption and long-term adherence of community-based walking programs.

Abbreviations

ACR: American College of Rheumatology,

ACSM: American College of Sports Medicine,

ANCOVA: Analysis of COVAriance,

ANOVA: Analysis Of Variance,

BI: Behavioural Intervention,

CONSORT: Consolidated Standards Of Reporting Trials,

CSER: Canadian Society for Exercise Physiology,

DSMB: Data Safety Monitoring Board ,

EBCPG: Evidence-Based Clinical Practice Guideline,

EF: Effect Size,

EQ: Euro Qol,

HSD: Honestly Significant Difference,

ITT: Intention-To-Treat,

KT: Knowledge Translation,

KTAC: Knowledge-To-Action Cycle,

MCID: Minimal Clinically Important Difference,

MI: Multiple Imputation,

MMRM: Mixed Model Repeated Measures,

OA: Osteoarthritis,

PA: Physical Activity,

PAR: Physical Activity Recall,

PGrip : People getting a Grip on arthritis,

QoL: Quality of Life,

RCT: Randomized Controlled Trial,

S: Supervised,

SD: Standard Deviation,

SPIRIT: Standard Protocol Items: Recommendations for Interventional Trials,

TAS: The Arthritis Society,

TUG: Time-Up-and-Go,

U: Unsupervised,

WBI: Walking program combined with a Behavioural Intervention component,

WOMAC: Western Ontario and McMaster Universities Arthritis Index.

1. Introduction

1.1 Problem

Osteoarthritis (OA) is the most common disabling disorder affecting joints, such as knees and hips. The prevalence of this degenerative disease significantly increases after the age of 40 and is seen principally among older individuals, in relation to the impact of a global ageing population [1]. OA is recognized as the primary cause of long-term disability, worldwide. Indeed, the impairments, disabilities and handicaps associated with knee OA can lead to devastating personal consequences as well as negative effects on the health care system and society at large [2,3]. The Bulletin of the World Health Organization confirmed that approximately 9.6% men and 18.0% women, aged over 60 years old, are diagnosed with OA, in the world [3]. A recent comprehensive systematic review by The Ottawa Panel on Evidence-Based Clinical Practice Guidelines (EBCPGs) Walking Programs in the Management of Osteoarthritis [4] found strong scientific short-term evidence (Grade A recommendations) for improving pain,

functional status, endurance, and quality of life on the efficacy of walking programs, either supervised or unsupervised, in the management of mild to moderate OA of the knee. Although evidence suggests that walking provides numerous clinical benefits [4], unfortunately individuals diagnosed with OA gradually become sedentary [5,6] and tend to avoid physical activity (PA) [7]. As a result, the majority of individuals with OA are approximately three times more likely to have difficulties walking more than 0.4 km because of pain [8] and have five or more functional disabilities, such as climbing stairs and performing activities of daily living, compared to healthy individuals [9]. Inactivity leads to decreased endurance and mobility, thus reducing quality of life [10-12].

Although aerobic PA programs, such as walking, can improve short-term effects on clinical, physiological and quality of life outcomes for OA [4,13], enrolment in these types of programs do not guarantee adherence and long-term maintenance. An ongoing concern in research is the high attrition rate (i.e. drop-out rate) ranging from 20% to 39% among OA participants recruited in short-term studies involving PA [4,14,15,44,45]. Of further concern, remaining participants in the short-term intervention trials demonstrated poor adherence (27% to 64%) [14,16,17]. A recently completed randomized controlled trials (RCT) concurs with previous walking studies, demonstrating poor adherence rates of 44.5% for the supervised walking program combined with a behavioural intervention (BI) component and 49.0% for the self-directed walking program (control group) without considering participant preferences, at the 12-month follow-up [18,19]. The term "adherence" means the action of a participant attending all scheduled sessions for a specific treatment in a particular trial [20,21]. Long term RCTs (study period of more than 6 months) involving aerobic PA programs for OA have typically

included BI components (e.g. goal settings, participant education, telephone contacts, face-to-face visits, social/peer support or positive feedback) [6,11,17,22,23]. These studies exhibited lower drop-out rates at follow-up compared to short-term studies which did not use BI (10% to 15% between 2 to 4 months and 10% to 49% between 10 and 18 months). Higher adherence rates were also demonstrated between 2 to 4 months (85% to 90%) and between 10 and 18 months (50% to 90%). Unfortunately, BIs are still rarely included in walking programs [4]. Since long-term RCTs have typically combined BIs, and demonstrated higher adherence rates [22,2], there is a need to further explore long-term community-based aerobic walking programs as recommended by international expert committees for OA [24]. Therefore, the critical challenge is to develop programs that will encourage participants to not only initiate, but also to adhere to a long-term walking program in order to maximize the benefits of walking.

1.2 Objectives

In this proposal, we will emphasize on the importance of focusing on Evidence-Based Clinical Practice and Knowledge Translation (KT) implementation. The literature shows that considering participants' exercise preference [21] improves clinical outcomes. In fact, Cahill et al. [25] confirmed that the inclusion of participant exercise preference increases participants' satisfaction with care and consequently may enhance adherence to treatment, since it has shown to prevent discouragement and desire to drop-out of the study [26,27]. The term 'participant exercise preference' reveals the individual's personal expression of a value following informed reflection on pros (benefits) and cons (risks) of the interventions proposed, based on his/her values, beliefs and needs [28]. Therefore, preference is a promising element to enhance walking adherence, that has not yet been applied to a long-term RCT consisting of aerobic walking

programs [21], not been studied among older adults with OA and has not been investigated with adherence as the primary outcome. It is likely that participants' exercise preference will offer a promising avenue if used as a KT strategy to implement successfully a proven walking program, in terms of improving adherence over the long-term [18,19].

The main objective of this pilot RCT is to evaluate the effect of participants' exercise preference. We will examine the hypothesis that participants who follow their preferred aerobic walking program: 1) supervised (S) or 2) unsupervised (U), combined with a BI component, will be more encouraged and satisfied, thus enhancing their walking adherence through the 9-month study period, compared to individuals who do not obtain their preferred choice of aerobic walking program, among people diagnosed with knee OA. Moreover, when there is no preference for a specific aerobic walking program (supervised vs. unsupervised), it is hypothesized that the supervised aerobic walking program (S) with a BI component will demonstrate an improvement in walking adherence compared to the unsupervised aerobic walking program (U) with an identical BI component through the 9-month study period, among people diagnosed with knee OA. We will secondly evaluate if favorable effects on pain, functional status, quality of life, physiological and economic outcomes [29] will be demonstrated among participants who present a preference, either supervised or unsupervised and who obtain their preferred choice of program compared to participants who did not obtain their preferred choice of program through the 9-month study period. We will be conducting a pilot RCT which is powered enough to measure an effect of the primary outcome (walking adherence) but could serve as a feasibility study, by 1) demonstrating if the recruitment process and rate, design, interventions and selected outcome measures

are feasible and by 2) determining the variance of our primary outcome measure (walking adherence). If it is not demonstrated feasible, we will use these data to plan a larger and more rigorous RCT.

2. Materials and Method

2.1 Study Design

This is a 6-month supervised walking program with a 3-month follow-up period using a preference trial design which consists of two single blind RCTs, based on a participant exercise preference model [25], to elicit preferences independently of randomization (Fig. 3.1). Before randomization, each participant will be informed of their choice of walking supervision (supervised or unsupervised) using the same effective walking program in terms of frequency, duration, and walking intensity (Table 3.1). All outcomes are reliable and validated and are based on The Ottawa Panel guidelines (2012) [4]. Eligible and consenting participants, recruited from the city of Ottawa, will be stratified on whether they do or do not have a preference for supervision of the walking program (preference for supervised or unsupervised, or no preference). Within each of these three groups, based on their stated exercise preference, participants will then be randomized to one of the two modes of supervision for the effective walking program: (a) a supervised walking program supplemented with a multifaceted BI (at a walking club, supervised by an exercise therapist) (S), or (b) a self-directed unsupervised walking program combined with an identical BI (no supervision) (U) (Fig. 3.1 for more details).

The term ‘adherence’ refers to the extent to which a person follows an intervention recommended by his health professional. Therefore, a participant will be described as non-adherent if not attending and completing the treatment sessions prescribed [31,15]. It is important to mention that health behaviour is defined as any activity undertaken by a person to preserve good health [21]. Given that health behaviours are beneficial only if they are maintained over the long-term, the most important challenge is to develop strategies that will encourage people to adhere permanently to a pattern of behaviour to maximize the benefits of the intervention. This strong protocol is based on the SPIRIT statements.

2.2 Sample Size Calculation

The goal of this trial is to compare the primary outcome ‘adherence with the intervention’ for: a) the group of participants with a preference for a supervised walking program (S) who obtain their preferred choice of program compared to the group of participants with the same preference who did not obtain their preferred choice of program; b) the group of participants with a preference for an unsupervised walking program (U) who obtain their preferred choice of program compared to the group of participants with the same preference who did not obtain their preferred choice of program. It is expected that adherence will be high among participants with a preference and who will obtain their choice of exercise program, and low among participants with a preference that will not obtain their exercise program of choice. It is expected that adherence levels among participants with no preference will be better in the supervised group compared to the unsupervised group. Nevertheless, all tests will be two-sided. Based on previous experience with arthritis patients, our preliminary results concur with existing literature that 2/3rds of the study participants sample have a preference [21]. A total of 46

participants with a preference for the supervised (S) or unsupervised (U) program will be recruited. Twenty-three participants with a preference for supervised program (S) will be recruited, and after randomization, half of the group will obtain their preferred exercise program of choice (S) while the other half of participants will not obtain their preferred exercise program of choice (U). Similarly 23 participants with a preference for unsupervised program (U) will be recruited, and after randomization, half of the group will obtain their preferred exercise program of choice (U) while the rest will not obtain their preferred exercise program of choice (S). Within the no preference group (n=23), after randomization, half of the group will be randomly allocated in the supervised program (S) while the other half of participants will be allocated to the unsupervised program (U) (Fig. 3.1). The two primary comparison groups are: a) preference for S group obtaining their choice (S) vs. preference for S group not obtaining their choice (U); b) preference for U group obtaining their choice (U) vs. preference for U group not obtaining their choice (S). For each of these primary comparisons, we will be able to detect a moderate effect size of 0.5 for adherence with a significance level of 0.05 ($0.05/2=0.025$; the alpha was adjusted to accommodate the two primary objectives) and power of 80% based on a two sided Student's t-test. A moderate effect size of 0.5 is necessary in order to justify a greater clinical impact of this EBCPG implementation, depending on its relative costs and benefits, since the supervised program will be more expensive to conduct than the unsupervised approach [46]. In particular, for a standard deviation of 0.433 [18,19] for the adherence to intervention outcome, a moderate effect size corresponds to a difference in adherence of 0.22 (i.e 22%) (Effect size (EF) = Minimal clinically important difference (MCID) / Standard deviation (SD)). Brosseau et al. [18,19] performed a similar study and confirmed that the adherence (based on attendance marked in logbooks) of a supervised aerobic walking program

with behavioural interventions decreased from 80% at the initial evaluation (0-3 months) to 45% at the end of the study (9-12 months). According to Rejeski et al. [32], a difference of 22% in adherence is considered an important difference when an exercise logbook was used for self-reporting the percentage of total exercise sessions performed in aerobic exercise program for osteoarthritis of the knee [33,32]. Therefore, the evidence supports the plausibility of seeing a difference in adherence of 22%.

2.3 Study Sample

Sixty-nine older adults with knee OA who are not already engaged in regular PA will be recruited (Fig. 3.1). Potential participants will be assessed through an admission questionnaire and a face-to-face interview by the Research Coordinator to ensure that they meet the study's selection criteria [2,22,34]. The inclusion criteria include: 1) Diagnosed with OA of the knee, based on the clinical symptoms of OA following the American College of Rheumatology (ACR) criteria for knee, including radiographic evidence according to the Kellgren-Lawrence grading scale during a radiological assessment of OA (1 - 3) [35,36], 2) Aged between 55 and 80 years old [1], 3) Able to walk for a minimum of 20 minutes at their own pace and 4) Available three times a week over a period of 9 months for 45 minutes (Supervised group: during the operating hours of the Walking Club; i.e. 7:30 to 10:00 am) [37], 5) No evidence of other illness judged by the physician to make participation in this study inadvisable, 6) No evidence of mental health condition.

2.4 Interventions

2.4.1 Supervised aerobic walking program (S)

All the participants in the supervised aerobic walking program based on the Ottawa Panel guidelines (2012) [4] and PGrip (People getting a Grip on arthritis) program will walk three days per week, for 6 months in an indoor Walking Club in the City of Ottawa, next door to The Arthritis Society Ottawa office (in addition to the 3-month follow-up period where they are free to walk according to their preference). Each participant will receive a pedometer, to monitor the number of steps per walking session [2]. Since the group is supervised, an exercise therapist with certification from either the Canadian Society for Exercise Physiology (CSEP) (Certified Exercise Physiologist), or American College of Sports Medicine (ACSM) (Clinical Exercise Specialist) will supervise all walking sessions. Therefore, the exercise therapist will perform the following tasks: 1) provide pedometers and heart rate monitors, 2) record attendance, number of steps, and vital signs, and will 3) give instructions on how to complete individual daily logbooks. He/she will provide a detailed orientation of the walking club and the walking program for each participant. Each walking session will start with a 5-minute warm-up period, including stretching exercises of the upper and lower extremities. Participants will subsequently be required to walk for 45 minutes in the shopping mall. At the end of the walking session, participants will perform a 5-minute cool-down period [39]. Regarding the intensity of the walking period, the participants will stay between 60-80% of their maximum heart rate ($220 - \text{age}$), using a heart rate monitor offered during the walking sessions (Table 3.1).

2.4.2 Unsupervised aerobic walking program (U)

Participants from the unsupervised walking program will be involved in the same training progression related to the effective walking program [4] (Table 3.1), but will be invited to walk by themselves, without supervision, i.e. at anytime and anywhere except at the Billings Bridge Shopping Centre, for 6 months (in addition to the 3-month follow-up period where they are free to walk according to their preference). The research coordinator will offer one introductory session to describe how the pedometers work so that they can carry out a self-directed walking program. She or he will also explain how to record the number of walking sessions and the daily step count (pedometer) in their log books. An independent evaluator will review the log books at the measurement sessions. To avoid potential contamination, individuals in group U will have no contact with the individuals in group S, who are registered at The Pace Setters Walking Club, next door to The Arthritis Society Ottawa office.

2.4.3 Behavioural intervention (BI)

The exercise therapist will be trained before implementing the existing evidence-based structured education program developed by The Arthritis Society (TAS) educational program: “Stay Active/Manage your OA pain”. Combined with a multifaceted BI, the education program will ensure participants' adherence, through the 6-month progression phase of the study period (Table 3.1). Based on a variety of sources of evidence including the Ottawa Panel CPGs [4], the BI will consist of the following components: (1) short- and long-term goal setting, according to other physical activities or functional concerns, at the walking club each 3 months (at baseline, 3, 6 and 9 months); (2) moral support to continue walking every 3 months; (3) number of steps measured 3x/week with a pedometer; (4) daily

walking logbooks to record the duration (min/day), frequency (days/week) and intensity of their walking sessions using the calendar included in the PA [2,18,19]. Barriers will also be identified and documented, as well as strategies to overcome them, in order to ensure long-term maintenance of walking.

2.4.4 Strategies to improve adherence

The term ‘adherence’ will be used throughout this protocol, even though other studies only used the term ‘compliance’. The reason is that compliance seems to reflect negative connotations, by indicating a more passive role of the participant following only the medical instructions. Since adherence means the action of a participant attending and participating in all scheduled treatment sessions, in a particular trial [25], generally a participant will have less than 100% adherence to interventions and study procedures. From an adherence viewpoint, the more control over the administration of the intervention the better. There are various reasons for non-adherence, such as the participant experiencing side effects and is unwilling to change his/her behaviour, the instructions are not understood, there is a lack of family support, or even if the individual changes his/her mind to participate [25].

Based on previous work, different steps will be taken prior to enrolment to improve adherence among all participants. Therefore, since we are performing a 6-month supervised walking program (+ 3-month follow-up period), we will encourage participants to follow the structured walking program considering exercise preference. In addition, other relevant actions such as: (1) selecting participants likely to follow the protocol, according to the inclusion criteria, and (2) optimizing participant’s experience, by involving them more in the

decision-making process and respecting their exercise preference can improve adherence. If participants in the unsupervised group state a preference to be supervised at the beginning of the study, they will be offered a free membership to the affiliated indoor Walking Club, at the end of the follow-up. To ensure participant retention and complete follow-up, we will track the data in the logbooks from participants who choose to withdraw from the study and identify personal factors influencing their low adherence and/or intention to drop-out. They will still receive reasonable compensation, relevant to their levels of participation.

Finally, we will consider participant adherence to other aspects of the study such as their attendance to measurement sessions. To perform this task, the exercise therapist will take attendance following the appropriate list of participants, each walking session.

2.5 Measurements

Measurement sessions will be scheduled every three months over the course of the 9-month study (i.e. at baseline, 3, 6, and 9 months). The blinded independent evaluator will assess the four main outcomes (adherence, quality of life, pain and functional status), and other relevant information. The evaluator will meet with each participant individually and will assist them with the questionnaire. The outcome assessment will be completed at the Walking club in a closed and private room after opening hours. The primary outcome will be participants' adherence to their respective walking program (S vs. U). Secondary outcomes measures will include: pain, stiffness, functional status, gait speed, number of steps completed during the walking sessions, self-efficacy, PA behaviour, walking endurance, change in blood pressure and heart rate, level of physical fitness, long term goal attainment, and stair climbing difficulty.

A follow-up period of 3 months will directly follow the 6-month intervention period. Given our target sample size and the study period, data collection is estimated to take 39 months (36 months to measure the short-term effects and three months to measure the long-term effects) and data analysis is estimated to take 3 months.

2.5.1 Screening measurement

At the first visit, the eligible participant will provide his/her written informed consent [38]. Study participants will be assessed and classified according to the American College of Rheumatology functional classification [15]. A complete medical history and examination will also be performed. A questionnaire will be completed concerning factors that could influence adherence to the walking programs, such as occupation, previous PA, proximity to the walking club, use of medications and non-pharmaceutical interventions, etc.

The participant will then be asked by the research coordinator to express his/her walking supervision preference and all the reasons behind his/her choice: 1) preference for supervised (S) or unsupervised (U) walking program or 2) no preference. The participants' exercise preference level will be estimated using a visual analogue scale, where 50-100% will represent a strong preference for one type of walking supervision (participating in a supervised or unsupervised walking program), 1-49% weak preference, and where 0% will represent a no preference for one mode of walking supervision (supervised or unsupervised) (Fig. 3.2).

According to this measurement, study participants will be randomly allocated to one of the two walking programs (S and U). Therefore, the participants' stated exercise preference will be independent of randomization [39] (Fig. 3.1).

2.5.2 Primary measurement

Adherence will be measured to determine the effect of the type of supervision (supervised vs. unsupervised) on the sustainability of the walking program. Program adherence to treatment will be monitored and calculated as a proportion of the number of walking sessions attended and completed divided by the number of walking sessions prescribed (3 times a week as recommended in the Ottawa Panel guidelines, 2012) [4] and recorded in the participants' logbooks [6,18,19,21,23,32]. The calendar proposed by the 7-Day Physical Activity Recall (PAR) [40] incorporated in the logbooks will be used as a self-report questionnaire, to calculate the number of walking sessions each participant will complete every week. For the supervised group (S), we will take the attendance at the walking club to confirm what is written in the walkers' logbooks. The logbook will also be used as a tool to measure other valid measurements of the physical activity level, using METS, pedometric and walking endurance measurements. It is important to note that this method of assessment was used in various RCTs that studied the impact of walking programs in the management of OA among older individuals [18,19,23].

2.5.3 Secondary measurements

a) Behavioural outcomes: Self-efficacy will be measured with the Chronic Disease Self-Efficacy Scale (www.patienteducation.stanford.edu/) which is a multidimensional scale including 1) Self-Efficacy to Perform Self-Management Behaviours, 2) General Self-Efficacy, and 3) Self-Efficacy to Achieve Outcomes. In addition, PA behaviour will be measured with an adapted PACE instrument (www.paceproject.org/Measures.html). The PACE instrument measures PA behaviours: 1) PA stages, 2) PA Change Strategies, 3) PA pros and cons, 4) PA confidence, 5) PA family support, 6) PA friend support, 7) PA closest friend support, PA enjoyment, 8) PA recreation choices, 9) PA environment factors [41]. Walking endurance (6-min walk-test) as well as change in blood pressure and heart rate [24] will also be measured. The level of physical fitness will be evaluated through the 7-Day (PAR), a generic instrument [40] principally created to measure the level of physical activity. Finally, an Adherence questionnaire will first be developed, based on current literature, and then completed by the participants in order to identify combined positive, negative and no influence factors, on a scale between -1 to +1, that can generally determine participants' walking adherence. Exercise preference may change during the 9-month period of the study for many reasons (e.g. weather, holidays, work, family commitment) therefore we will evaluate if the preference has changed over time, and use the data in the subsequent analysis. Long Term Goal Attainment Scaling, a validated tool, will measure participants' long term goal attainment levels. This tool includes five goal attainment levels: 1) -2 (much worse than expected), 2) -1 (somewhat less than expected), 3) 0 (expected level), 4) +1 (somewhat better than expected) and 5) +2 (much better than expected) [21,42].

b) Clinical outcomes: Quality of life will be assessed using the ‘EuroQoL Index (EQ-5D- 5L)’. This generic instrument is the most commonly used and extensively validated measure of health-related quality of life. Five domains are included in this measure: 1) mobility, 2) self-care, 3) usual activities, 4) pain/discomfort, 5) anxiety/depression. Each dimension has 5 levels: no problems, slight problems, moderate problems, severe problems, and extreme problems. It is important to mention that the EQ-5D-5L was used to measure quality of life in various RCTs that studied the impact of walking programs in the management of OA, in older people [43]. Three secondary outcomes, pain, stiffness and functional status, will be examined using the ‘Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC)’ questionnaire. This five-point questionnaire contains 3 dimensions: pain (5 questions), stiffness (2) and function (17). The WOMAC instrument has been used to report pain and functional status [44] in several previous RCTs involving walking programs designed for individuals with OA.

Other quantitative continuous functional outcomes will be measured such as: Gait speed (time to walk 6 meters) [23,47], Timed-up-and-Go (TUG) test [48] and the Number of steps completed during the walking sessions measured with a pedometer. A Stair Climbing questionnaire will finally be completed during the evaluation sessions to assess the level of difficulty to go up and down the stairs [19]. All these measures were extensively used in RCTs and are validated.

2.6 Trial Conduct

2.6.1 Recruitment process

All aspects of participant recruitment explained below will be discussed among all research staff. Strategic plan will consist of posting recruitment posters at the Ottawa office of TAS located at The Billings Bridge Shopping Centre in order to seek contact referral groups at the early stage of the study, with the help of health professionals (physiotherapists, occupational therapist, etc.) dealing everyday with arthritic people. We will also contact the Division of Rheumatology based in the Riverside Campus of the Ottawa Hospital to recruit patients from rheumatology clinics. A letter describing the rationale of our study will be sent to each physician, followed-up with a visit at their office, in order to refer participants. As a complementary source of recruitment, we will use media advertising such local newspapers to recruit participants and disseminate information about the trial, given the success of recruitment through the use of media advertising in previous RCT (85%) [18,19,47,49]. Consequently, a recruitment of 69 participants during 3 consecutive months is realistic for the proposed pilot RCT. Based on previous similar RCTs, the study of Brosseau et al.

(2012a, b) [18,19] demonstrated a successful recruitment of 80 participants with mild to moderate OA of the knee in 4 months.

2.6.2 Screening and Allocation

Participants who are interested in participating in the study will contact the principal investigator directly. Telephone follow-up will be provided by the study coordinator to assess inclusion/exclusion criteria. Fig. 3.2 presents more information on the eligibility and screening process of this walking study. If deemed eligible, the research coordinator will contact the Methods Center. Prior to running

the randomization software, the Methods Center employee will document each participant's study ID. After running the randomization software, the Methods Center employee will document the treatment assignment. To perform a stratified block randomization, the research coordinator will obtain two series of opaque envelopes from the Methods Center according to the randomly generated sequence for each of the two blinded comparisons (preference for supervised (S) or unsupervised (U) vs. no preference). Research staff and the evaluator will be unaware of the treatment. Study participants will then be randomly allocated to one of the two walking programs (S and U), using the central randomization scheme [19].

All information obtained will be kept secret at all times. Rather than using names, code numbers will be given to identify each participant. The same code will be used on each questionnaire. All the questionnaires will be kept in a locked filing cabinet in the research lab of the director. Only the research staff will know the secret code and will have access to the filing cabinet.

2.7 Statistical Methods

2.7.1 Statistical analysis

Descriptive statistics including means, medians, standard deviations and interquartile ranges for continuous outcomes and proportions for discrete outcomes will be used to summarize the baseline variables in the study groups. Also, the analytic procedures will determine if the recruitment flow and rate, design, interventions and selected outcome measures are feasible for a large-scale RCT and to identify the variance of walking adherence in order to calculate the sample size required for the future large-scale RCT. The purpose of this

analysis is threefold: to provide a descriptive summary of the variables; to provide summaries of the variables on which to compare the study groups; and to assess whether the distributions of the variables satisfy the underlying assumptions of the statistical methods to be considered, using SPSS software. An intention-to-treat basis (ITT) for efficacy will be conducted. Multiple imputation (MI) and mixed model repeated measures (MMRM) procedures will be used for accommodating missing data.

2.7.2 Primary analysis

1) Participants with a preference for a supervised walking program (S) and who obtain their preferred choice of program vs. participants with the same preference who did not obtain their preferred choice of program will be compared on program 'adherence' at 9 months using the Student's t-test. If significant baseline imbalances between these two study groups are found, adherence to treatment comparisons will be made using analysis of covariance (ANCOVA) adjusting for baseline differences (past studies have identified five important covariates, namely: age, sex, severity of OA, external support and, level of education [34]). In addition, a repeated measure analysis of variance (ANOVA) with the between factor preference group (S vs. U) and the within factor assessment time (0, 3, 6, 9 months) will be used to assess differences in adherence between the supervised (S) and unsupervised (U) groups over time. Tukey's honestly significant difference (HSD) multi-parameter test for comparing the pair wise differences and orthogonal polynomials for trend analysis will be considered. The above analyses will be repeated using ANCOVA to control for these covariates if they were not balanced at baseline. **2)** This analysis will be repeated for participants with a preference for an unsupervised walking program (U) who obtained their preferred choice of program vs. participants with the same preference who did not obtain their preferred choice of program.

2.7.3 Secondary analysis

A similar plan to the above primary analysis will be conducted for the three secondary research questions: 1) When there is no preference, participants receiving the S vs. U will be compared as in the primary analysis 2.7.2 above; 2) When there is a preference for a supervised walking program (S) and participants obtain their preferred choice of program, a similar analytical strategy as in 2.7.2 will be used for the continuous secondary outcomes (i.e. WOMAC pain and functional status, QoL), and for the discrete secondary outcomes (i.e. Long Term Goal Attainment Scaling, Stair Climbing), chi-square analysis techniques will be used for comparing groups and assessing trends over time and logistic regression will be used if significant baseline imbalances in important covariates are found; 3) This similar analytical strategy (i.e. 2.7.3, number 2) will be used for the continuous secondary outcomes (i.e. WOMAC pain and functional status, QoL) when there is a preference for an unsupervised walking program (S) and participants obtain their preferred choice of program.

3. Discussion

The Ottawa Panel experts, related to the Ottawa Panel EBCPGs [4] on effective walking programs in the management of knee, are in agreements with other studies and reviews, since the evidence strongly recommends to OA people to perform a low-impact aerobic physical activity, particularly walking, for a minimum of 3 times a week at a moderate pace, in order to minimize any related limitations [8,17].

BI strategies have been used in other chronic health conditions to improve long-term maintenance of PA programs, such as walking, with varying success. The scientific literature demonstrated that multifaceted BIs seem to have the greatest results on long-term adherence to treatments, the level of physical activity performed, and the quality of life [27]. The systematic review by Tilbrook et al. [21] found conclusive results when considering participants' preferences in 11 selected RCTs for musculoskeletal conditions. In other words, the authors stated that participants who were allocated to their preferred treatment demonstrated improved clinical outcomes compared to participants who did not receive their preferred treatment. Both the consideration of participants' exercise preference [27] and behavioural strategies such as goal setting, face-to-face visits, social/peer support, or positive feedback [50] are key components that may enhance adherence rates, since the belief that physical activity causes an increase in pain to the affected joint is often strongly expressed by the majority of OA individuals and results in a negative chain reaction. The current literature also confirmed that participants' expectation toward efficacy of a treatment represents an important factor to consider when measuring adherence. As explained by the theory of planned behaviour, if an individual demonstrates negative attitudes (risks, time commitment, laziness, etc.) toward a particular treatment, before randomization, he or she will be less motivated in performing or following the intervention [51]. In our proposed RCT, these components mentioned above will be identified and applied to better understand their effects on long-term adherence.

Given that the data on the efficacy of BIs are more limited than those on OA aerobic training, it is likely that participants' exercise preference will offer a promising avenue in terms of improving adherence over the long-term [18,19]. Participants' exercise preference will be evaluated as a KT strategy to implement an evidence-based long-term walking intervention, in which adherence will represent the primary outcome. Surprisingly, this outcome has not yet been examined in previous RCTs focussing on participant preference [8]. To fill this new knowledge gap in the scientific literature, the first step is to identify the most effective intervention, based on EBCPGs (i.e. Knowledge Creation of the KTAC framework). Afterwards, it is important to ensure the integration of recommendations of the Ottawa Panel guidelines into the interventions, by implementing innovative KT strategies, such as participant's exercise preference (Action Cycle concepts of the KTAC framework) (Fig. 3.3) [52].

We will monitor knowledge use, i.e. conceptual knowledge use (e.g. level of intention to continue walking, identification of perceived motivators/reasons to continue walking, level of importance to follow walking goal, etc.) and instrumental knowledge use (e.g. adoption of new strategies to maintain walking goal, etc.) as well as clinical outcomes to measure the impact on participants of using and applying the knowledge (e.g. pain, functional status, quality of life, etc.).

Some limitations of the walking study should be addressed. First of all, this is a 6-month supervised walking program with a 3-month follow-up period using a preference trial design which consists of two single blind RCTs, based on a participant exercise preference

model [25], to elicit preferences independently of randomization. As known, RCTs are considered the gold standard for assessing the effectiveness of interventions [28]. The main concern is that participants' exercise preference could influence adherence, when it is not possible to blind the participants to the physical interventions [30], like in this walking study. However, an innovative robust approach is to use the randomization process and consider the exercise preference before randomization, using the data in the subsequent analysis. This approach will allow for an unbiased evaluation of the effects of exercise preference on walking adherence, avoiding any selection bias.

Moreover, previous RCT on walking programs for older individuals with OA of the knee attained a poor consent rate of 54.4% [18] (accepted to enrol in the study). We expect a similar consent rate for the pilot RCT proposed. Therefore, it will be essential to support the decision-making process of the participant, before the beginning of the study, by giving him/her all the relevant information to help him/her easily assess the advantages and disadvantages of joining the pilot RCT.

Finally, the 7-Day Physical Activity Recall (PAR) will be used as a self-recorded questionnaire, to assess the duration (min/day) of doing moderate physical activities (such as walking). Even though, it represents a self-management measurement, Rauh et al. [53] showed that the PAR appeared to be administratively feasible and demonstrated relevant validity. Several trials confirmed that a daily recording is more accurate among an older population when self-reporting. Also, the use of pedometers to monitor walking adherence

in older adults appears to be another reliable and valid instrument [54]. Generally used by elderly people, pedometers are easy to use and provide an objective measurement of walking adherence [23,55]. Therefore, we will be using pedometers as a second tool to measure objectively the adherence rate, as well as a motivational tool for the participants. In fact, the study of Motl et al. [56] demonstrated evidence of strong and statistically significant correlations between scores from the 7-Day PAR self-report measure and the objective device, pedometer step counts, based on a multi-method analysis. More sophisticated tools are also available to replace pedometers, such as accelerometers. Even if accelerometers give more relevant information other than just daily steps count, they are very costly and seem to have similar problems than pedometers, i.e. replacing the batteries often and wearing the device insufficiently or not at all [57].

4. Dissemination and Conclusion

This proposed pilot RCT is based on solid methods, since it will follow the SPIRIT recommendations. The reporting of the pilot study will be eventually based on the CONSORT guidelines also. It will address questions of clinical and scientific importance to identify the main strategies to promote the long-term adherence of community-based walking program. It will also guide clinical decision-making of health professionals in rehabilitation sciences, by disseminating scientific results through professional scientific journals. If results of this study show this is indeed advantageous, it will finally assist the health care providers through their decision-making process, by 1) implementing an evidence-based walking program in existing health organizations (e.g. Public Health: City of Ottawa) and 2) referring OA patients, who prefer to walk inside with a group, to walking clubs in Ottawa walking. Moreover, the Walking Club at The Billings

Bridge Shopping Centre has a strategic location, since next door to TAS Ottawa office. The sustained goals are to encourage: 1) Shopping Centre to promote better communication between TAS and the existing walking club, 2) the health professionals from TAS to refer OA patients to the existing walking club (to become new members), by respecting their exercise preference, and 3) the current members from the walking club to welcome participants from the study to continue walking with members of the walking club and, implement the same effective aerobic walking program beyond the study.

Key Message

Preference is an innovative approach for improving walking adherence, not yet studied among OA population.

Consent

All authors declare that written informed consent was obtained from each participant.

Ethical Approval

All authors hereby declare that all experiments have been examined and have therefore been performed in accordance with the ethical standards.

The Research Ethics Board from the University of Ottawa approved this pilot study (#H01-07-08C) and will be available if urgent changes need to be made on the proposal. The clinical study has been also registered with the International Standard Randomised Controlled Trial Number Register (ISRCTN) and Current Controlled Trials.

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Competing Interests

Authors have declared that no competing interests exist.

Trial Registration

TRIAL REGISTRATION: ISRCTN, <http://www.controlled-trials.com/ISRCTN51981241/>, ISRCTN51981241

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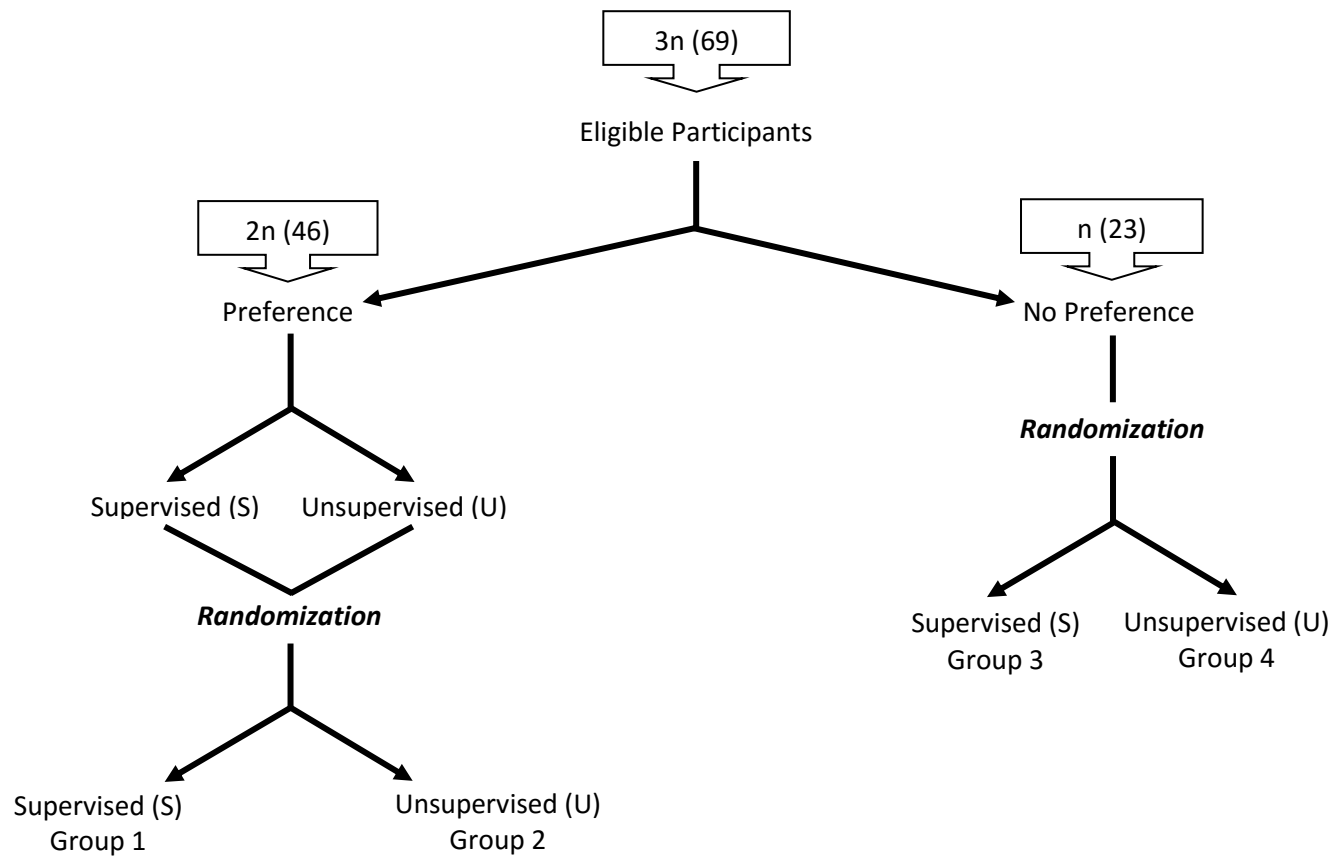
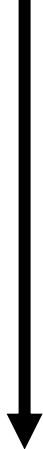


Fig. 3.1 The adapted randomized participant-preference design

Used with permission from Patient's Preference and Randomization: New Paradigm of Evidence-based Clinical Research. Millat B, et al. World Journal of Surgery, 29. Copyright © 2005 [30]. Sample size calculation performed according to current literature (2/3rds of study participants sample have a preference [27]).

		INDIVIDUAL AEROBIC WALKING TRAINING		
Week No.	Phase	Duration (min/day)	Intensity (% HRmax)	Frequency (days/wk)
1-4	Progression	25	60	3
5-8	Progression	30	65	3
9-12	Progression	35	70	3
13-16	Progression	40	75	3
17-20	Progression	45	80	3
21-26	Maintenance	45	80	3
27-38				

Progression Phase



Follow-Up Phase



Table 3.1. Individual aerobic walking training progression

Participants' aerobic walking training, related to the progression of their walking duration, intensity and frequency, throughout the study period, based on the Ottawa Panel et al., 2012 [4]

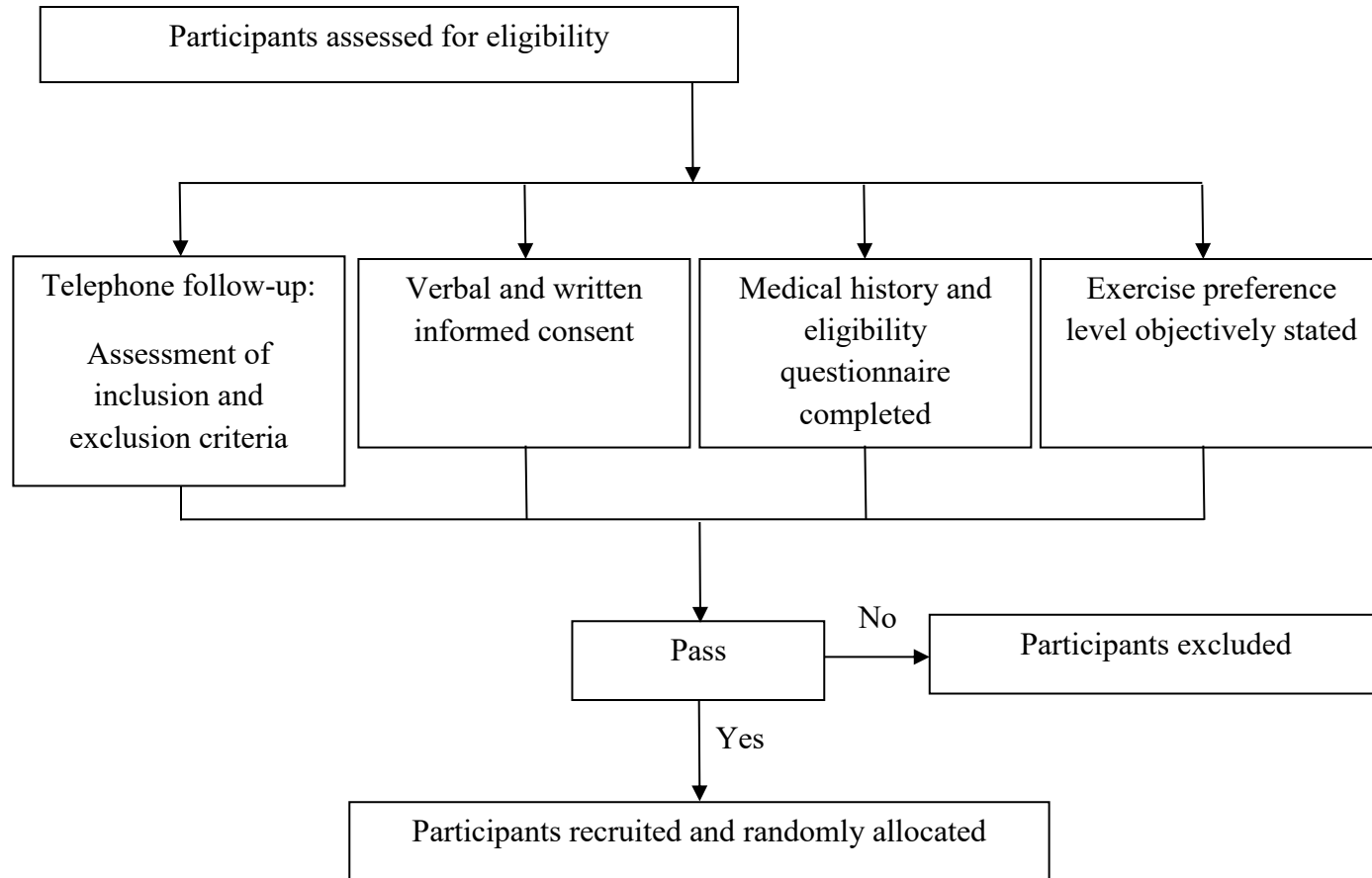


Fig. 3.2 Eligibility and Screening

Different steps for screening eligible participants.

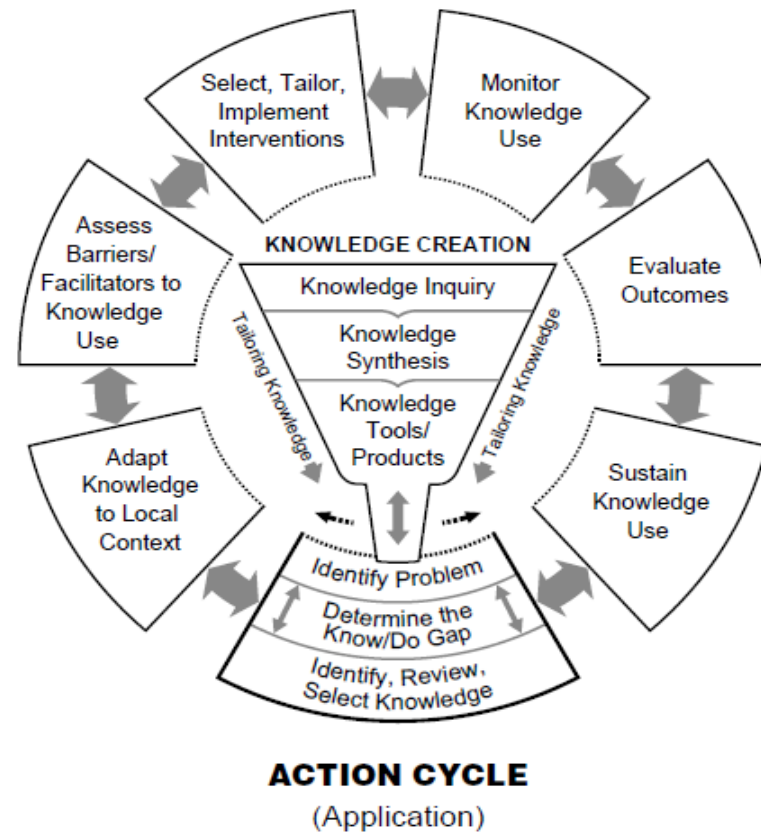


Fig. 3.3 The knowledge translation in health care action cycle

Used with permission from Straus SE, Tetroe, J & Graham ID. Introduction Knowledge translation: What it is and what it isn't, in Knowledge Translation in Health Care: Moving from Evidence to Practice (eds SE Straus, J Tetroe and ID Graham), John Wiley & Sons, Ltd, Chichester, UK. 2013. doi:10.1002/9781118413555.ch01 [52].

Chapitre 4 : Facteurs d'adhésion

Le chapitre 4 présente le deuxième article de ce projet de recherche. Le 28 novembre 2015 dernier, le journal *Clinical Rheumatology* a accepté la publication de ce manuscrit, rédigé en anglais. Les recommandations indiquées par le journal, concernant le style et la mise en forme, ont été respectées. Par contre, les tableaux et la figure sont ici divulgués séparément du texte, à la fin de l'article. L'objectif général de cette étude se résumait à identifier les facteurs exploratoires pouvant potentiellement influencer l'adhésion et alors aussi l'application du programme de marche structuré, basé sur des données probantes, et ce en suivant le protocole de recherche décrit de façon détaillée dans le chapitre 3. Les facteurs d'influences personnels et externes identifiés auprès des personnes âgées atteintes d'arthrose du genou pourront être par la suite pris en considération pour guider les professionnels de la santé lors de l'élaboration d'interventions futures en activité physique pour cette même population.

Une copie de la version publiée du chapitre 4 sous forme d'article (annexe 10), du sondage sur les facteurs d'adhésion (annexe 11) et des permissions obtenues de republier dans la présente thèse l'article: *Factors influencing adherence among older people with osteoarthritis* (annexe 12.5) peuvent être consultées à la section IV sous « ANNEXES ».

Le présent article a été co-rédigé par la candidate au doctorat (LL), sous la supervision de ses co-directeurs, le D^r George A. Wells et D^{re} Lucie Brosseau, le comité de thèse, formé de D^r Glen P. Kenny, D^{re} Natalie Durand-Bush et D^r Stéphane Poitras, ainsi que d'un assistant de recherche, Gino De Angelis. La candidate au doctorat (LL) est la première auteure de cet article, après avoir été

principalement responsable de 1) recruter les participants, 2) coordonner la sélection et l'invitation des participants, 3) rendre accessible les questionnaires d'évaluation, 4) coordonner la saisie des données et analyser les données recueillies, 5) produire les versions finales des rapports scientifiques ainsi que de 4) rédiger et publier cet article pour sa thèse doctorale. Ses co-directeurs (LB et GAW) ont supervisé chaque étape de la réalisation de cet essai contrôlé randomisé. Les membres du comité de thèse (GPK, NDB, SP) ont également fourni leurs précieux commentaires tout au long du processus. Tous les co-auteurs ont révisé la version finale de l'article rédigé.

Titre de l'article: *Factors influencing adherence among older people with osteoarthritis*

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Abstract

This study aims to identify potential factors that could affect adherence and influence the implementation of an evidence-based structured walking program, among older adults diagnosed with knee osteoarthritis. A total of 69 participants with mild to moderate osteoarthritis of the knee fulfilled an online survey on potential factors that could affect their adherence to an evidence-based structured walking program. Adherence with regard to the influencing factors was explored using a logistic regression model. Results tend to show higher odds of adhering to the evidence-based walking program if the participants were supervised (more than 2.9 times as high), supported by family/friends (more than 3.7 times as high), and not influenced by emotional involvement (more than 11 times as high). The odds of adhering were 3.6 times lower for participants who indicated a change in their medication intake and 3.1 times lower for individuals who considered themselves as less physically active (95 % confidence interval (CI)). Our exploratory findings identified and defined potential adherence factors that could guide health professionals in their practice to better identify positive influences and obstacles to treatment adherence, which would lead to the adoption of a more patient-centered approach. A large-scale study is required to clearly delineate the key factors that would influence adherence. We addressed a new knowledge gap by identifying the main strategies to promote the long-term adherence of community-based walking program.

Keywords

Adherence . Factors . Implementation . Osteoarthritis . Preference . Walking

Introduction

Osteoarthritis (OA), a degenerative joint disease, frequently affects the knees. It is one of the most common causes of pain in older individuals [1]. Moderate-intensity physical activity, such as walking, is an effective intervention and has been linked to numerous health benefits [2]. However, people affected by this chronic health condition tend to avoid physical activity [3]. Therefore, it is essential to understand why this population commonly chooses to not adhere to a physical activity [4, 5] that could help circumvent the deleterious effects of OA on functional ability. As demonstrated in a recent systematic review of Loew et al. [2], studies involving physical activity interventions in individuals with OA reported low adherence rates ranging from 27 to 64 % [2]. Adherence is considered a key criterion to evaluate the therapeutic effectiveness of an exercise program. It refers to the extent to which a person follows and accepts a treatment recommended by health professionals [6, 7] and is able to successfully reach the therapeutic goals [7]. Poor adherence indicates that important internal as well as external barriers in the implementation or successful completion of a physical activity intervention exist. The success of implementing an evidence-based intervention may perhaps be affected by factors related to adherence [6]. Though previous researchers identified adherence factors impacting arthritis [8–10], a clear consensus of influencing factors to improve

adherence has not yet been established. Thereby, there is a need to identify the factors related to adherence and to adopt new tailored strategies to promote the adherence of physical activity interventions or programs.

To date, there remains a significant gap in knowledge regarding the process through which individuals with OA fail to regulate physical activity over time. To address this knowledge gap, two main theoretical frameworks have been proposed to identify potential factors affecting adherence to physical activity in the management of chronic diseases [11–13]. The social cognitive theory of Bandura has shown that personal characteristics contribute to an individual's level of motivation to adhere to physical activity [12–14]. Behavior is regarded as a reciprocal interaction between personal and environmental components [15]. The latter is defined as social or physical factors that facilitate or hinder behavior. Given the importance of these concepts, a framework pertaining to physical activity behavior change was developed by the World Health Organization (WHO) [13], based on the concepts of social cognitive theory [15]. The WHO published a conceptual framework to better illustrate how adherence is a multidimensional phenomenon not only defined exclusively by personal determinants but also by important environmental determinants [13]. In fact, adherence incorporates the broader notions of an external determinant called “concordance” (i.e., influence of the health professional on an individual's treatment decision, while promoting harmony between the two parties) [16].

The five dimensions of adherence in this model illustrate that participant adherence is a multi-dimensional behavior construct, determined by five dimensions: (1) health system (e.g., community support, relationship with health professionals), (2) social/economic (e.g., social status, external environment), (3) therapy related (e.g., benefits, treatment effects), (4) condition related (e.g., illness related, level of physical/emotional disability), and (5) patient related (e.g., level of knowledge, beliefs) [13]. Therefore, this conceptual framework facilitates the theoretical understanding of adherence to physical activity behavior [13] and was used to guide the present study (see Fig. 4.1 for additional details). Concerns regarding adherence still persist, even when the effectiveness of a physical activity intervention has been established [2]. When participants are not engaged in the clinical decision-making, they may feel less empowered, resulting in decreased adherence [12]. The treatment preferences of individuals thereby need to be considered, allowing the participants to express themselves. In fact, the term “participant exercise preference” (PEP) refers to the individual’s personal expression of a value following consideration of benefits and risks of the interventions proposed, based on his/her values, beliefs, and needs [17]. PEP can be used as a knowledge transfer strategy to implement an evidence-based intervention. This strategy has not yet been applied to an aerobic walking program trial [18] nor has it been studied among older people with OA and investigated with adherence as the primary outcome [19]. Given these gaps and the relevance of the PEP factor, adherence is considered an essential outcome to successfully transfer evidence-based guidelines into clinical practice and patient care but remains challenging for stakeholders [20].

Aim

The general objective of the present study was to identify potential factors that could affect adherence and consequently influence the implementation of an evidence-based structured walking program [2], among older individuals diagnosed with mild to moderate knee OA. Since the primary outcome measured in the main study—The PEP trial [21]—was walking adherence, we expected to encourage OA participants to successfully adhere to an evidence-based effective walking program, by implementing a PEP strategy based on the evidence-based clinical practice guidelines [2]. In the present study, we evaluated three main research questions:

1. Question 1: What are the most potential factors related to walking adherence?
2. Question 2a: What are the five most potential factors that best describe each of the five dimensions of adherence, based on the WHO conceptual framework?

Question 2b: What is the potential influence of participants' preference as it relates to walking adherence over and above the factors identified within each dimension of adherence, based on the WHO conceptual framework?

Materials and methods

Protocol

This study describes the findings from the first 3 months of a larger 9-month study using a preference study design [21]. The main objective of the larger study was to evaluate the effect of PEP, by examining the hypothesis that participants who followed their preferred intervention (supervised vs. unsupervised aerobic walking program) would be more likely to adhere throughout the 9-month study period. The inclusion criteria were participants (1) diagnosed with mild to moderate OA of the knee, (2) aged between 55 and 80 years old [1], (3) able to walk for a minimum of 20 min, (4) available to walk 3 times/week, and (5) give informed consent. A total of 69 adults were recruited (50 women (72.4 %) and 19 men (27.5 %)). Participants were stratified on whether they did or did not indicate a preference for supervision related to the walking program ((1) preference for supervised, (2) preference for unsupervised, or (3) no preference). The reader is referred to the larger study for a more detailed overview of the study methodology [21].

Primary Outcome

Walking Adherence

Walking adherence was monitored as a percentage of the number of walking sessions attended and completed by each participant divided by the number of walking sessions recommended in the Ottawa Panel guidelines [2, 5]. Participants who completed at least on average two of three sessions

(66 %) of the prescribed walking sessions per week were considered as adherent. This clinically relevant cut-off point was selected based on a previous physical activity study in which significant changes in health outcomes were demonstrated (e.g., improvement in pain, function, and overall health) among an OA population [22]. A review of aerobic activities for individuals with arthritis confirmed that walking demonstrated the highest clinical improvements with an adherence rate ranging between 68 and 88 %, compared with other modes of aerobic exercises (e.g., swimming, cycling, dance) [23]. To the best of our knowledge, only one study has used a participation threshold of 100 % [24].

Adherence Factors

The purpose of this exploratory behavioral study was to identify factors that could potentially affect adherence and consequently influence the implementation of an evidence-based structured walking program [2]. To our knowledge, no detailed survey pertaining to physical activity adherence factors for individuals with knee OA has been published. To this end, a self-reported survey was developed based on two main sources.

To date, few studies have provide a thorough description of adherence factors, with the majority either only provided keywords for adherence concepts or described factors without developing a survey [6, 25–27]. Nonetheless, some adherence factors (e.g., self-efficacy, motivation) have been recognized in the literature [8–10, 12–14, 17, 18] and were considered to develop this self-reported survey.

Since the literature on determinants influencing adherence to walking programs for individuals with OA is very limited, participants were therefore asked to complete an initial evaluation. The participants had to identify (a) barriers that limit their participation in physical activity and (2) facilitators that help them engage in physical activity. These responses were integrated when developing the proposed survey on adherence factors.

Whether the adherence factors were identified from the literature or by the participants, they were categorized according to the WHO's conceptual framework which integrates five key concepts (see Fig. 4.1) [13]: (1) social or economic, (2) health system, (3) therapy related, (4) condition related, and (5) patient related. See Table 4.1 for a list of all the potential adherence factors identified.

Data Collection

Data were collected using the aforementioned survey. The compilation of data was verified independently by two members of the research staff. For the PEP, three types of preference were collected:

1. Initial preference: at baseline, preference was evaluated where the participants had to respond “yes” or “no”: Do you have a preference for participating in a supervised or unsupervised walking program?

2. Preferred choice: at baseline, the preferred choice was also examined, where the participants had to respond “yes” or “no”: Did you receive your preferred group?
3. Preference at 3 months: participants enrolled in the study completed the online survey at 3 months after enrolment to a walking program. They responded whether the preference factor (“I was enrolled in my preferred group”) influenced their adherence to the study negatively (−1), had no impact (0), or positively (+1).

Data Analyses

The data analysis focused on the evaluation of factors identified as most important to potentially predict the adherence of older adults diagnosed with knee OA participating in an evidence-based walking program. The dependent variable (adherence) was considered as a dichotomous binary variable since it was represented by two categories: 1, participant successfully attended and completed the walking program; 0, participant did not successfully attend but completed the walking program.

Adherence was influenced by variations in the independent variables, following a 3-point Likert ordinal scale: negative (−1), no impact (0), or positive (+1). This common rating scale was concise and allowed the participants to better express their opinion [28]. Adherence with regard to the influencing factors was determined using a polychotomous binary logistic regression model [29]. It evaluated the probability to adhere to the walking program in accordance to the explanatory variables, in this case, all the identified influencing factors.

A multivariate analysis was performed using the variables that indicated a p value of ≤ 0.2 in order to identify the predictor variables, i.e., only the most important potential factors. As frequently selected in behavioral and social sciences research, this p value was used since a large number of categorical variables were entered in the equation [29]. Odds ratio could not be interpreted as a relative risk because adherence is not a rare event [29]. To be significant, the odds ratio of a factor needed to be in the range of 95 % (confidence interval (CI)), without including 1 within this range.

To assess research question 1, the most potential factors related to walking adherence were identified, among all the factors included in the online survey, using a univariate quantitative analysis to look at each factor separately. A set of the five most important variables reaching statistical significance was conserved.

To assess research question 2a, the five most important factors that best describe adherence were identified using a univariate analysis according to each dimension of adherence (WHO's conceptual framework [13]). A set of the five most potential variables was taken to do a stepwise procedure (one factor represented each dimension). To assess research question 2b, we determined the importance of PEP related to walking adherence, in conjunction with the five same potential variables, selected in question 2a, in order to perform a stepwise procedure with the three types of preference.

The most important potential factors related to walking adherence were assessed based on all of the participants who adhered (successfully or not), and those who dropped out (n=69) using the intention-to-treat approach, since the factors affecting an individual's decision to drop out [30] were significantly related to the factors identified as important for adherence, as demonstrated by a Chi-square test (Chi-square=39.403, $p<0.001$). In light of the fact that 20 participants withdrew from the study at 3 months, secondary analyses were performed with the 49 participants who completed the 3-month intervention.

Results

At baseline, 54 out of 69 (78 %) participants indicated a preference for participating in a supervised (20/54 (37 %)) or unsupervised (34/54 (63 %)) walking program. Based on their stated exercise preference, participants were then assigned to one of the two modes of supervision for the effective walking program. Twenty-nine participants who indicated a preference were able to participate in their preferred walking supervision mode (54 %). Out of the 69 participants, 43 participants (62.3 %) successfully adhered to the walking program.

Among the 20 participants (18 women) who dropped out within 3 months, 19 did not adhere successfully prior to dropping out (95 %). At baseline, 95 % (19/20) of the participants indicated a preference for participating in a supervised or unsupervised walking program, and 11 of them who stated a preference did not obtain their preferred group after being assigned (58 %).

Since the range of value (95 % CI) included 1 in the results, evidence of the odd ratios was not statistically significant and tendencies were therefore suggested for each factor that were potentially important. By using the intention-to-treat approach, the most potential factors related to adherence were identified, at 9 months (p value ≤ 0.2): (1) change in medication use, (2) work/volunteering schedule, and (3) fear (fear of falling, walking causing pain). Results indicated a tendency that participants were 20 % less likely to adhere if change in medication use (p value, 0.236) and work/volunteering schedule (p value, 0.158) both represented a negative influence. Participants were 31 % less likely to adhere if their fear of falling negatively impacted their walking adherence (p value, 0.117) (see Table 4.2).

With regard to the 49 participants who completed the study at 3 months, 42 (85.7 %) successfully adhered to the walking program. Thirty-five (71 %) participants indicated a preference for participating in a supervised or unsupervised walking program, in which 21 of them were able to participate in their preferred group (60 %). At the end of the study program, the majority of participants (90 %) specified that participating in their preferred group had a positive influence on their adherence (44/49).

Table 4.3 shows the results according to research question 1. The five most important factors potentially influencing the adherence rate as determined from the survey response at 3 months were (p value ≤ 0.2) (1) level of satisfaction during walking and (2) emotional

involvement. Specifically, participants were 3.4 times more likely to adhere if their level of satisfaction influenced their walking adherence in a positive way (p value, 0.293) Moreover, we observed a tendency that people were 53% less likely to adhere to the walking program if they characterized the factor “emotional involvement” (i.e., attitude and unbearable emotions toward physical activity) as having a negative influence on their adherence.

With regard to research question 2a, the five most important potential factors influencing walking adherence representing each adherence dimension [13] were (p value ≤ 0.2) (see Table 4.4):

(A) Environmental factors:

1. Health system: participants were 2.9 times more likely to adhere if they felt being supervised by an exercise therapist had a positive impact on adherence (p value, 0.230).
2. Social/economic: participants who indicated that family or friend support had no impact on their walking adherence were 3.7 times more likely to adhere (p value, 0.246).
3. Therapy related: participants were 3.6 times less likely to adhere if they perceived a change in their medication use during the study. It seemed to have a negative influence on their adherence since it was a sign of more pain or additional health problems (p value, 0.073).

(B) Personal factors:

- (i) 4. Condition related: participants were 3.1 times less likely to adhere if they considered their physical fitness level as a negative influence on walking adherence (p value, 0.191).
- (ii) 5. Patient related: participants were 11 times more likely to adhere if unbearable feelings, to the point of losing one's ability, had no influence on their walking adherence (p value: 0.133).

With respect to research question 2b, Table 4.4 details the influence of preference compared with the five most potential adherence factors identified above (according to each dimension of adherence; p value ≤ 0.2). Preference was not considered the most important factor; it pertained to medication use and emotional involvement. The logistic regression revealed a tendency that participants who indicated a strong preference for being supervised or unsupervised were 46 % less likely to adhere if emotional involvement seemed to have a negative influence on walking adherence, in comparison with preference at baseline. Participants who had a preference and did not obtain their choice were 49 % less likely to adhere if again the factor “emotional involvement” had a negative influence on their adherence. At 3 months, results showed a tendency that participants were 77 % less likely to adhere if change in medication use had a negative influence on adherence.

Discussion

The purpose of this study was to identify factors that could potentially affect adherence and consequently influence the implementation of an evidence-based structured walking program [2], among older adults diagnosed with knee OA. We found that the five following most potential factors were deemed important to walking adherence and were therefore linked to the overall success of the walking program: participants' (1) level of satisfaction during walking, (2) emotional involvement, (3) fear, (4) physical fitness level, and (5) change in medication use.

It has been established that adherence to physical activity is a multi-dimensional behavior construct, determined by the interaction between five dimensions of adherence [13]. The conceptual framework by the WHO [13] stipulates that physical activity behavioral change is influenced by both personal determinants and environmental factors, without identifying precise factors to better understand each dimension of adherence. Preliminary results delineate the key factors that had a greatest influence on adherence to physical activity in the context of the five dimensions. This was an innovative feature of the study, as it was never examined in studies with people diagnosed with OA. These are as follows:

(A) Environmental factors:

1. Health system: supervision by exercise therapists' seemed to have a positive impact on the participant's adherence.
2. Social/economic: adherence seemed to be positively influenced if the participant received support from his family or friends.
3. Therapy related: change in the medication use seemed to negatively influence the participant's adherence.

(B) Personal factors:

4. Condition related: high physical fitness level seemed to positively affect adherence.
5. Patient related: absence of emotional involvement seemed to have a positive impact on the participant's adherence.

The implementation of the innovative strategy using PEP was essential to address the recommendations of the Ottawa Panel guidelines, in order to successfully transfer evidence-based clinical practice guidelines into clinical practice [20]. Even though preference was not considered the most important factor, walking adherence was dependent on the PEP. Participants who stated that preference had a positive influence, were two times more likely to adhere (n=69). Preference should be considered as an important influencing factor related to dropout as well as adherence.

This exploratory study supports the results of other studies examining adherence and drop out related to physical activity programs [17–19, 31]. Crandall et al. [32] suggested that considering preference when determining which type of intervention the participant should follow, can improve adherence. Our aforementioned findings are in accordance with those of Hendry et al.'s [33] since, the authors

confirmed that perception of individual physical capacity, beliefs about physical activity and motivational approaches should be considered and examined when working with a physical activity population as they can influence their behavior [33]. According to several other authors, self-efficacy [14, 25, 34] and motivation [25, 34–39] are factors that can significantly influence adherence, albeit these same factors did not reach statistical significance in our analyses even though they were evaluated.

Moreover, a new observation emerged from the analyses. Participants who perceived a change in their medication use during the study seemed to adhere poorly. It is plausible that a change in their medication prescription implies poorer health status, and as a consequence, they do not view physical activity as being able to provide any health benefits. Without perceived benefits on health or beliefs in physical activity, individuals tend to be less motivated, which influences their adherence. More research is warranted to examine this observation.

This study was novel in that it considered many factors to potentially impact adherence to physical activity, and a quantitative methodology was used to define the relative importance of each of these potential factors. However, since the majority of the factors influenced each other, a strong multicollinearity could be noticed, which may have decreased the significance of each factor. A strong multicollinearity increases the standard error and confidence intervals for the coefficients. Thus, multicollinearity may have to lead to some statistically non-significant analyses. To address this issue, a multivariate analysis commonly employed in behavioral and social sciences research was performed using only the variables that indicated a p value of ≤ 0.2 , in order to identify the predictor variables,

i.e., most potential factors. This p value was selected since a large number of categorical variables were entered in the equation. While the sample size was relatively small, a power calculation was performed prior to the study to justify the sample size. Our findings allowed for the development of a new relevant survey that can guide health professionals in their practice. The survey can be used by health professionals to assess their patients' perceptions regarding adherence factors, and therefore adopt a more patient-centered approach. Ultimately, the goal is to help researchers and health care providers to better promote long-term adherence to a physical activity program and manage these potential factors in order to enable individuals with mild to moderate OA of the knee to participate in these exercise programs. Health professionals should also assess and respect their patients' preferences for treatments [40, 41]. This will, in turn, allow the health care practitioners to adopt a patient-centered approach, to better accommodate the need of their patients, and increase their chance of success [41].

Conclusion

This exploratory study identified different potential factors, such as supervision, social support, medication use, fitness level, and emotional involvement that can influence walking adherence in clinical practice and research. Future studies should adopt an equally rigorous methodology, but factors which are inter-related and have strong associations should be removed (by performing a multicollinearity test) to avoid multi-collinearity and a larger sample size must be considered to confirm the factors that influence adherence.

In conclusion, there are many factors influencing adherence to walking program designed specifically for individuals with knee OA. These should be considered when developing physical activity interventions with this population. The most important ones included emotional involvement, mode of supervision, family/friends support, medication intake, and physical fitness level.

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Compliance with ethical standards

This proposed study was in accordance with ethical standards for human research and was approved by the Research Ethics Board from the University of Ottawa (H01-07-08C).

Disclosure

None.

Electronic supplementary material

The online version of this article (doi:10.1007/s10067-015-3141-5) contains supplementary material, which is available to authorized users.

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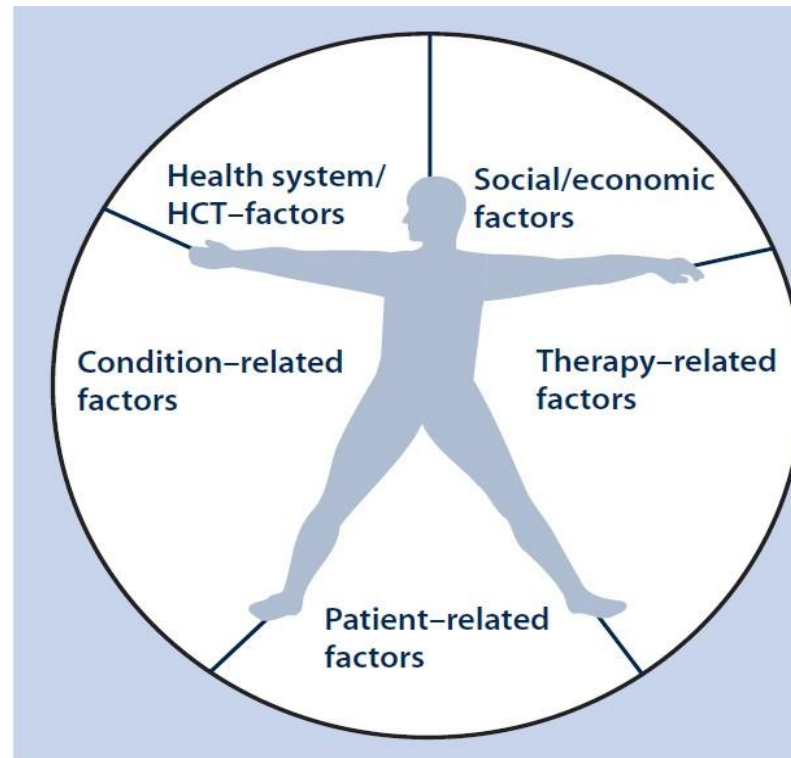


Fig. 4.1 Reproduced, with the permission of the publisher, from the World Health Organisation. Adherence to long-term therapies - evidence for action. Noncommunicable diseases and mental health adherence to long term therapies project. Report. Geneva: World Health Organisation; 2003 (Fig. 3, section II, chapter V, page 41) [13]

Table 4.1 A summary of all the potential adherence influencing factors selected are listed below, where they are separated into five categories, based on the conceptual framework presented by WHO (2003) [13]

Factors	Categories				
	Health system	Social/Economic	Condition-related	Therapy-related	Patient-related
	Supervised by exercise therapists	Family/friends support	Other health problems/co-morbidities	Knowing the benefits of walking	Randomly assigned to group of intervention
	Constant feedback	Work/volunteering schedule	Joint pain	Level of satisfaction during walking	Level of motivation
	Incentives	Type of neighbourhood	Joint stiffness	Perceived impact of the walking	Determination/Perseverance

Categories					
Factors	Health system	Social/Economic	Condition-related	Therapy-related	Patient-related
	Proximity of the walking area	Access to safe physical activity facilities	Joint instability	Health purposes (walking for health)	Morning attitude
	Group participation	Domestic responsibilities	Level of endurance	Difference in mobility	General mood
		Travelling (vacation/work)	Level of Energy	Difference in balance control	Interest in walking
		Rush hours	Physical fitness level	Difference in quality of sleep	Habits
		Easy access to motorised vehicles	Aging	Different perception in ability to walk	Self-confidence
		Social contact	Psychological well being	Change in medication use	Comparison with other walkers

Categories					
Factors	Health system	Social/Economic	Condition-related	Therapy-related	Patient-related
			Physical well being		Emotional involvement
		Weather	Weight control		Fear
			Quality of sleep		Perceived personal control of the risk factors affecting OA
					Attitude towards actual health condition Self-efficacy

Table 4.2 Most important potential factors related to adherence

		Sig.*	Exp(B) ^a	95% CI for EXP(B)	
				Lower	Upper
Most important potential factors	Work/Volunteering Schedule	0,158 *	0,800	0,587	1,091
	Fear	0,117 *	0,689	0,432	1,098
	Change in Medication Use	0,236 *	0,796	0,546	1,161
	Comparison with Other	0,728	0,921	0,579	1,464
	Participants/Walkers				
	Joint Instability	0,598	1,105	0,763	1,600

Data of 69 participants; intention-to-treat method.

CI confidence interval

*** p value ≤ 0.2**

^a Odds ratios for the predictors

Table 4.3 Most important potential factors related to adherence

Factors		Sig.*	Exp(B)^a	95% CI for EXP(B)	
				Lower	Upper
Most important potential factors	Emotional Involvement	0,082 *	0,467	0,198	1,101
	Level of Satisfaction	0,293 *	3,368	0,350	32,439
	Fear	0,993	1,003	0,549	1,832
	Physical Fitness Level	0,541	1,458	0,435	4,890
	Change in Medication Use	0,421	1,306	0,681	2,506

Data of 49 participants; without the 20 participants who dropped-out. ^a p-value ≤ 0.2

CI confidence interval

* p value ≤ 0.2

^a Odds ratios for the predictors

Table 4.4 Most potential factors identified to better understand the five dimensions of adherence compared to the PEP factor

Concepts	Dimensions	Most important factors	PEP factor	Sig. *	Exp(B) ^a	95% CI for EXP(B)	
						Lower	Upper
Environmental	1.Health system	Supervised by Therapist		0,230 *	2,933	0,383	22,463
	2.Social/Economic	Family/Friends support		0,246 *	3,692	0,406	33,547
	3.Therapy-related	Change in Medication Use		0,073 *	0,104	0,009	1,239
Personal	4.Condition-related	Physical Fitness Level		0,119 *	0,232	0,037	1,453
	5.Patient-related	Emotional Involvement		0,133 *	11,000	0,482	250,865
			Initial Preference	0,185 *	0,544	0,221	1,338
			Preferred Choice	0,136 *	0,508	0,209	1,236
			Preference at 3 months	0,074 *	0,023	0,000	1,439

CI confidence interval

* p value ≤ 0.2

^a Odds ratios for the predictors

Chapitre 5 : Résultats cliniques

Suite à l'identification des facteurs exploratoires d'adhésion au chapitre 4, un troisième et dernier article a été rédigé en présentant les résultats détaillés obtenus suite à la mise en place de ce projet de recherche, suivant le protocole de recherche décrit de façon détaillée dans le chapitre 3. Le manuscrit a été soumis pour publication en anglais, dans le journal *Clinical Rheumatology*. Le style et la mise en forme actuels concordent avec les recommandations indiquées par le journal, toutefois les tableaux et les figures ont été placés séparément, à la fin de l'article, pour alléger le texte. Cet article avait pour but de montrer que l'adhésion au programme de marche ainsi que les bienfaits cliniques de la marche semblaient s'améliorer lorsque la préférence des participants était considérée. Cette stratégie d'application favorisera à long terme l'adhésion à un programme de marche en milieu communautaire, tout en assurant le maintien des bienfaits de la marche, auprès des personnes âgées atteintes d'arthrose légère à modérée du genou.

Les copies du protocole de recherche, des évaluations ainsi que des permissions obtenues de republier dans la présente thèse peuvent être consultées à la section IV sous « ANNEXES ».

Le présent article a été co-rédigé par la candidate au doctorat (LL), sous la supervision de ses co-directeurs, le D^r George A. Wells et D^{re} Lucie Brosseau, le comité de thèse, formé de D^r Glen P. Kenny, D^{re} Natalie Durand-Bush et D^r Stéphane Poitras, ainsi que d'un assistant de recherche, Gino De Angelis. La candidate au doctorat LL) est la première auteure, après avoir été principalement responsable de 1) recruter les participants, 2) coordonner la sélection et l'invitation des participants, 3) rendre accessible

les questionnaires d'évaluation, 4) coordonner la saisie des données et analyser les données recueillies, 5) produire les versions finales des rapports scientifiques ainsi que de 4) rédiger et soumettre pour publication cet article pour sa thèse doctorale. Ses co-directeurs (LB et GAW) ont supervisé chaque étape de la réalisation de cet essai contrôlé randomisé. Les membres du comité de thèse (GPK, NDB, SP) ont fourni leurs précieux commentaires tout au long du processus. Tous les co-auteurs ont révisé la version finale de l'article.

Titre de l'article: *An Evidence-Based Walking Program among Older People with Knee Osteoarthritis: The PEP (Participant Exercise Preference) Pilot Randomized Controlled Trial*

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L'article publié inclut six tableaux et deux figures.

Abstract

Background

Knee osteoarthritis is a common joint problem leading to an increase of pain and a loss of function in older individuals. Regardless of the demonstrated benefits of walking programs, older adults with osteoarthritis tend to remain inactive. The main objective of this study was to evaluate if a participant who was randomly assigned to his preferred group improved his adherence to an effective walking program compared to a participant who did not receive his preferred group.

Methods

This was a 9-month pilot randomised clinical trial, based on a patient treatment preferences design. Over 173 older adults were screened, of which 69 eligible participants had a diagnosis of knee osteoarthritis. Participants were randomized to one of two groups: a supervised community-based or unsupervised walking program, based on the Ottawa Panel guidelines. Adherence to the walking program and favorable effects on clinical outcomes were assessed from baseline to 9 months.

Results

At 6 months, participants who expressed a preference, either for the supervised or unsupervised program, and who were assigned to their preferred choice of program showed significantly higher adherence to walking sessions (Supervised: $60.7 \pm 12.3\%$, $P < 0.0001$;

Unsupervised: $43.1 \pm 12.1\%$, $P = 0.03$), compared to the participants who did not obtain their preferred choice of program. After 9 months, significant improvements were shown according to the level of stiffness evaluated with the Western Ontario and McMaster Universities Arthritis Index ($P = 0.01$) and the functional status assessed with the Timed Up and GO Test ($P = 0.04$), among the adherent participants who obtained their preference, as compared to those who did not receive their preference.

Conclusions

We show that adherence and clinical benefits of walking can be improved when participants' preferences were respected. This approach promotes long-term adherence to a community-based walking program, while ensuring the maintenance of clinical benefits of walking, among older adults susceptible to avoid or not properly engage in physical activity.

Trial Registration

International Standard Randomised Controlled Trial Number Register (ISRCTN #51981241) and Current Controlled Trials.

Introduction

Osteoarthritis (OA) is considered as the most common chronic disease that affects the joints [1]. It is one of the top five causes of pain and disability in older individuals [2]. It has been established that walking represents the most beneficial low-impact physical activity recommended for individuals suffering from lower limb OA [3-4]. This form of moderate therapeutic physical activity is safe, inexpensive and accessible. It is suggested for individuals diagnosed with knee OA to perform at least 30 minutes of walking, for a

minimum of 3 days per week [4]. Without exacerbating joint damage as well as increasing symptoms observed in OA [3], walking reduces pain and stiffness, and improves mobility, strength and functional status and quality of life [4].

Despite strong evidence for the effectiveness of physical activity, older adults with OA tend to remain inactive [5] since they believe that physical activity increases joint pain [2]. As a consequence of their sustained inactivity, they experience a decline in physical endurance and muscle strength (especially in lower extremities) as well as marked reductions in functional status (i.e., mobility, gait, performance of daily activities), which together leads to reductions in quality of life [6-7]. Researchers and health professionals are concerned about this wrongful persuasion that pain exacerbates during physical activity. Thereby, they urge to understand how to effectively overcome these barriers to physical activity behaviour in order to implement existing guideline recommendations. To ensure the implementation of OA guidelines is both effective and successful, perceived internal and external barriers to participation in physical activity programs must be considered [8]. Previous studies reported that poor participation in physical activity programs (i.e., low adherence rates) and high dropout rates are generally caused by perceived poor general health, lack of motivation, busy schedules as well as perceived poor weather conditions [9]. While Brosseau et al. (2012) also identified these same barriers, they also noted that accessibility to transportation, and family responsibilities were important barriers to consider, as they negatively impact adherence to physical activity [10].

To overcome barriers to participation, it is important that health-care providers have the ability to identify and measure these modifiable barriers such that they may be better informed and more able to support and facilitate the participation of individuals with

OA in physical activity programs [11]. Individuals with chronic diseases, such as OA, generally make choices about physical interventions that best fit with their perceptions about the disease, their values, and their personal lifestyle. It is beneficial for them to be able to make independent decisions regarding their physical activity [12]. Indeed, in recent years, a number of studies [13-18] have identified the importance of identifying physical activity preferences, for different populations, by inviting participants to express their preferences about the environment, the type of intervention, time, etc. [12]. The studies confirmed an improvement of various clinical outcomes by including the participants' preferences approach. In fact, they illustrated that discouragement and desire to drop-out of the study were reduced [19-20]. These results confirmed the importance of preference as it may consequently enhance adherence to physical activity programs whenever the participants are satisfied with the intervention proposed [13-20].

As a physical activity programme promote major clinical benefits only when it is sustainable over the long-term, adherence becomes an essential variable to consider in the evaluation of physical activity programs [21], although, to date, no randomized controlled trials (RCTs) have assessed the impact of preference on adherence rates. They only assessed clinical outcomes, such as pain relief and drop-out rate [18, 22-26]. To enhance current understanding of the impact of preference on program adherence rates, it is essential to conduct a properly structured long-term community-based walking program based on an innovative behavioural strategy. The current study integrates an original knowledge translation (KT) approach to address a new knowledge gap, by adopting specific results from the scientific literature and surpassing the different barriers of KT. No other studies have applied the participant exercise preference KT strategy to a long-term pilot RCT involving walking programs among older adults diagnosed with knee OA, with a

primary goal of evaluating the impact on adherence rate [26]. In the following pilot RCT examining adherence in individuals undergoing a 6-month walking program followed by an additional 3-month follow-up period, we assessed the following research questions:

Primary research questions

- a) Among participants who expressed a strong preference for a supervised walking program (S) and who obtained their preferred choice of program (Group 1), was there an improvement in walking adherence, compared to participants who did not obtain their preferred choice of program (Group 2) at 6 months and 9 months?
- b) Among participants who expressed a strong preference for an unsupervised walking program (U) and who obtained their preferred choice of program (Group 3), was there an improvement in walking adherence, compared to participants who did not obtain their preferred choice of program (Group 4) at 6 months and 9 months?
- c) Among participants who expressed no preference for a supervised or unsupervised program, was there an improvement in walking adherence for the supervised walking program (Group 5), compared to the unsupervised walking program (Group 6) at 6 months and 9 months?
- d) Among participants who expressed a strong preference (either for a supervised or unsupervised walking program) (Groups 1,2,3,4), was there an improvement in walking adherence, compared to participants who expressed no preference (Groups 5,6)?

Secondary research questions

- a) Among participants who expressed a strong preference for a supervised (S) or unsupervised (U) walking program and who obtained their preferred choice of program (Group 1 and Group 3), were there more favorable effects on pain, functional status, and quality of

life, compared to participants who did not obtain their preferred choice of program (Group 2 and Group 4) during the period of intervention from baseline to 6 months and at 9 months?

Another aim of the PEP pilot RCT was to determine if the recruitment process and rate, design, interventions and selected outcome measures were feasible for a future large-scale RCT.

Methods

The pilot study was registered with the International Standard Randomised Controlled Trial Number Register, that is considered as a primary registry in the World Health Organization (WHO) Registry Network (ISRCTN #51981241) and Current Controlled Trials. Ethics approval was obtained from the Research Ethics Board of the University of Ottawa without modifications to the design and measurement as registered for the pilot RCT.

Study Design

This was a 6-month supervised walking program with a 3-month follow-up period (9 months total study duration) using a partial-preference study design, which consisted of three single blind randomized pilot clinical trials (RCTs) (Figure 5.1). RCTs are considered the gold standard for assessing the effectiveness of health interventions [16]. Since the current literature showed that preference can influence adherence when it is not possible for the research staff to blind their participants to the active physical interventions [26-27], our approach was to identify the preferences before randomization, to avoid any potential selection bias. As a consequence, it allowed

for a more valid evaluation of the effects of exercise preference on walking, since it gathered information to better meet the needs of the study participants [27].

Sample

Adults aged between 40 to 81 years, with a confirmed diagnosis of mild to moderate knee OA were recruited for the study. Recruitment was centered on a non-probability sampling technique (convenience sampling). Recruitment was performed using advertisements in local newspapers as well as posters affixed in senior and retirement homes. During the first screening visit, the research coordinator had the potential study participants complete an eligibility questionnaire, in order to ensure that participants met the inclusion criteria as presented in our recently published study protocol [28]. The trial was conducted at a walking club in the Ottawa region (Canada). To facilitate long-term participation, we offered a free membership to the Walking Club (Ottawa) after 9 months to each participant involved in the study. Participants with cardiovascular disease or other chronic health conditions required medical clearance to participate in the walking program. Those participants who met all inclusion criteria provided written consent prior to participating in the study. Thereafter, each participant was asked by the research coordinator to express their walking preference at the first meeting.

Allocation/Randomisation

Eligible and consenting participants were stratified according to their: 1) preference for a supervised walking program (S), 2) preference for an unsupervised (U) walking program, or 3) no preference. Thereafter, participants were randomly assigned using the 3

stratifications, by computer generated numbers to one of the two walking programs: a 6-month supervised community-based walking program followed by an additional 3-month follow-up period (S) or a 6-month self-directed unsupervised walking program with a 3-month follow-up period (U). Centralized randomization, using sealed envelopes from the methodology center, was used.

Interventions and Data Collection

All 6 groups (Figure 5.1) followed the same progression of the walking program. Participants were instructed to walk three times per week for a duration of 25 minutes for the first month, increasing thereafter to 45 minutes between for the 5th to 9th months (by increasing the duration of 5 minutes each month until 5 months). Attendance of the participants (n=34) randomized to the supervised walking program only (Groups 1, 4 and 5) was logged by a physiotherapist present for all three weekly sessions. Participants in the unsupervised group (Groups 2, 3 and 6) were invited to walk three days per week on their own, without supervision.

A pedometer and heart rate monitor was provided to each participant in order to record their number of steps achieved per walking session and to monitor the level of physical effort, respectively. Participants were required to complete walking logbooks where they recorded the duration (min/day), frequency (days/week) and intensity of their walking sessions. Participants were also required to monitor and record their heart rate and pulse before and after each walking session.

The primary outcome, adherence, was measured every week and summarized at 3 months, 6 and 9 months. Secondary outcome measures were monitored using validated questionnaires and physical tests, at baseline and every 3 months, until the follow-up period (9 months). An independent evaluator supervised the online evaluation of self-reported clinical outcomes, to help participants from all groups to do this online questionnaire if they were not computer literate, and performed the physical tests.

Standardized Outcome Measures

The primary outcome was adherence to their respective walking program (S vs. U), measured using the 7-Day Physical Activity Recall (PAR) [29-31] and was expressed as a percentage of the number of completed walking sessions divided by the number of recommended walking sessions [4,9,28,32]. The participants were asked to attend more than 66% of all the walking sessions prescribed, to be considered as adherent participants (attend more than 71 walking sessions out of the 108 prescribed). This clinically relevant cut-off point is accepted in the field without controversy. It was defined a priori before the data were observed. Validated physical tests done at the walking club, every 3 months, assessed secondary clinical data: weight, Body Mass Index (BMI) and waist circumference. The 6-minute walk test (gait endurance) [33-34] and the Timed Up and Go (TUG) test (static and dynamic balance) [35-36] were performed in order to evaluate functional status. The participants were also asked to fill out a combined survey containing all the selected secondary self-reported questionnaires. Pain, stiffness and daily functional status were assessed using the Western Ontario McMaster Universities Arthritis Index (WOMAC) tool [37-38]. Quality of life was measured with the EQ-5D-5L self-report questionnaire with 5 subscales (mobility, self-care, usual activities, pain/discomfort, anxiety) [39-40]. The participants' logbooks provided important data on the level of physical activity in minutes, intensity and duration, the number of steps achieved per walking session and the level of physical effort.

METs (Metabolic Equivalent of Tasks) minutes characterized by an energy expenditure were calculated every day using the walking minutes recorded and selecting a walking pace equivalent to 4 METS. Lastly, data from the logbooks were used to measure walking adherence, based the 7-Day PAR, to assess walking sessions [29-31]. The data collected by the physiotherapist, in order to keep track of sessions attended, was used to approve what the participants in the supervised program marked in their logbooks.

The independent evaluator used a computerized platform, called Survey Monkey (<https://www.surveymonkey.com/>) to compile the data collected from the online versions of the physical tests and all the abovementioned self-reported questionnaires (weight, BMI, waist circumference, 6-minute walk test, TUG, WOMAC, EQ-5D-5L, 7-Day PAR). Once the data was compiled, a second independent examiner double checked the outcomes to ensure the reliability of the data entry and ensure the validity of the subsequent analyses.

Statistical Analysis

Demographic and baseline information were categorized by groups (6). Categorical variables were described using numbers and percentages. Means and standard deviations (SD) were calculated to summarize the continuous variables. In order to evaluate the primary outcome (Primary Research Questions a, b and c), a mixed model was performed within the independent Time factor and among the groups of comparison and their interaction. Specifically, a calculation of all the possible differences and the adjusted p-values using the Tukey's Honest Significance Test multiple comparisons was done. This analysis was used to evaluate the dependent variable, adherence rate among the supervised (S) and the unsupervised (U) groups from baseline to the follow-up period, from the 6 different groups of

comparison. Moreover, the analyses of the secondary outcomes (Secondary Research Question) were based on a saturated Type III repeated measure analysis of variance (ANOVA) for all the aforementioned dependent standardized outcome measures, in order to obtain a p-value of significant results ($P = 0.05$). These analyses were performed according to an interaction between three types of independent factors followed:

- 1) Factor A (X2): adherence rate (adhered or not adhered),
- 2) Factor C (X3): congruency (Yes (Groups 1, 3) , No (Groups 2, 4) or Indifferent (Groups 5, 6)); and,
- 3) Within Factor T (X4): over time (0, 3, 6, 9 months).

For each of these comparisons, we detected a moderate effect size of 0.5 for adherence with a significance level of 0.05 and power of 80% based on a two sided Student's t-test.

Results

Recruitment and Retention Rates

Between May 2012 and March 2013, 173 older adults were screened and 69 were deemed eligible to participate in the study. Thirty-four participants were randomized in the supervised walking program and 35 in the unsupervised walking program. Figure 5.2 shows the flow of participants from recruitment to follow-up.

Twenty-five participants withdrew from the trial between baseline and 3 months (11 in the supervised group and 14 in the unsupervised group). They were aged between 42 and 78 years, 95% were women and 55% of them lived between 5 and 15 kilometers from the walking club. Out of the 25 withdrawals, 12 participants were assigned to their non-preferred group (48%), 10 in their preferred group and 3 expressed no preference at baseline. The reasons for withdrawal were: 1) Time commitment (36%), 2) Family commitment (20%), 3) Transportation difficulties (8%), 4) Did not receive the preferred treatment (16%), 5) Other illness/disability (12%), and 6) Difficulty to follow the program structure (8%). No adverse events were reported during the 9-month study period.

Demographic and Baseline Information

The participants' baseline characteristics are presented in Table 5.1. Fifty women (72.4%) and 19 men were enrolled in the study. The age of the participants ranged from 40 to 81 years. The mean age was 66.3 (± 6.3) for the supervised group and 64.1 (± 11.1) for the unsupervised group. With significant baseline imbalances found between Groups 1 and 2, as well as between Groups 5 and 6, an analysis of covariance (ANCOVA) adjusting for baseline differences was performed.

Primary Outcome: Adherence

Results related to primary research question a

Preference and adherence seemed to be associated since adherence rates were superior at 3 months (mean: 70.5 (± 9.8) %, $P < 0.001$) among the participants in Group 1 who expressed a preference for a supervised walking program and who obtained their

preferred choice of program, compared to the participants from Group 2 who obtained the unsupervised walking program, incongruent with their preference (mean: 62.0 (± 10.8) %, $P < 0.001$). A similar pattern of response was measured at month 6, such that participants in Group 1 adhered 60.7 (± 12.3) % of the time ($P < 0.0001$) compared to 35.4 (± 13.6) % ($P = 0.18$) among participants in Group 2 (Table 5.2). At 9 months, Group 2 performed slightly better than Group 1 of 13.6 (± 15.6) % ($P = 0.99$) more, since they perhaps became accustomed to walk without supervision.

Significant baseline imbalances were found between Groups 1 and 2. The mean adherence was 50.5% after adjustment for the 4 baseline covariates, since there was enough data to include them in the model, weight ($P = 0.6$), distance of the walking club ($P = 0.046$), medication intake ($P = 0.018$) and surgery of the lower extremities ($P = 0.1$), between Group 1 and 2.

Results related to primary research question b

At 3 months, a superior adherence rate was measured for the participants in Group 3 (56.1 (± 12.2) %, $P = 0.0017$) who expressed a preference for an unsupervised walking program and were assigned to their preferred program, as compared to Group 4 who were not allocated the non-preferred supervised walking program (46.7 (± 10.6) %, $P = 0.003$). At 6 months, Group 3 demonstrated a higher adherence rate of 43.1 (± 12.1) % ($P = 0.03$), compared to 40.5 (± 10.6) % ($P = 0.003$) for Group 4. Finally, Group 3 adhered 1.9 times more ($P = 0.04$) than Group 4 (19.9 (± 10.8) %, $P = 0.60$) at 9 months (Table 5.3). No baseline imbalances between the Groups 3 and 4 were detected.

Results related to primary research question c

In contrast to Group 6, Group 5 in the supervised walking program demonstrated the highest adherence rates throughout the study attending 93.7 (± 10.1) %, $P < 0.0001$) of the prescribed walking sessions at 3 months, 85.6 (± 12.7) %, $P < 0.0001$) at 6 months and 68.9 (± 13.9) %, $P < 0.0001$) at 9 months. Participants in Group 6 showed lower adherence rates compared to Group 5: 76.4 (± 14.6) % at 3 months ($P < 0.0001$), 54.9 (± 14.6) % at 6 months ($P = 0.01$) and 43.4 (± 14.6) % at 9 months ($P = 0.08$). In fact, throughout the study period (3 to 9 months), a difference of 50.5 (± 14.6) % ($P = 0.02$) was shown between the two groups, favouring the participants in the supervised walking (Table 5.4).

Significant baseline imbalances were found between Groups 5 and 6. The mean adherence was 67.4% after controlling for the two baseline covariates, since there was enough data to include them in the model, age ($P = 0.5$) and weight ($P = 0.7$), between Groups 5 and 6.

Results related to primary research question d

Among participants who expressed a strong preference (either for a supervised or unsupervised walking program) in groups 1,2,3,4, they demonstrated lower adherence rates throughout the study attending 56.87 (± 41.41 %, $P < 0.0001$) of the prescribed walking sessions at 3 months, 44.52 (± 43.14 %, $P < 0.0001$) at 6 months and 29.33 (± 40.32 %, $P < 0.0001$) at 9 months walking adherence, compared to participants who expressed no preference in groups 5 and 6. In regards, groups 5 and 6 adhered more with a walking adherence of 84.53 (± 26.52 %, $P < 0.0001$) at 3 months, 69.20 (± 37.94 %, $P < 0.0001$) at 6 months and 55.27 (± 37.5 %, $P < 0.0001$) at 9 months.

Secondary Outcome: Clinical Effects

Over the intervention phase from baseline to 6 months (see Table 5.5), weight in kilograms ($P = 0.0350$ with $n=69$; $P = 0.0442$ with $n=44$) and the level of anxiety ($P = 0.0396$ with $n=44$), a subscale of the EQ-5D-5L, significantly decreased, when comparing the participants who received their preference (Groups 1 & 3) to those not receiving their preference (Groups 2 & 4).

The study participants who adhered to the walking sessions showed a significant decrease in waist circumference ($P = 0.0143$ with $n=44$), in comparison with non-adherent participants. They also indicated a higher gait speed during the 6-minute walk test ($P = 0.0180$ with $n=44$) as well as an increase in their physical fitness level ($P = 0.0005$ with $n=69$).

At 9 months (Table 5.6), significant improvements in level of stiffness ($P = 0.0143$ with $n=44$), functional status (TUG) ($P = 0.0378$ with $n=44$) and level of anxiety ($P = 0.0449$ with $n=44$) were measured in the adherent participants who obtained their preference (Groups 1 & 3) as compared to those who did not receive their preference (Groups 2 & 4). Moreover, adherent participants who indicated no preference (Groups 5 & 6) improved their mobility over time ($P = 0.0471$ with $n=44$).

Lower waist circumference ($P = 0.0140$ with $n=44$) and improved gait speed values were shown ($P = 0.0219$ with $n=44$) among the adherent participants, compared to non-adherent participants. Additionally, a reduction of waist circumference measures were found for the adherent participants and who obtained their preference (Groups 1 & 3) ($P = 0.0201$ with $n=69$), compared to those not receiving their preference (Groups 2 & 4). Based on an intention-to-treat analysis, no missing data were observed for all the analyses.

Discussion

Adherence

Our study findings demonstrate that preference had the greatest impact on adherence, regardless of the type of walking program (supervised or unsupervised). In other words, study participants who stated a strong preference, independent of the mode of supervision and received their choice of preferred walking program showed greater adherence to treatments over time (48.8%). As reported by the authors Kwan et al. (2010), older adults, in particular those with chronic health conditions, who seem to be very less motivated to perform physical activity are generally less likely to follow the exercise recommendations for chronic populations [41]. Their expectations or attitudes towards an unhealthy condition is an element that greatly influences their behaviour to change [42]. In addition, if their preferences, beliefs and opinions about a treatment are not considered, they might not pursue the physical activity suggested by their health professional [41]. According to other studies [9,12,43], a number of interdependent factors can influence the participation of an individual who tends to change a physical activity behaviour. Indeed, the characteristics of the participant, environmental influences, as well as preferences and beliefs about the effectiveness of an intervention are important factors to take into consideration by the health care professional [9, 43]. Loew and colleagues (2015) indicated that the individual's perception of his medication use, physical fitness level, and emotional involvement represent potential personal influences that may affect walking adherence [9]. Therefore, outcomes of treatments are likely to be improved when participants' preferences are matched to the treatment, as the individual plays an active role in his treatment plan [41,44].

This study also shows that when preference was not expressed, the results favoured the participants in the supervised walking program. As explained by other authors [10,21,45-46], without supervision by an exercise therapist or other peers (e.g., study participants), participants seem to show a lack of commitment to the program. Indeed, Loew and colleagues (2015) affirmed that

supervision from the health care provider and social support from family members need to be considered in order to promote adherence [9]. Freene et al. (2011) indicated that the majority of older adults prefer to perform physical activity on their own but also desire to receive some form of feedback, in order to positively adhere to a recommended physical activity [47]. It has been recently suggested that individuals with OA who adopt a more active role in their health condition, will be able to: 1) deal with obstacles and resolve their exacerbations, 2) become more confident when making decisions about their health condition, 3) ask for help when needed, 4) better understand and interpret their actual condition and 5) better manage their chronic pain independently [12].

Clinical Effects

Our findings provides additional support to the recommendation that individuals with OA need to participate into walking programs in order to improve their pain relief and aerobic fitness level, without exacerbating joint pain [4,7,32,48]. Improved scores were observed for weight, functional status (i.e. TUG) and level of anxiety among the participants who expressed a strong preference and who obtained their preferred choice of program, compared to those who were allocated to their non-preferred group, at 6 and 9 months. We also confirmed that the adherent participants presented significant improvements in BMI, waist circumference as well as gait speed and physical fitness level. For the adherent participants who were assigned to their preferred program, lower stiffness, waist circumference, functional status (TUG) and level of anxiety were found, in comparison with those in the non-preferred group. Moreover, the adherent participants who indicated no preference at baseline improved their mobility over time. As demonstrated by other physical activity studies, participants who identified a specific intervention and were allocated to the preferred group reported improved clinical

outcomes [49] and higher adherence rates [41,44,50-51]. Therefore, a participant's preference represents a potential KT facilitator of treatment response [44], by positively influencing adherence and ultimately improving clinical outcomes [41]. As a consequence, if long-term adherence is poor, the beneficial effects of physical activity will decline with time and will not be maintained, even for proven effective interventions [41,52].

Limitations

The PEP pilot RCT was original and followed rigorous quantitative methods. However, a larger sample size of 216 older individuals (36 per group) with a confirmed diagnosis of OA of the knee is needed to confirm our conclusions. This larger sample size will allow to achieve 80% statistical power in order to detect a minimal difference of 10% [53] between the groups with an estimated group SD of 13.5 (based on the results from this pilot study) and a significance level (alpha) of 0.025, using a two-sided two-sample test based on the Bonferroni correction for multiple tests.

Furthermore, it would have been better to restrict the age group to recruit only older retired people, since the age of the participants ranged from 40 to 81 years. This would have guaranteed a more homogeneous sample, since younger participants did not always have the same occupations as older participants. Some of the younger participants (mean age: 62 years) were still working (18 participants) and had children to take care of, whereas the relatively older participants (mean age: 68 years) were mostly retired (49 participants) or had more comorbidities.

Also, the one location of the walking club may not have been central or convenient for all participants, since it seemed to be too far for some participants who had transportation difficulties. Therefore, proposing several walking clubs in Ottawa could be a good alternative in order to accommodate participants.

Due to the type of physical interventions, it was not practical to blind the participants and the exercise therapist involved in this research project [54]. However, the research staff or personnel and the evaluator were all blinded to the treatment allocation.

Potential negative factors, such as family support, medication intake, external supervision, emotional involvement, and fitness level perceptions were identified to overcome the application of this RCT (more details on potential influencing factors can be found in Loew et al., 2015[9]). Unfortunately, these adherence barriers were not measured but it would have been interesting to take them into consideration when performing the analyses on walking adherence.

Finally, the validated 7-Day PAR questionnaire in the walking logbooks assessed the duration, frequency and intensity of each walking session as well as walking adherence, as a self-management measurement. However, attendance was also recorded on site to objectively measure the adherence rate. Unfortunately, this measure was only documented by the physiotherapist on site for the supervised group and was not used in analyses.

Conclusion

The results of this pilot RCT indicated that preference should be taken into account in order to promote long-term adherence, among older adults diagnosed with knee OA. Older adults diagnosed with knee OA need some guidance in order to change their unhealthy behaviour and adopt physical activity on a regular basis. In other words, they can better adhere to a physical activity, if : 1) they follow a structured evidence-based program, and 2) they respect preference choice for the different treatment options independent to the supervision mode. Our study was less costly compared to preference trials without randomisation. As a pilot RCT, the recruitment process and rate, study design, physical activity interventions, and selected outcome measures are feasible for a larger RCT. A full-scale RCT will help to confirm our findings on adherence and clinical outcomes, by considering individuals' preferences for treatment.

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Authors' Contributions

LL (Ph.D. candidate) coordinated the recruitment of participants, the selection and invitation of participants, data entry and analysis of the collected data. She also developed the evaluation questionnaires, obtained ethics documents, and drafted the final version

of the manuscript. LB (co-supervisor) and GAW (co-supervisor) both supervised all the different phases of the PEP study. LB provided assistance with the methodology, recruitment phase, selection of outcomes and data collection. GAW played an essential role in the methodology, statistical analysis and interpretation of the PEP RCT. GPK and NDB (thesis committee members) brought experience in applying innovative behavioural approaches aimed at increasing physical activity in chronic diseased populations. GPK and NDB participated in the study coordination and helped draft the manuscript. SP (external reviewer) and GDA enriched the discussion and revised the final version of the manuscript. All authors read and approved the final manuscript.

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Supporting Information

See additional document: S1: CONSORT Checklist (PDF)

See additional document: S2 Full Study Protocol Published (PDF)

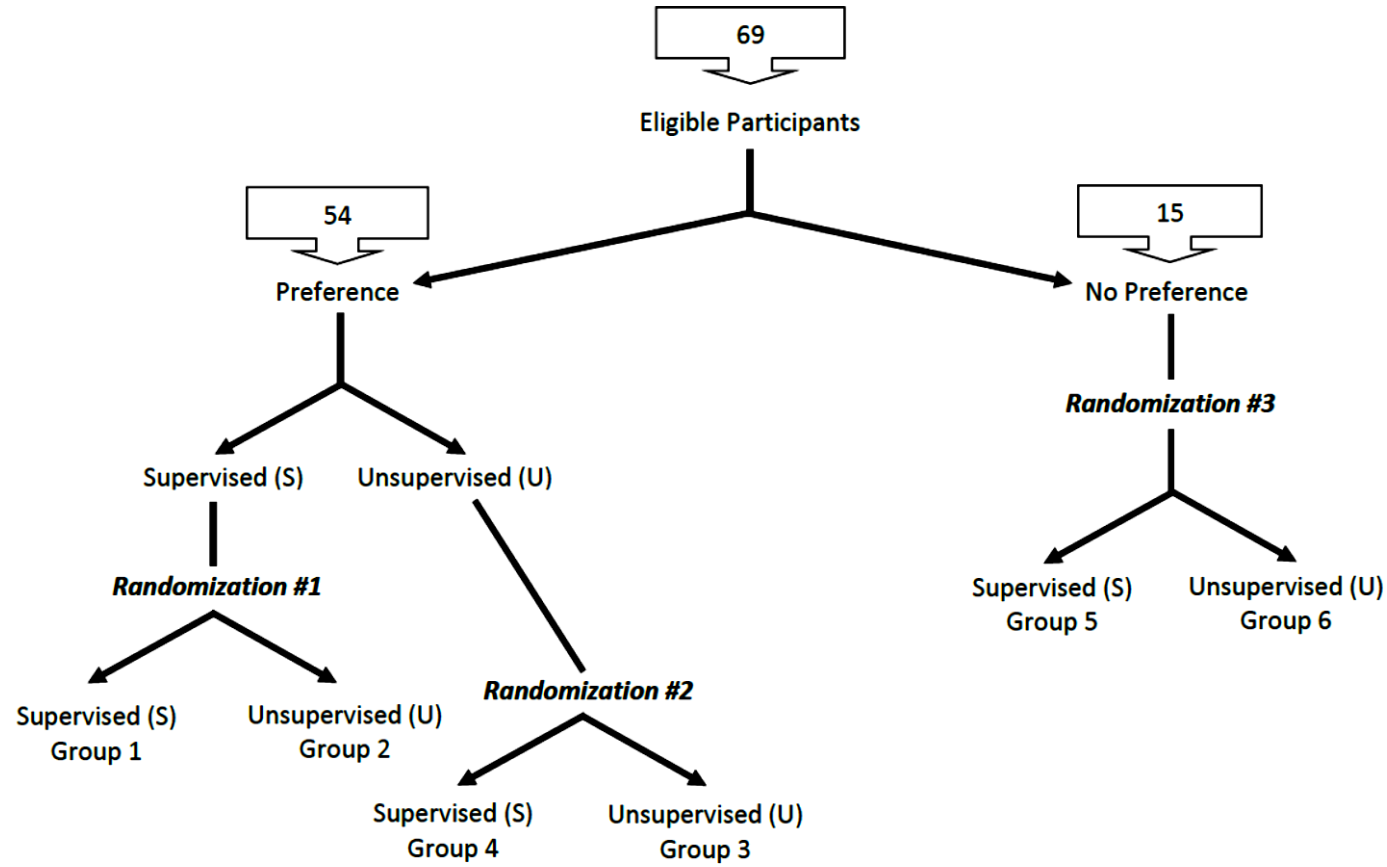
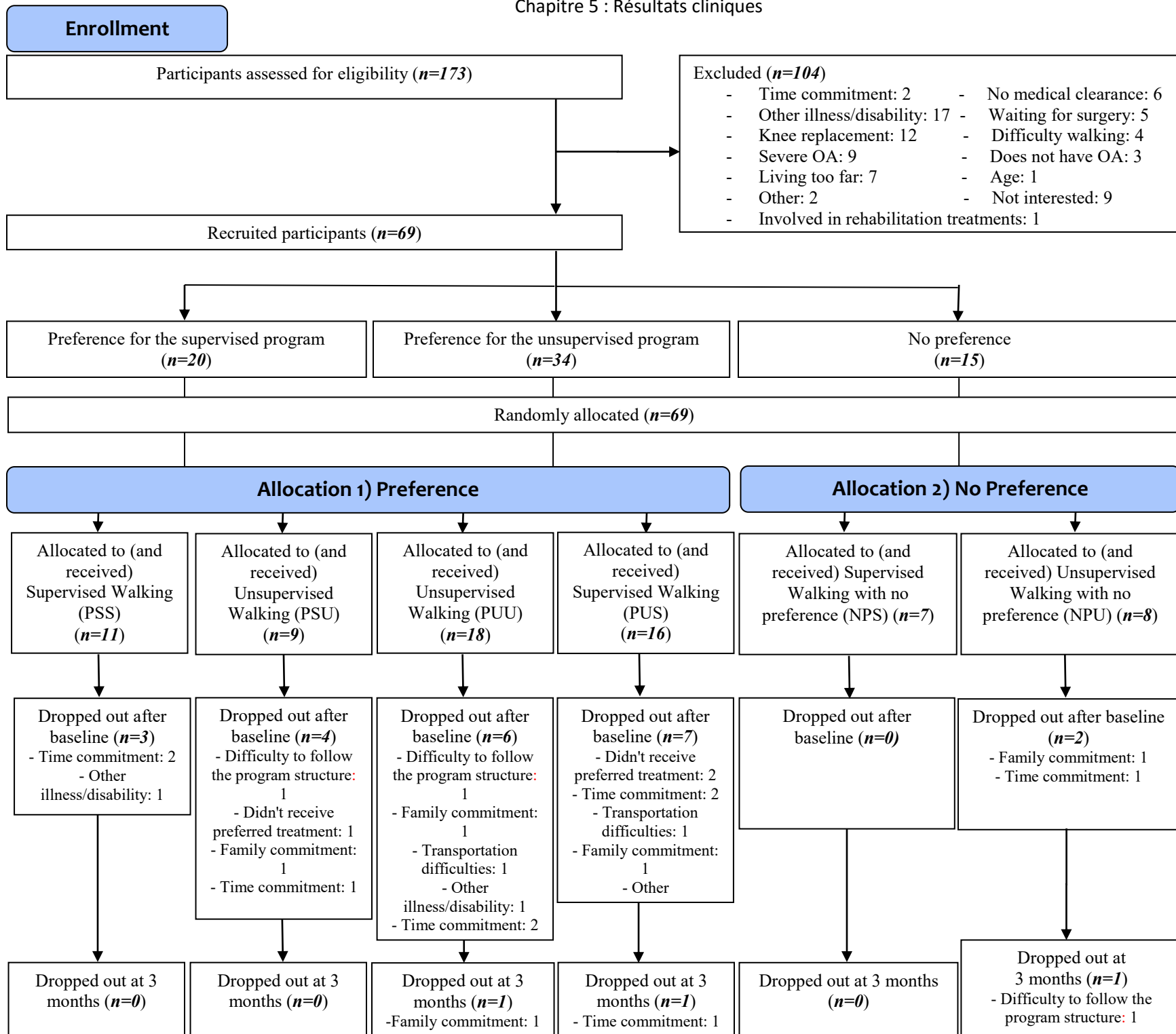


Fig. 5.1 Detailed version of the adapted randomized participant-preference design

Legend: Reproduced and adapted with permission from The Implementation of an Effective Aerobic Walking Program Based on Ottawa Panel Guidelines for Older Individuals with Mild to Moderate Osteoarthritis: A Participant Exercise Preference Pilot Randomized Clinical Protocol Design. Loew L, et al. British Journal of Medicine and Medical Research, 4(18). Copyright © 2014 [28]. Permission received from the original author of the study design: Patient's Preference and Randomization: New Paradigm of Evidence-based Clinical Research. Millat B, et al. World Journal of Surgery, 29. Copyright © 2005 [27].



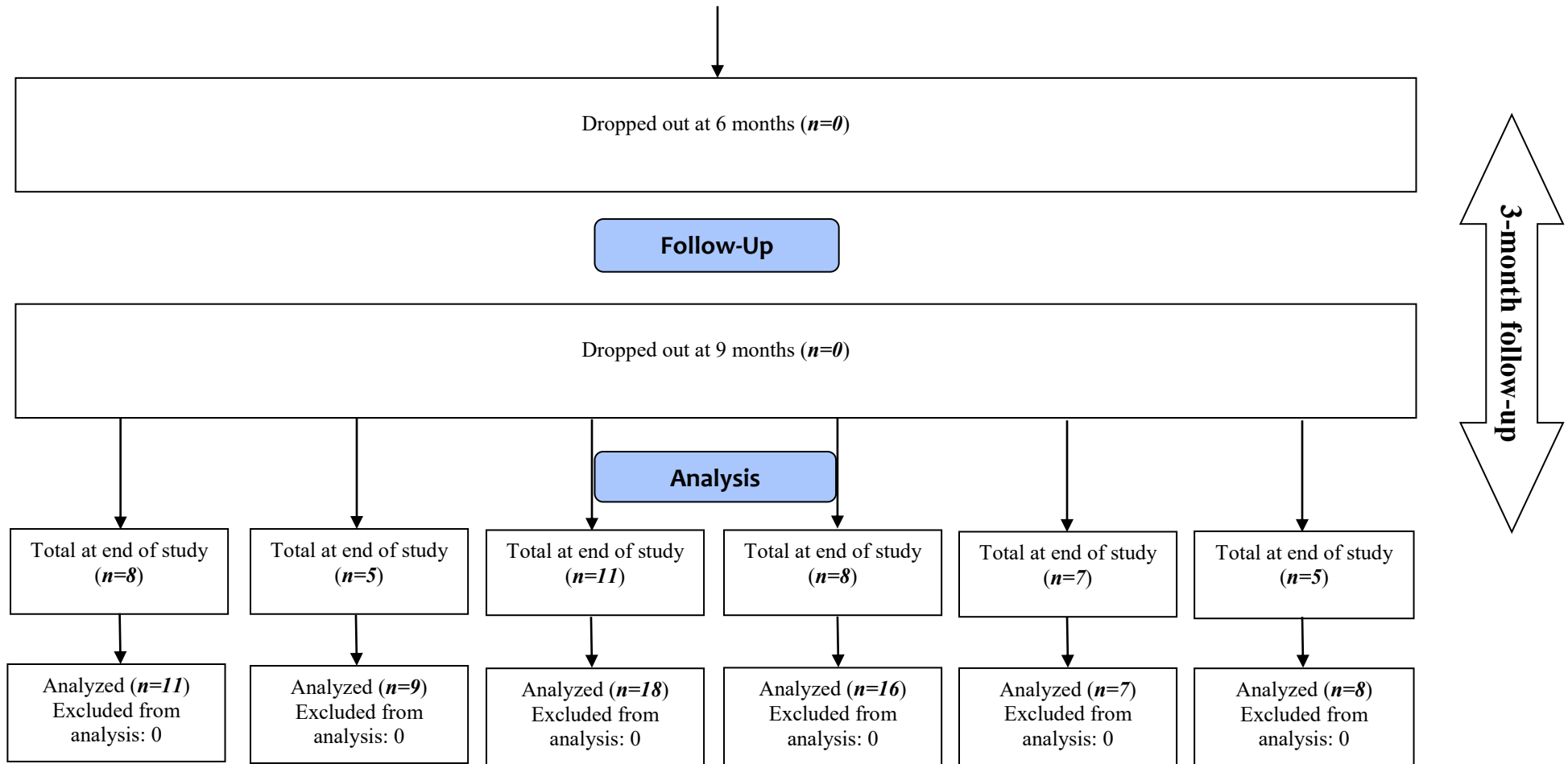


Fig. 5.2 CONSORT Study Flow Diagram

Table 5.1 Baseline Characteristics

Data	Stratified randomisation #1 (preference for S group)		Stratified randomisation #2 (preference for U group)		Stratified randomisation #3 (No preference)	
	Group 1 (n=11)	Group 2 (n=9)	Group 3 (n=18)	Group 4 (n=16)	Group 5 (n=7)	Group 6 (n=8)
Age (Years: Mean±SD)	68.1±5.5	67.5±12.8	64.4±9.2	66.1±5.7	66.1±7.7	57.8±11.9
Gender (n (%))						
Female	10 (90.9)	7 (77.8)	12 (66.7)	12 (75.0)	4 (57.1)	5 (62.5)
Male	1 (9.0)	2 (22.2)	6 (33.3)	4 (25.0)	3 (42.9)	3 (37.5)
Weight (Kilograms: Mean±SD)	79.6±10.4	83.3±10.4	88.8±16.7	86.5±13.3	106.3±29.3	94.0±29.7
Right	7 (63.6)	7 (77.8)	8 (44.4)	7 (43.8)	4 (57.1)	4 (50.0)

How far do you live from the walking club? (Kilometers: Mean±SD)	2.8±1.1	1.6±0.7	3.2±1.3	3.1±1.4	3.3±1.4	3.3±1.5
Do you take any medication? (n (%))						
Yes	6 (54.5)	8 (88.9)	10 (55.6)	14 (87.5)	7 (100.0)	7 (87.5)
No	5 (45.5)	1 (11.1)	8 (44.4)	2 (12.5)	0 (0.0)	1 (12.5)
Do you use a walking aid? (n (%))						
Yes	1 (9.1)	3 (33.3)	3 (16.7)	1 (6.3)	0 (0.0)	0 (0.0)
No	10 (90.9)	6 (66.7)	15 (83.3)	15 (93.8)	7 (100.0)	8 (100.0)
Have you ever had surgery of the lower extremities? (n (%))						
Yes	1 (9.1)	4 (44.4)	8 (44.4)	7 (43.8)	4 (57.1)	4 (50.0)
No	10 (90.9)	5 (55.6)	10 (55.6)	9 (56.3)	3 (42.9)	4 (50.0)
Have you had a diagnosis of OA for longer than 3 months? (n (%))						
Yes	11 (100.0)	8 (88.9)	18 (100.0)	14 (87.5)	7 (100.0)	6 (75.0)
No	0 (0.0)	1 (11.1)	0 (0.0)	2 (12.5)	0 (0.0)	2 (25.0)

n: number; SD: standard deviation; %: percentage; OA: osteoarthritis.

No missing data.

Table 5.2 Adherence rates (in percentages) over time among the participants who expressed a preference for a supervised program (Groups 1 vs 2).

GROUPS	TIME					
	Phases of interventions			Interactions		
	3 months	6 months	9 months	3 Vs. 6 months	3 Vs. 9 months	6 Vs. 9 months
1	70.5±9.8*	60.7±12.3*	24.8±13.5	9.7±9.8	45.6±12.3	35.9±9.8
2	62.00±10.8*	35.44±13.6	38.44±14.9	26.56±10.8	23.56±13.6	-3±10.8
1 Vs. 2	8.5±15.6	25.3±15.6	-13.6±15.6	-35.0±15.6	32.0±15.6	22.3±15.6

Vs.: versus

*: $P \leq 0.05$

Means, Standard Deviations and Mean differences were expressed as a percentage of the number of completed walking sessions divided by the number of recommended walking sessions.

Table 5.3 Adherence rates (in percentages) over time among the participants who expressed a preference for an unsupervised program (Groups 3 vs 4).

GROUPS	TIME					
	Phases of interventions			Interactions		
	3 months	6 months	9 months	3 Vs. 6 months	3 Vs. 9 months	6 Vs. 9 months
3	56.1±12.2*	43.1±12.1*	37.9±11.3*	13±6.2	18.2±9.7	5.2±6.9
4	46.7±10.6*	40.5±10.8 *	19.9±10.8	6.3±6.3	26.8±9.1	20.5±6.5
3 Vs. 4	9.3±15.0	2.6±14.9	17.9±13.6	3.7±14.9	-8.9±14.3	-2.6±14.3

Vs.: versus

*: $P \leq 0.05$

Means, Standard Deviations and Mean differences were expressed as a percentage of the number of completed walking sessions divided by the number of recommended walking sessions.

Means, Standard Deviations and Mean differences were expressed as a percentage of the number of completed walking sessions divided by the number of recommended walking sessions.

Table 5.4 Adherence rates (in percentages) over time among the participants who expressed no preference (Groups 5 vs 6).

GROUPS	TIME					
	Phases of interventions			Interactions		
	3 months	6 months	9 months	3 Vs. 6 months	3 Vs. 9 months	6 Vs. 9 months
5	93.9±10.1*	85.6±12.7*	68.9±13.9*	8.3±10.1	25±12.7	16.7±10.1
6	76.4±14.6*	54.9±14.6*	43.4±14.5	21.5±9.5	33±11.9	11.5±9.5
5 Vs. 6	17.5±14.6	30.7±14.6	25.5±14.6	-38.9±14.6	-50.5±14.6*	42.2±14.6*

SD: standard deviation; m: months; Vs.: versus

*: $P \leq 0.05$

Means, Standard Deviations and Mean differences were expressed as a percentage of the number of completed walking sessions divided by the number of recommended walking sessions.

Table 5.5 Impact on clinical effects with regards to adherence rate and congruency (preference), from baseline to 6 months.

Outcome measures	Interactions	Degree of Freedom (df)	F-value	<i>P</i>
Weight (Kilograms)	T (n=69)	2	3.6	0.0350
	T (n=44)	2	3.0	0.0442
Waist Circumference (Centimeters)	A (n=44)	1	6.6	0.0143
Gait Speed with 6-minute walk test (Meters/Seconds)	A (n=44)	1	6.1	0.0180
Anxiety with EQ-5D-5L (Scale 1-5)	TXC (n=44)	4	2.4	0.0396
Physical Fitness Level (METs)	A (n=69)	1	13.3	0.0005

n = number of participants; A = adherence; C = congruency; T = time

$P \leq 0.05$

Table 5.6 Impact on clinical effects with regards to adherence rate and congruency (preference), from baseline to 9 months.

Outcome measures	Interactions	Degree of Freedom (df)	F-value	<i>P</i>
Waist Circumference (Centimeters)	T (n=69)	3	6.3	0.0012
	A (n=44)	1	7.2	0.0140
	AXC (n=69)	2	4.2	0.0201
Stiffness with WOMAC (Scale 0-8)	TXCXA (n=44)	3	4.0	0.0143
Gait Speed with 6-minute walk test (Meters/Seconds)	T (n=69)	3	3.2	0.0335
	T (n=44)	3	3.5	0.0250
	A (n=44)	3	5.7	0.0219
Functional Status with TUG test (Seconds)	TXCXA (n=44)	3	3.1	0.0378
Mobility with EQ-5D-5L (Scale 1-5)	TXCXA (n=44)	3	2.5	0.0471
Anxiety with EQ-5D-5L (Scale 1-5)	TXC (n=44)	6	2.0	0.449

n = number of participants; A = adherence; C = congruency; T = time

$P \leq 0.05$

SECTION III : DISCUSSION GLOBALE

Chapitre 6 : Synthèse et conclusion

Le sixième et dernier chapitre intègre d'abord une explication des résultats cliniques et fournit une analyse globale des données recueillies au cours de ce projet de recherche. Une description des forces et des limites de l'ECR préliminaire est également abordée. Enfin, le chapitre résume les contributions ainsi que l'implication clinique de cette thèse doctorale sur la santé des personnes âgées atteintes d'arthrose légère à modérée du genou, y compris une vue d'ensemble des projections pour l'amélioration de la rigueur.

Synthèse des résultats

Forces du projet de recherche

L'objectif principal de ce projet de recherche visait à souligner l'importance d'appliquer les LDC existantes en lien avec les programmes de marche prouvés efficaces auprès des personnes âgées atteintes d'arthrose légère à modérée du genou afin de mieux prendre en charge les symptômes d'arthrose. La mise en place d'un ECR préliminaire, fondé sur les stratégies d'application des connaissances, a permis d'évaluer une approche innovatrice sur la préférence des participants afin de promouvoir efficacement l'adhésion des personnes âgées atteintes d'arthrose du genou. Comme l'arthrose du genou accentue la douleur articulaire et, par conséquent, provoque une perte fonctionnelle chez les personnes âgées (Bathia, 2013), il était primordial d'examiner l'application des

recommandations émises par les LDC concernant la pratique régulière de la marche thérapeutique efficace dans le traitement de l'arthrose du genou. Même si ces LDC sont généralement destinées aux professionnels de la santé afin d'améliorer leur pratique clinique, cela n'empêche pas le fait que les personnes âgées intéressées à prendre en charge elles-mêmes leur arthrose peuvent aussi en bénéficier. De ce fait, le groupe d'experts et de méthodologistes du panel d'Ottawa a recommandé fortement aux individus atteints d'arthrose du genou de pratiquer une activité physique en aérobie de faible intensité, notamment la marche, pour un minimum de trois fois par semaine à un rythme confortable (Loew, 2012).

Par conséquent, cet ECR préliminaire a été essentiel puisqu'il a permis d'enrichir les écrits scientifiques par l'examen des raisons de cette population qui choisit souvent de ne pas adhérer à une activité physique (Dunlop, 2011), malgré le fait que les écrits scientifiques affirment l'efficacité de la marche ainsi que les effets nuisibles de l'inactivité sur l'arthrose. L'application d'une approche plutôt axée sur l'autonomisation des clients (Jordan, 2010; Miranda, 2009; Nicholas, 2015; Slade, 2009) afin de subvenir aux besoins réels des personnes âgées motive davantage cette clientèle à adopter à long terme une habitude de vie saine, car elle sait que sa préférence sera prise en considération. En effet, la préférence représente un des plus importants facteurs influençant l'adhésion (Sirur, 2009). Il s'agit d'un élément important pour évaluer l'efficacité des stratégies d'application d'un programme de marche avéré efficace selon les LDC, par ses bienfaits cliniques, physiologiques ainsi que les effets sur la qualité de vie. L'ECR préliminaire a ainsi confirmé toutes les hypothèses prédéterminées sur l'impact positif de la préférence sur le taux d'adhésion et les effets cliniques de la

marche. Les participants qui ont été assignés au hasard au programme de marche de leur choix ont montré un taux d'adhésion nettement supérieur, tout au long de la période d'étude de neuf mois, comparativement à ceux qui n'ont pas obtenu leur programme de marche de préférence suite à la randomisation. Un autre point original de ce projet de recherche est que la préférence des participants n'a jamais été considérée dans les études précédentes comme un élément clé de l'application de connaissances, dans le but ultime d'améliorer l'adhésion aux programmes de marche. L'implication des participants dans la décision des traitements à privilégier est un moyen efficace pour améliorer leur adhésion, car cela augmente leur satisfaction à l'égard de l'intervention suivie. Cette stratégie complexe n'a d'ailleurs aucunement été envisagée dans le but d'examiner l'adhésion comme principal résultat de mesure, chez une population âgée (Tilbrook 2008). Les ECR sont considérés comme le devis le plus valide pour évaluer l'efficacité d'une intervention. Le problème survient lorsqu'il est difficile de nier l'assignation aléatoire ainsi que le type d'interventions aux participants lorsque c'est une intervention physique. Dans ce cas, la préférence du participant entre en compte et peut influencer l'adhésion à une intervention surtout pour un échantillon de petite taille et dans le contexte d'un ECR préliminaire. De ce fait, l'originalité ici était de garder les éléments clés d'un ECR mais de considérer la préférence des participants et de l'évaluer quantitativement avant la randomisation. Cet ECR préliminaire a contribué à l'avancement des connaissances scientifiques en évaluant la mise en place d'un programme de marche avéré efficace, combiné à l'approche sur la préférence des participants à titre de stratégie innovatrice pour l'application de connaissances. Cette avenue prometteuse peut contribuer à l'amélioration et au maintien à long terme de la qualité de vie de nombreux Canadiens âgés de plus de 40 ans souffrant d'arthrose légère à modérée du genou.

Bref, la prise en compte de la préférence a été d'une importance fondamentale, autant au niveau clinique que scientifique, pour répondre aux preuves scientifiques en lien avec les LDC du groupe d'experts et de méthodologistes du panel d'Ottawa en vue d'améliorer l'adhésion maintenue des participants aux recommandations émises sur la marche en communauté.

Explications des résultats

Il a été établi que l'adhésion à l'activité physique, telle que la marche, est un comportement multidimensionnel déterminé par l'interaction entre les facteurs personnels et externes de l'adhésion (WHO, 2003). De ce fait, le premier objectif de cette thèse doctorale a été atteint en identifiant les facteurs personnels et externes qui sembleraient influencer l'adhésion des participants au programme de marche avéré efficace et, par conséquent, l'application des LDC par cette population ciblée. Pour la première fois dans les écrits scientifiques, les résultats ont permis d'identifier les facteurs exploratoires qui semblent potentiellement avoir une influence sur l'adhésion à la marche des participants, en les caractérisant selon les cinq principales composantes de l'adhésion présentées ci-après (WHO, 2003).

Facteurs personnels

1. Particularités de la condition de santé : le haut niveau d'activité physique semblait influencer positivement l'adhésion.
2. Caractéristiques personnelles : l'absence d'influence émotionnelle semblait avoir un impact positif sur l'adhésion.

Facteurs externes

3. Influence du système de santé : la supervision par un professionnel de la santé semblait améliorer l'adhésion.
4. Contexte environnemental : le soutien social semblait influencer de façon positive l'adhésion.
5. Approche thérapeutique proposée : le changement de médication semblait avoir un impact négatif sur l'adhésion.

Ensuite, le second objectif visait l'impact de la préférence concernant le mode de supervision du programme de marche (soit supervisé ou non-supervisé) sur le suivi des recommandations des LDC émises par une amélioration de l'adhésion à la marche. Les résultats de l'ECR préliminaire ont suggéré que la préférence a eu une influence aussi sur l'adhésion. En effet, les participants qui ont exprimé une forte préférence et qui ont été assignés au programme de marche de préférence, indépendamment du mode de supervision (supervisé ou non supervisé), semblent avoir mieux adhéré au programme que ceux qui n'ont pas obtenu leur programme de choix. Cette étude a également dévoilé que parmi tous les participants qui n'avaient pas de préférence, les participants du programme de marche supervisé ont été favorisés en montrant un meilleur taux d'adhésion. D'ailleurs, les participants n'ayant aucune préférence ont de façon générale mieux adhéré au programme de marche, indépendamment du mode de supervision, à comparer à ceux qui avaient exprimé une préférence. Dans ce cas, ils ont été possiblement moins influencés par les facteurs internes et externes de l'adhésion et n'avaient peut-être pas les mêmes objectifs ainsi que les responsabilités personnels ou avaient un horaire plus flexible pour s'ajuster au mode de supervision assigné. Enfin, les participants qui ont indiqué que l'assignation en fonction du programme de leur préférence a eu une influence positive ont mieux adhéré. Bref, la préférence des participants devrait être considérée comme un facteur exploratoire d'influence potentiellement important qui est lié à l'adhésion à la marche.

Finalement, le troisième objectif examinait la préférence concernant le mode de supervision du programme de marche (soit supervisé ou non-supervisé), mais cette fois-ci dans l'optique de son impact sur les améliorations cliniques. Les participants de l'étude semblent avoir amélioré leur poids, état fonctionnel ainsi que leur niveau d'anxiété suite à l'adhésion au programme de marche de préférence, comparativement à ceux qui n'ont pas été assignés à leur programme de choix, ce qui a permis de confirmer les recommandations existantes des LDC sur l'arthrose (Loew, 2012). Les participants qui ont adhéré de façon efficace au programme de marche de leur préférence (soit dans plus de 66 % des cas) ont montré de meilleurs résultats au niveau de la réduction de leur raideur articulaire et de leur tour de taille ainsi qu'une amélioration de leur état fonctionnel et du niveau d'anxiété, par rapport à ceux qui n'ont pas reçu leur programme privilégié.

Comparaisons avec les écrits scientifiques

Les résultats de cet ECR préliminaire concordent avec les écrits scientifiques sur l'adhésion à l'activité physique. En effet, la préférence des participants représente une stratégie d'application des connaissances qui semble essentiel à considérer lors de la mise en place d'un programme de marche dans le but ultime de promouvoir l'adhésion (Corrigan, 2003; Preference Collaborative Review Group, 2008). Dans le même ordre d'idées, Crandall et collègues (2013) suggèrent que se fier à la préférence des participants pour déterminer quelle intervention ces derniers devraient suivre peut significativement améliorer le taux d'adhésion à l'activité physique (Kocsis, 2009; Kwan, 2010; Raue, 2009) ainsi que leurs résultats cliniques (Klaber, 2005). Si leurs préférences pour une intervention ne sont pas considérées et respectées, les participants risquent fortement de ne pas poursuivre l'activité physique, même si elle est

recommandée par leur professionnel de la santé (Kwan, 2010). Par conséquent, si l'adhésion à long terme n'est pas maintenue, les bienfaits cliniques de l'activité physique, telle que la marche, diminuent avec le temps et ne sont pas garantis, et ce, pour toute intervention avérée efficace (Kwan, 2012; Marks, 2012). Cela signifie l'adoption d'une approche axée sur le client qui prend en compte tous les facteurs importants pour celui-ci. Bref, le succès d'une activité physique est assuré si cette intervention convient à la personne, qu'elle est adaptée selon ses préférences et que la personne joue un rôle plus actif dans sa décision clinique (Kocsis, 2009; Kwan, 2010).

Les résultats de la présente étude concordent avec les conclusions de Hendry et collègues (2006) indiquant que la perception de la capacité physique ou du niveau d'activité physique (Alkerwi, 2015), les connaissances/croyances sur les bienfaits de la thérapie ainsi que le niveau de motivation de la personne doivent être envisagés et analysés étant donné que ces facteurs peuvent influencer l'adhésion à une activité physique. L'influence de son état émotionnel représente un obstacle à l'adhésion d'une activité physique, lorsque la personne connaît les bienfaits de l'activité physique sur sa santé mais n'a pas la volonté d'y participer (McArthur, 2014). Selon l'étude de Schutzer et collègues (2004), le professionnel de la santé joue un rôle essentiel dans la promotion de la pratique régulière d'une activité physique auprès des personnes âgées. Sans son aide, la sédentarité continuera d'avoir un effet néfaste sur le système de santé publique. Supervisées dans un programme structuré, le participant recevra davantage de conseils de son professionnel de la santé, ce qui l'incitera à participer plus facilement à une activité physique de niveau modéré ou difficile, à toutes les semaines. Les écrits scientifiques que les personnes âgées atteintes de l'arthrite semblent préférer l'activité physique en groupe

sous la supervision d'un professionnel (Jack, 2010). En effet, le soutien social représente un important facteur à considérer, puisqu'il a été montré que le participant n'adhère pas à une activité physique si aucun ou un faible soutien social l'entoure (Jack, 2010). Enfin, l'étude de Stineman et collègues (2011) a confirmé les résultats de la présente étude en indiquant que les participants qui ingéraient moins de médicaments ont adhéré plus facilement à un programme d'exercices auprès des personnes âgées.

De plus, selon plusieurs auteurs, l'auto-efficacité, soit la croyance que possède une personne en sa capacité de produire une tâche ou non (Bandura, 1986; Damush, 2005; Hutton, 2010; Pistors, 2010; Sirur, 2009), et la motivation (Damush, 2005; Ehrlich-Jones, 2011; Hutton, 2010; Hurkmans, 2010; Jones, 2007; Kehn, 2009; Lee, 2012) représentent deux importants facteurs d'influence, même si ces facteurs n'ont pas atteint une signification statistique dans les analyses de l'étude présente. Tel que Kwan et collègues (2010) le rapportent, les personnes âgées souffrant d'une affection chronique, telle que l'arthrose, sont généralement moins motivées à suivre les recommandations émises sur la pratique régulière de l'activité physique. En effet, elles ont des attentes particulières face à leur état de santé actuel et il est ainsi important de les considérer pour mieux les guider dans l'adoption d'un nouveau comportement, tel que l'adhésion à l'activité physique (Harmon-Jones, 2007).

Les résultats préliminaires ont indiqué que les participants du programme de marche supervisé ont généralement mieux adhéré à celui-ci et que la supervision par un professionnel de la santé semblait améliorer l'adhésion des participants de cet ERC. Ceci indique que les propos d'autres auteurs montrant que la supervision et la rétroaction par un professionnel de la santé motivent les gens

à s'engager plus facilement à un programme d'activité physique (Brosseau, 2012 a, b; McDonnell, 2014; Ussher, 2007). D'ailleurs, la majorité des personnes âgées désirent obtenir une rétroaction afin d'adhérer efficacement à une activité physique recommandée (Freene, 2011). Il a été récemment suggéré que les personnes souffrant d'arthrose qui prennent en charge activement et de façon indépendante leur état de santé sont généralement en mesure de surmonter plus facilement les obstacles et de résoudre leurs signes et symptômes efficacement. En comprenant mieux leur affection, ces individus deviennent plus confiants lorsqu'ils prennent des décisions au sujet de leur problème de santé et savent quand demander de l'aide, au besoin, auprès de leur entourage (Nicholas, 2015).

Pour conclure, de nombreux facteurs semblent influencer l'adhésion à un programme de marche conçu spécifiquement pour les personnes souffrant d'arthrose du genou. Tous ces facteurs exploratoires qui ont été identifiés dans le présent projet de recherche devraient être pris en considération lors de l'élaboration d'un programme d'activité physique auprès de cette population susceptible d'abandonner ou de ne pas suivre adéquatement les recommandations en termes de pratique régulière de la marche. Cette approche semble favoriser l'adhésion à long terme, en communauté, tout en assurant le maintien des bienfaits cliniques. Une fois qu'ils sont identifiés, il est envisageable d'agir sur ces facteurs modifiables pour permettre aux individus de bénéficier pleinement et de manière optimale de la marche.

Limites du projet de recherche

Plusieurs limites à la transférabilité de ce projet de recherche ont préalablement été mentionnées dans les chapitres 3, 4 et 5 (articles scientifiques), mais elles seront davantage expliquées dans cette section.

En effet, cet ECR préliminaire novateur a suivi des méthodes quantitatives rigoureuses. Toutefois, un plus grand échantillon de 216 personnes âgées (36 par groupe) atteintes de l'arthrose légère à modérée du genou serait nécessaire pour confirmer les conclusions. Cet échantillon plus large permettrait d'atteindre 80 % de la puissance statistique pour détecter une différence minimale de 10 % (Smith-Forbes, 2015) entre les groupes avec un écart-type estimé à 13,5 (fondé sur les résultats de cet ECR préliminaire) et un seuil de signification (alpha) de 0,025, en utilisant un test bilatéral à deux échantillons se rapportant à la correction de Bonferroni pour des tests multiples. Il aurait été également mieux de restreindre le groupe d'âge pour avoir un échantillon plus homogène puisque les personnes plus jeunes n'avaient ni les mêmes occupations, ni les mêmes activités, que celles plus âgées. En effet, certains adultes plus jeunes (moyenne d'âge : 62 ans) étaient encore sur le marché du travail (18 participants sur 69) alors que les personnes plus âgées (moyenne d'âge : 68 ans) étaient généralement retraitées et présentaient plusieurs comorbidités (49 participants sur 69).

D'ailleurs, un biais potentiel de sélection a également été identifié pour la méthode de recrutement. Les participants ont été recrutés grâce aux annonces placées dans les journaux locaux, ce qui représente un biais de sélection pour les gens qui sont illettrés ou qui ne reçoivent pas le journal chez eux. En utilisant cette stratégie, les personnes se portent volontaires pour prendre part à l'étude, ce

qui rejoint une population qui semble déjà plus motivée à participer à un groupe de marche. Une solution serait le recrutement par les médecins ou les professionnels de la Société d'arthrite.

Ensuite, cette étude comprenait des limites au niveau de l'intervention. En effet, l'emplacement du club de marche n'était pas central puisqu'il semblait être situé trop loin pour certains participants de l'étude. La distance du lieu d'intervention a donc possiblement influencé les résultats. De ce fait, il aurait fallu proposer plusieurs emplacements et collaborer avec d'autres clubs de marche existants afin d'accommoder tous les participants. Aussi, en raison du type de programme représentant une activité physique, il n'était ni pratique ni même réalisable de cacher la nature de l'intervention aux participants de l'étude ainsi qu'aux professionnels de la santé (Menard, 2002). Cependant, les membres de l'équipe de recherche ainsi que l'évaluateur externe ont tous nié l'assignation au hasard des participants aux groupes d'intervention. Aussi, une étude économique aurait été de mise afin de connaître le coût d'implantation du programme de marche, soit supervisé ou non-supervisé, au club de marche ciblé ou même dans la communauté.

Les biais potentiels d'information ont été l'utilisation des journaux de bord et les questions incluses dans les auto-évaluations. Puisque les participants avaient parfois de la difficulté à bien remplir leur journal de bord, il manquait certaines informations; cela a principalement été observé pour le groupe non supervisé qui n'avait pas de professionnel de la santé pour donner des conseils chaque semaine. De plus, les podomètres ont été utilisés comme deuxième mesure objective afin de mesurer l'adhésion au programme de marche de tous les participants. Toutefois, il aurait fallu qu'un professionnel soit responsable de mieux contrôler la mesure des résultats, comme c'était le cas pour le groupe supervisé où le professionnel prenait en note les présences (adhésion) ainsi que les

données cliniques (nombre de pas avec le podomètre, fréquence cardiaque, pression artérielle, etc.) de chaque participant supervisé. De ce fait, il manquait moins d'informations. De plus, le sondage sur les facteurs d'adhésion a été conçu de manière à demeurer neutre dans le but de ne pas influencer les réponses des participants. Toutefois, cette stratégie a donné la possibilité d'interprétations différentes par les participants et donc une vaste étendue de réponses possibles. Le sondage comportait également plusieurs facteurs similaires pouvait induire de la confusion chez les participants ainsi qu'une multi-colinéarité potentielle entre les facteurs, soit une forte corrélation entre les facteurs, causant des intervalles de confiance plus larges et entraînant une non signification statistique des résultats. Enfin, il est possible que les participants aient eu de la difficulté à interpréter des questions lors des évaluations aux trois mois, malgré la présence de l'évaluateur externe, ce qui pourrait avoir exercé une influence sur les résultats. À ce jour, il n'y a malheureusement aucune méthode idéale, facile d'utilisation et peu coûteuse, pour mesure l'adhésion, surtout auprès d'un groupe de participants qui n'est pas supervisé. Les avancées rapides de la technologie ainsi que les applications pour téléphones intelligents pourront peut-être un jour fournir la solution à cette limite mais le coût de ces applications reste à voir (Bollen, 2014).

Finalement, cette étude comprenait également des limites par rapport au biais de désistement. Puisque 20 participants ont abandonné le programme de marche avant trois mois, ils n'ont pas été en mesure de compléter le programme de marche. Ceci consiste un haut taux d'abandon précoce. Par contre, comme les participants devaient toujours citer les raisons d'abandon, il était ainsi possible de considérer leurs raisons comme facteurs d'influence dans l'analyse des résultats. Bref, seulement 49 participants ont complété le

programme de marche, ce qui a probablement influencé les résultats et ce qui a réduit, conséquemment, la puissance statistique des résultats. Les résultats des participants ayant abandonné plus tôt auraient été utiles pour avoir une vue d'ensemble de l'échantillon de cette étude. Ces informations auraient permis de mieux cerner les facteurs d'influence sur l'adhésion pour le type de participants qui ne semble pas adhérer aussi facilement à des programmes de marche, comparativement à ceux qui ont complété l'intervention.

Implication clinique

Au préalable, il existait un manque de connaissances dans les écrits scientifiques concernant les types de personnes qui parviennent à changer leurs habitudes malsaines de ceux qui abandonnent avant même d'adopter un comportement approprié. Comme les bienfaits de la marche ont été prouvés à maintes reprises auparavant, ce travail de recherche de grande envergure visait notamment à faire comprendre que l'adhésion à la marche doit être encouragée. En effet, même si la volonté initiale de participer à une activité physique qui a été recommandée est présente chez un individu, son adhésion à la marche doit absolument être maintenue à long terme afin qu'il puisse en bénéficier pleinement. Les résultats de cette étude exploratrice a permis d'identifier 5 principaux facteurs perçus par cette population pouvant potentiellement influencer l'adhésion soit, la supervision, le soutien social, la consommation des médicaments, le niveau d'activité physique ainsi que l'influence émotionnelle. La préférence doit probablement être considérée et respectée car cette population a tendance à mieux adhérer si elle suit un programme de marche avéré efficace, tout en respectant leurs préférences en termes de mode de supervision. Il est vrai que lors du sondage sur les facteurs d'adhésion, les participants ne

semblaient pas considérer ou percevoir le facteur préférence comme important et influençant leur adhésion, mais les résultats cliniques semblent montrer le contraire. Dans les faits, la préférence semble importante car les participants qui ont affirmé que le facteur préférence avait une influence positive sur leur adhésion semblent effectivement avoir mieux adhérer. De plus, ceux qui avaient exprimé une préférence (autant le groupe supervisé que non-supervisé) et ont été assignés à leur programme de choix ont mieux adhéré que ceux qui n'ont pas obtenu leur choix. Enfin, les participants qui n'avaient exprimé aucune préférence, alors le groupe supervisé semblait adhérer mieux à la marche.

Ainsi, les personnes âgées atteintes d'arthrose du genou devraient possiblement être initialement guidés en vue non seulement d'initier la marche, mais également d'y adhérer de façon définitive et sur une base régulière, soit pour un minimum de 3 fois par semaine. Ces individus auront davantage de succès à suivre les recommandations nationales émises en lien avec l'activité physique et l'auto-prise en charge de l'arthrose s'ils : 1) suivent un programme structuré et fondé sur les données probantes, et 2) respectent leurs préférences selon les options d'interventions qui leurs sont accessibles. Ainsi, les résultats préliminaires semblent indiquer qu'il est important de renforcer le message de participer en toute sécurité à un programme de marche, sans douleur, afin d'assurer une adhésion de façon définitive en atténuant les nombreux obstacles potentiels à l'adhésion. Il faut éliminer le mythe que la douleur domine la vie de ces gens. Ils peuvent contrôler eux-mêmes leurs symptômes étant donné qu'ils connaissent le mieux leur état de santé. En connaissant tous les outils nécessaires à la pratique adéquate et régulière de la marche, cela leur permet de participer

activement à la prise en charge de leur affection, dans le but ultime d'encourager à long terme l'auto-prise en charge, c'est-à-dire se sentir apte à prendre en charge sa propre condition de santé.

De plus, la présente thèse doctorale a permis aux participants de l'étude d'être mieux informés, en fonction des plus récentes et fidèles preuves scientifiques. Ils ont bénéficié d'une trousse d'application conçue pour eux en se fondant sur les recommandations émises des LDC du groupe d'experts et de méthodologistes du panel d'Ottawa (Loew, 2012), soit une source d'information fiable, mais surtout simple à utiliser. En effet, il existe de nombreuses sources d'information pour aider un individu atteint d'un problème de santé à prendre des décisions personnelles sur sa condition. Par contre, ce dernier n'est pas toujours au courant de ces ressources et ne s'instruit pas forcément auprès des sources crédibles. La grande majorité des gens sont d'ailleurs plus enclins à chercher de l'information à travers les ressources médiatiques populaires. Malheureusement, les renseignements retrouvés ne sont pas toujours véridiques ou à jour. Les LDC évoquent quant à elles une synthèse de recommandations cliniques rédigées sur une question de recherche particulière, par l'évaluation systématique des meilleures preuves de recherche actuellement disponibles. Les LDC, qui représentent le plus haut niveau de preuves scientifiques si elles sont de bonne qualité méthodologique, sont particulièrement conçues pour : 1) partager et évaluer les nouveaux faits scientifiques en recommandant les meilleurs soins de santé pour le traitement d'un problème de santé visé; 2) appuyer ou contester l'ensemble des recommandations déjà émises, parmi toutes les autres LDC antérieures; 3) exposer les avantages et les risques de chacune des approches cliniques; 4) identifier les interventions considérées inefficaces qu'il faut éliminer de la pratique, et 5) reconnaître les traitements efficaces que les intervenants en santé devraient

prioriser. Bref, ce projet de recherche a été fondé sur l'application des LDC dans le but ultime de procurer une assistance dans la prise de décision quotidienne des personnes âgées atteintes d'arthrose du genou. L'objectif de renforcer le message de participer en toute sécurité à un programme de marche, sans douleur, afin d'assurer une adhésion de façon définitive en atténuant les nombreux obstacles potentiels à l'adhésion a été atteint. Par la promotion de ce programme de marche avéré efficace, au moyen de stratégies d'application des connaissances, les résultats du projet de recherche ont confirmé finalement l'importance de mettre en place des programmes en milieu communautaire afin de faciliter l'accès à la pratique régulière de la marche. Rendre les programmes de marche en communauté simples et adaptés pour répondre aux différents besoins des gens selon leurs préférences, facilite considérablement l'adhésion et ainsi le maintien des bienfaits cliniques. Bref, l'accessibilité aux programmes de marche pour les individus souffrant d'arthrose est ainsi indispensable afin d'assurer leur efficacité.

Projections

Comme la participation active des personnes âgées souffrant d'arthrose du genou favorise l'amélioration des résultats cliniques, la qualité de vie ainsi que l'efficacité des interventions physiques, il est primordial que ces gens collaborent activement et composent de façon plus autonome avec leur problème de santé. Ainsi, leur comportement contribue à la nécessité de modifier la pratique clinique des professionnels de la santé qui doivent partager les données probantes avec leurs clients pour viser l'amélioration des soins de santé. En effet, ils sont responsables d'obtenir la confiance de leurs clients lors de la détermination d'une intervention. Cette approche a pour effet d'adapter le traitement aux particularités et selon les préférences du client, de motiver ce dernier ainsi que d'améliorer sa réponse au traitement (Lutfey, 2005; Nieuwenhuijsen 2006). Étant donné qu'il est essentiel de respecter le processus de prise de décision partagée, en promouvant la participation conjointe du professionnel et de son client, cela pourrait augmenter l'intérêt et la motivation des participants à suivre un programme de marche si leurs préférences initiales sont prises en considération.

Pour ce faire, les professionnels de la santé doivent d'abord évaluer la phase dans laquelle se situe chacun de leurs clients concernant l'intention d'adopter un comportement, et ce, avant même de commencer une intervention (Nigg, 2011). En connaissant immédiatement le degré d'adhésion à une activité physique désiré du client, le professionnel de la santé peut adapter l'intervention pour chaque client selon les objectifs réalistes déterminés par le client (Fortier, 2007; Lutfey, 2005; Nieuwenhuijsen 2006). Il faut également respecter la préférence du client concernant le type et le niveau de supervision dont le client a besoin afin de réduire le

risque d'influence des facteurs multidimensionnels de l'adhésion. Ces approches permettront d'accroître l'impact et l'efficacité de l'intervention fournie par le professionnel de la santé. Le professionnel sera en mesure d'utiliser ultérieurement des stratégies motivationnelles appropriées selon les caractéristiques et habiletés pour réussir à faire progresser le client vers le maintien d'un comportement sain (Ryan, 2000). Il est important que le professionnel de la santé promeuve une collaboration équilibrée entre lui et son client, qui se traduit alors par une harmonie entre leurs rôles respectifs, en agissant comme un partenaire afin d'encourager son client à prendre en charge son arthrose (Vahdat 2014). Bref, un lien de confiance, prônant le respect, doit être mieux établi afin de guider le client vers l'auto-prise en charge de son arthrose en lui enseignant les bons outils de départ et le référant aux bonnes ressources communautaires.

De ce fait, le présent projet de recherche a permis de montrer la faisabilité et la nécessité d'élaborer un ECR à plus grande échelle, suite à l'évaluation du processus et du taux de recrutement des participants, de la conception d'un ECR, de la mise en place des interventions ainsi que des mesures de résultats sélectionnées. En d'autres termes, soixante-neuf participants ont été recrutés en 3 mois, le devis original a été testé et les schèmes de préférence ont été respectés tels qu'expliqués, en plus d'avoir montré des interventions simples n'ayant causé aucun effet néfaste ainsi que de recueillir et analyser des résultats de mesure réalistes et organisés.

Toutefois, il est vrai que la conception future d'un ECR à grande échelle permettra de confirmer les conclusions tirées sur les résultats des stratégies d'application utilisées dans le but de promouvoir l'adhésion à la marche chez les personnes âgées atteintes

d'arthrose légère à modérée du genou, en tenant compte de la préférence, et de viser éventuellement la population arthrosique tout en incluant également les professionnels de la santé qui côtoient cette clientèle. Il sera enfin intéressant d'extrapoler de façon transparente ces résultats à plus grande échelle, avec un échantillon plus homogène (soit de restreindre le groupe d'âge) dans des contextes et des cultures différents et plus larges au sein du Canada ou dans d'autres pays.

Conclusion

Cette thèse doctorale a enrichi les écrits scientifiques en contribuant cliniquement et scientifiquement à la meilleure compréhension des principales stratégies visant à promouvoir l'adhésion à long terme aux programmes de marche en communauté et en considérant la préférence des participants comme une approche novatrice d'application des connaissances. Les conclusions suggèrent de considérer la préférence afin d'améliorer l'adhésion des personnes âgées atteintes de l'arthrose légère à modérée à un programme de marche avéré efficace, tout en assurant le maintien des bienfaits cliniques de la marche. De façon générale, les résultats préliminaires pourront possiblement guider les individus souffrant d'arthrose dans la prise en charge de leur affection chronique. Ils suggéreront aussi aux professionnels de la santé d'adapter leur pratique clinique afin de mieux identifier les influences positives d'une intervention physique et les obstacles à son adhésion en adoptant une approche collaborative prônant le respect et la considération des préférences de son client afin de mieux aider leurs clients dans la prise en charge des signes et symptômes de l'arthrose.

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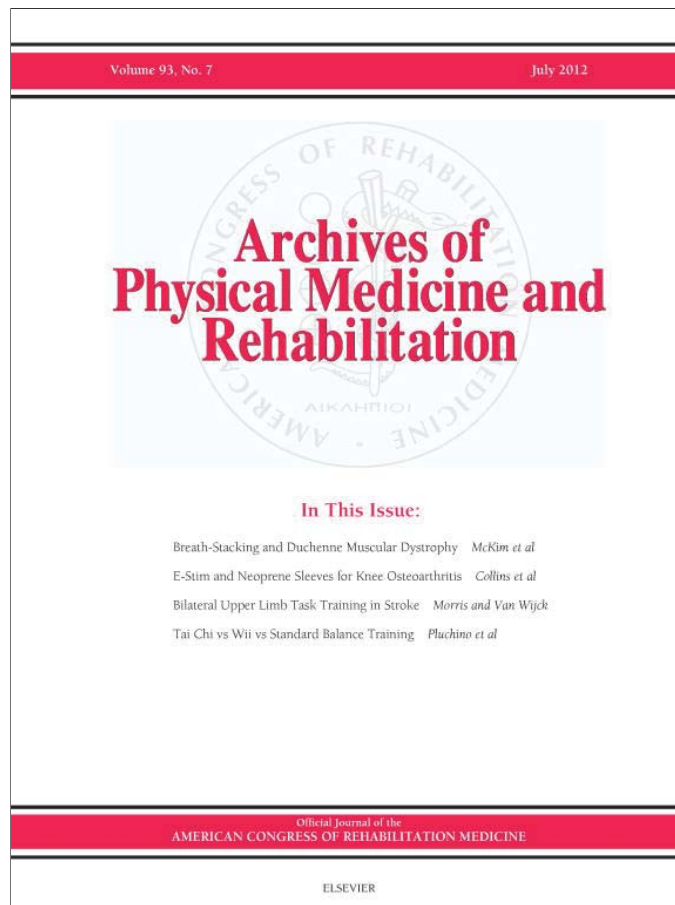
Dissémination des résultats sous forme de présentations

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- 2) Loew L. *Implementation of Evidence-Based Clinical Practice Guidelines for Walking Programs in the Management of Osteoarthritis: Participant Exercise Preference Design*, Cochrane Canada 11th Annual Symposium, Ottawa, Ontario, Canada, Avril 2014;
- 3) Loew, L. *The Implementation of Ottawa Panel Evidence-Based Clinical Practice Guidelines for Aerobic Walking Programs in the Management of Osteoarthritis: The PEP (Participant Exercise Preference) Study*, Assemblée scientifique annuelle de la société canadienne de rhumatologie (SCR) et l'Association des professionnels de la santé pour l'arthrite (APSA), Whistler, Colombie-Britannique, Février 2014;
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SECTION IV : ANNEXES

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REVIEW ARTICLE (META-ANALYSIS)

Ottawa Panel Evidence-Based Clinical Practice Guidelines for Aerobic Walking Programs in the Management of Osteoarthritis

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ABSTRACT. Loew L, Brosseau L, Wells GA, Tugwell P, Kenny GP, Reid R, Maetzel A, Huijbregts M, McCullough C, De Angelis G, Coyle D, and the Ottawa Panel. Ottawa Panel evidence-based clinical practice guidelines for aerobic walking programs in the management of osteoarthritis. *Arch Phys Med Rehabil* 2012;93:1269-85.

Objective: To update the Evidence-Based Clinical Practice Guidelines (EBCPGs) on aerobic walking programs for the management of osteoarthritis (OA) of the knee.

Data Sources: A literature search was conducted using the electronic databases MEDLINE, PubMed, and the Cochrane Library for all studies related to aerobic walking programs for OA from 1966 until February 2011.

Study Selection: The literature search found 719 potential records, and 10 full-text articles were included according to the selection criteria. The Ottawa Methods Group established the inclusion and exclusion criteria regarding the characteristics of the population, by selecting adults of 40 years old and older who were diagnosed with OA of the knee.

Data Extraction: Two reviewers independently extracted important information from each selected study using standard-

ized data extraction forms, such as the interventions, comparisons, outcomes, time period of the effect measured, and study design. The statistical analysis was reported using the Cochrane collaboration methods. An improvement of 15% or more relative to a control group contributes to the achievement of a statistically significant and clinically relevant progress. A specific grading system for recommendations, created by the Ottawa Panel, used a level system (level I for randomized controlled studies and level II for nonrandomized articles). The strength of the evidence of the recommendations was graded using a system with letters: A, B, C+, C, D, D+, or D-.

Data Synthesis: Evidence from 7 high-quality studies demonstrated that facility, hospital, and home-based aerobic walking programs with other therapies are effective interventions in the shorter term for the management of patients with OA to improve stiffness, strength, mobility, and endurance.

Conclusions: The greatest improvements were found in pain, quality of life, and functional status (grades A, B, or C+). A common limitation inherent to the EBCPGs is the heterogeneity of studies included with regards to the characteristics of the population, the interventions, the comparators, the outcomes, the period of time, and the study design. It is strongly recommended to use the Cochrane Risk of Bias Summary assessment to evaluate the methodologic quality of the studies and to consider avenues for future research on how aerobic walking programs would be beneficial in the management of OA of the hip.

Key Words: Exercise; Knee; Osteoarthritis; Practice guidelines as topic; Rehabilitation; Review [publication type]; Rheumatology; Walking.

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OSTEARTHRTIS (OA) is the most common joint disorder, often affecting the knees and hips.¹ Symptoms include pain, temporary stiffness, crepitus, swelling, fatigue, and movement limitation. OA is rarely present before the age of 40.¹ Incidence is greater among men before the age of 45 but

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List of Abbreviations

AIMS	Arthritis Impact Measurement Scales
BI	behavioral intervention
BMI	body mass index
CCT	controlled clinical trial
EBCPG	Evidence-Based Clinical Practice Guideline
FU	follow-up
OA	osteoarthritis
PICOPS	population, intervention, comparator, outcomes, period of time, and study design
QOL	quality of life
RCT	randomized controlled trial
SMD	standardized mean difference

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higher among women after the age of 55. After the age of 70, there is a dramatic increase in prevalence of OA among both sexes, and the majority of older adults will develop OA in 1 or several joints.² Currently, more than 50% of Americans aged over 65 (over 24 million individuals) are affected by OA.³ With the aging population, some researchers predict that by 2030, approximately 72 million Americans will have developed the disorder.^{4,5}

In general, people diagnosed with OA will gradually become sedentary,⁶ because most of them are approximately 3 times more likely to have difficulty walking, and to have 5 or more functional limitations.² The belief that physical activity causes an increase in pain to the affected joint has resulted in a negative chain reaction. Inactivity leads to decreased endurance and mobility, loss of independence, and thus it can reduce quality of life (QOL).⁷ In addition, OA is responsible for a reduction in productivity, and an increase in disability compensation and work absenteeism. These indirect costs represent one third of the overall costs attributed to OA, where the total cost is estimated at \$16,146. Direct costs are disbursed for pain medication and general medical treatments. Together, individuals affected by OA present an annual average cost of \$11,542.⁸

The Ottawa Panel is a group of researchers producing Evidence-Based Clinical Practice Guidelines (EBCPGs) with the objective of reporting recommendations regarding specific interventions. General aerobic exercise is recommended as a core treatment for subjects with OA. An aerobic walking program is defined as "a dynamic physical activity with an intensity sufficient to improve aerobic capacity, and muscle strength, which establishes to improve functional status among older individuals with OA."^{9(p677)} Many previous systematic reviews have already determined that walking is an effective and safe way to treat OA, but these reviews are now dated.^{10,11} The scientific evidence recommends that aerobic physical activities, such as walking programs, have a therapeutic effect in the short-term (2–6mo) for pain relief, improved strength, and functional status in subjects diagnosed with OA.^{12–14} However, these existing guidelines do not provide detailed recommendations regarding effective walking programs for OA. Therefore, an update of clinical practice guidelines for aerobic walking programs for OA would be a valuable resource for clinicians and researchers.^{8,10,11}

The objective of this project was to create an EBCPG for an aerobic walking program in the management of OA of the knee, in order to support health professionals and their patients diagnosed with OA in choosing the most effective aerobic walking programs for this population. Evidence shows that an inactive patient with OA will present a gradual deterioration of the affected joint, an increase of functional dependency, and a poorer QOL.⁷ It is, therefore, important to persuade inactive individuals to follow an aerobic walking program, which helps relieve pain and pro-

mote remodeling without increasing stress in the affected joint.¹⁵ Even though aerobic walking promotes low impact on the weight-bearing articulations, positive changes are still attributed to improving joint loads and biomechanics, stability, and neuromuscular function.¹⁵ Therefore, the stability of the affected joint assists persons with OA to be more functional in everyday living, which will progressively improve their QOL.¹⁶ Promotion of aerobic walking, especially in a community-based context, is a priority for health organizations serving the general population and is highly recommended for subjects affected by OA, because it is easily accessible to walk in a shopping center or a community place, without having to spend too much money. In other words, walking is one of the safest no-cost ways of doing physical activity, because no special equipment is needed other than good walking shoes.⁶

METHODS

Protocols and Registration

The development process of the EBCPGs was similar to that of the Philadelphia Panel and other EBCPGs created by the Ottawa Panel.¹² The methodology of this project followed the Preferred Reporting Items for Systematic and Meta-Analyses¹⁷ checklist from the *Journal of the American Physical Therapy Association*, the Ottawa Expert Panel methods, and used a quantitative grading system.

In conjunction with the methodology of previous Ottawa Panel publications,¹⁸ the construction of the EBCPGs was developed using the Appraisal of Guidelines Research and Evaluation criteria (www.agreestrust.org). The Ottawa Panel individual recommendations were graded as A, B, C, C+, D, D+, or D– based on the strength of evidence (table 1). An alphabetical grading system was presented according to the Ottawa Panel methodology¹⁸ in table 2. Appendix 1 and an additional alphabetical system recently adopted by the Cochrane Collaboration (www.cochrane.org) have the corresponding levels in parenthesis.

Eligibility Criteria

To accomplish systematic literature reviews, a list of eligibility criteria was developed by the Ottawa Methods Group, who decided to follow the population, intervention, comparator, outcomes, period of time, and study design (PICOPS) strategy, in order to ensure inclusion of relevant studies. Therefore, the inclusion and exclusion criteria include the characteristics of the population, intervention, comparator, outcomes, the period of time an intervention becomes effective, and the study design (see table 2). Only articles written in English or

Table 1: Grading for Recommendations

Grade	Clinical Importance (%)	Statistical Significance (P)	Study Design
A (strongly recommended)	≥15	<.05	RCT (single or meta-analysis)
B (recommended)	≥15	<.05	CCT or observational (single or meta-analysis)
C+ (suggested used)	≥15	Not significant	RCT/CCT or observational (single or meta-analysis)
C (neutral)	<15	Not significant	Any study design
D (neutral)	<15 (favors control)	Not significant	Any study design
D+ (suggested no use)	<15 (favors control)	Not significant	RCT/CCT or observational (single or meta-analysis)
D– (strongly not recommended)	≥15 (favors control)	<.05 (favors control)	Well-designed RCT with >100 patients (if <100 patients, becomes grade D)

NOTE. Combined Grading Recommendations according to the Ottawa Panel¹⁸ for alphabetical grading system and the Cochrane collaboration (www.cochrane.org) for international nominal grading system.

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Table 2: Inclusion and Exclusion Criteria According to the PICOPS Strategy

Inclusion	Exclusion
Participants/population • Outpatients or inpatients • Diagnosis of OA of the lower extremity(ies) • Chronic vs acute conditions • Healthy weight (BMI<25kg/m²) • Age groups of more than 40y old • Medically stable • Mentally competent Interventions • Eligible interventions: therapeutic program related to aerobic walking training, in community or not, and with or without: 1. Concurrent programs (eg, strengthening and stretching exercises, behavioral approach) 2. Supervision • Eligible control groups: conventional therapy, untreated, waiting list, active physiotherapy treatments, educative pamphlets (not surgery, not drugs, or injections) Comparisons • Studies were included if they compare an intervention group (eg, walking group, walking and behavioral group, walking and strengthening group) with a comparison group (eg, uncontrolled cohort trials) Outcomes • Absenteeism, sick leave, return to work (if available) • Balance status • Cardiopulmonary functions • Coordination status • Fatigue • Flexibility • Functional status, activities of daily living (self-care activities) • Gait status • Girth, volume • Inflammation • Joint imaging • Medication intake (if reported) • Mobility • Muscle strength, walking endurance, and power • Pain • Patient satisfaction • Postural assessment • Quality of life • Range of motion, flexibility, mobility • Side effects (if reported) • Swelling • Compliance • Morning stiffness • Walking endurance • Number of steps • Stride length • Stairs management Period of time • Studies were included if the intervention period lasts more than 1mo, with or without a follow-up period.	Participants/population • Cancer (and other oncologic conditions) • Dermatologic conditions • Healthy normal • Juvenile arthritis • Mixed population (other than OA and/or RA) • Multiple conditions (presenting other chronic problems additional to OA) • Neurologic conditions • Pediatric conditions (no juvenile arthritis) • Psychiatric conditions • Pulmonary conditions • Scoliosis • Condition where rapid weight loss or exercise is contraindicated (unstable angina, frailty, advanced osteoporosis) • Food allergies or reactions to the meal replacements • Obese or overweight patient (BMI≥25kg/m²) Interventions • Surgery of all lower extremities and lower back (ie, not the effect of the surgery) • Medication (eg, phonophoresis with medications) • Thermal biofeedback • Interventions related to weight loss (dietary advices, medication, etc) alone or in combination with walking program Comparisons • Studies were excluded if they did not compare the intervention group with a comparison group (eg, uncontrolled cohort trials) • Studies were excluded if they compared the intervention with a walking and diet group Outcomes • Biochemical measures • Patient compliance to medication • Psychosocial measures (depression, home and community activities, leisure, social roles, sexual functions) • Serum markers (except ESR) • Weight loss Period of time • Studies were excluded if the intervention period lasts <1mo

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Table 2 (Cont'd): Inclusion and Exclusion Criteria According to the PICOPS Strategy

Inclusion	Exclusion
Study designs • RCT • CCT • Cohort study • Case-control study	Study designs • Case-series/case report • Uncontrolled cohort studies • Data (graphic) without a mean and SD • Sample size of <5 patients per experimental group • Studies with more than 20% dropout rate

NOTE. English and French articles only.

Abbreviations: ESR, erythrocyte sedimentation rate; RA, rheumatoid arthritis.

French, from 1966 until February 2011, were selected. The Ottawa Methods Group read and analyzed the articles and organized several evidence tables. The Ottawa Panel experts later reviewed the work to attain a consensus.

Type of Participants

Studies were chosen if the comparison groups were composed of participants aged over 40 years who were diagnosed with OA of the knee, as defined by Klippel et al.¹⁹ For the inclusion of participants, the studies were required to follow the Kellgren-Lawrence grading scale, according to the radiologic and/or clinical assessment of OA.²⁰ The patients had to show no signs of psychiatric conditions, demonstrate stable physical and medical status, and have a healthy weight (body mass index [BMI] <25kg/m²).²¹ Mixed populations were permitted only if they consisted of patients with OA or rheumatoid arthritis, where the patients with OA were the majority. For the complete list of exclusion criteria and the PICOPS process please refer to table 2.

Risk of Bias Across Studies

Studies that were described only in an abstract, where authors could not be contacted for further details, were automatically excluded because they did not provide enough results for the data analysis. Time and translation costs were limited, therefore only English and French studies were selected (see table 2).

Information Sources

The library scientist (J.M.) performed a systematic search of the literature using a search strategy proposed by the Cochrane Collaboration. The main focus of the search was to identify the methodology and study design determined by primary studies, rather than identifying outcomes. In other words, the library scientist based her search on relevant topics, by including OA terms, physical therapy terms (eg, walking), and study design terms. The systematic approach, which consisted of an organized method for the selection of articles, data extraction, and synthesis analyses decreased the possibility of presenting bias. See appendix 2 for more details on how the literature search was completed.

The search was conducted using the electronic databases EMBASE, PubMed, CINAHL, PEDro, SCOPUS, BioMed, SUMsearch, and Cochrane Library and also included case-control, cohort, and nonrandomized studies up until February 2011.

Data Collection Process

Study selection/data items. After a systematic search of the literature, a pair of reviewers (L.L. and G.M.) evaluated the studies. Referring to the inclusion and exclusion criteria (see table 2), the reviewers created a list of the included and

excluded articles. The reviewers referred to the principal assessor (L.B.) when uncertainty was present.

Data Extraction

The reviewers independently extracted important information from each included study using standardized data extraction forms. This included the characteristics of participants, treatment, study design, allocation concealment, comparative results, and period of data collection.

Methodologic Quality Assessment/Risk of Bias in Individual Studies

The Jadad scale was used to assess the methodologic quality of each study selected.^{22,23} Each study was awarded a maximum of 5 points: 2 points for the randomization method, 2 points for double-blinding, and 1 point for a description of the dropouts. The reviewers referred to the principal assessor when differences were noticed in data extraction and Jadad scale scoring. A study assessed at a Jadad scale score of 3 or more points is typically considered as having high methodologic quality. The Ottawa Panel accepted the inclusion of studies with a Jadad scale score of less than 3 points. Points for double-blindness were rarely given because of the nature and difficulties of blinding therapists or participants during physical therapy treatments.^{23,24} Consequently, more importance was given to the 2 other categories of the Jadad scale, which are randomization and withdrawals (appendix 3). Articles were excluded if they did not meet the selected inclusion criteria according to the Ottawa Panel (see table 2).

Data Analysis/Summary Measures

The Cochrane Collaboration methods were used to perform statistical analysis (www.cochrane.org). Weighted mean differences between the experimental and control groups were calculated for continuous data, allowing for the calculation of the mean and SD corresponding to the sample size of each group. According to the Cochrane Collaboration, for each specific outcome, weighted mean differences were indicated by a square and the SD of the weighted mean difference was illustrated by a horizontal line. As long as the horizontal line reached the central vertical axis, the weighted mean difference between the 2 comparative groups was not statistically different because the confidence interval included zero (fig 1A at 9mo). By subtracting the improvement of the experimental group with the improvement in the control group, it is possible to calculate the absolute benefit. The relative difference can be found by dividing the absolute benefit out of the baseline mean (weighted for the treatment and control groups). Selected by the Philadelphia Panel and adopted by the rheumatology and biostatistician experts of the Ottawa Panel, an improvement of 15% relative to a control group contributes to the achievement of clinical improvement. For dichotomous variables, the clin-

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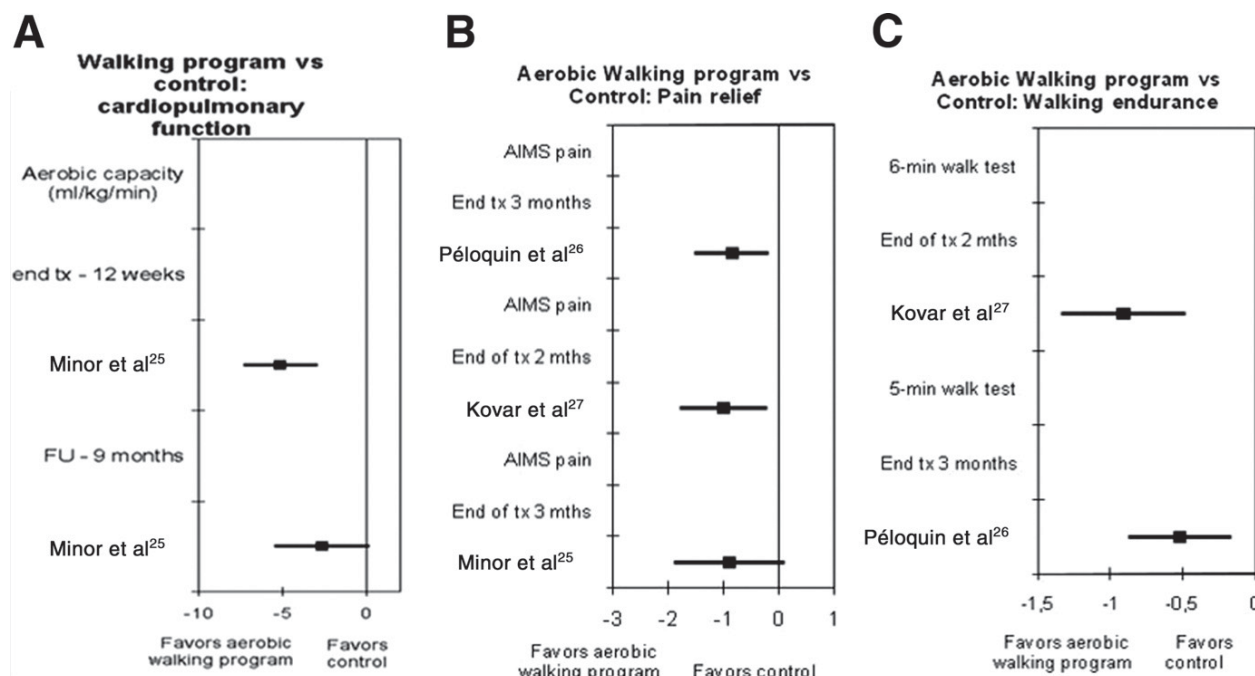


Fig 1. (A) Results from the only RCT evaluating an aerobic walking program versus a control: aerobic capacity with a maximum oxygen consumption test.²⁵ (B) Pooled results of RCTs evaluating aerobic walking programs versus controls: pain relief with AIMS.²⁵⁻²⁷ (C) Pooled results of RCTs evaluating an aerobic walking program versus a control: endurance walking with a six-minute walk test²⁷ and five-minute walk test.²⁶ Abbreviation: tx, treatment.

ical improvement is calculated as the difference between the percent improved among the experimental and control groups. For more details about the statistical analysis, see the previous publications of the Ottawa Panel.¹⁰ According to the Cochrane Collaboration, the standardized mean difference is used as a summary statistic, which represents the recommended effect size when studies select the same outcome but are measured with a different scale in the meta-analysis. The goal of calculating this value is to standardize and combine the results of the studies to a uniform statistic for pooling and comparison purposes (figs 1B and 1C). The individual results for each randomized controlled trial (RCT) are shown in figures 1B and 1C. The global effect of the pooled results of figures 1B and C is indicated in the Results section.

RESULTS

Study Selection

The literature search found 719 potential records (see appendix 2). The reviewers (L.L. and G.M.) screened 88 eligible articles on aerobic walking programs and OA. According to the selection criteria (see table 2), 10 full-text articles were included and 78 articles were excluded for the following reasons (appendix 4): no walking program intervention in 31 trials²⁸⁻⁵⁸ dropout rates of over 20% in 12 studies⁵⁹⁻⁷⁰ no control group in 5 trials,⁷¹⁻⁷⁵ outcome measures not considered in this review (eg, markers of chronic inflammation, psychosocial aspects, compliance, cost estimate) in 5 trials⁷⁶⁻⁸⁰ only healthy subjects in 2 studies^{81,82} no intervention in 3 studies,^{74,83,84} methodology was a systematic review or meta-analysis in 5 studies,^{13-15,85,86} diet intervention with physical activity including walking, with

individuals who are obese or overweight in 8 studies,⁸⁷⁻⁹⁴ not enough statistical data in 1 trial,⁹⁵ main intervention focused on nutrition in 1 trial,⁷ only qualitative data in 1 trial,¹⁴ design but no measurement in 1 study,⁷⁰ a pilot study in 2 trials,^{16,96} and no control group results in 1 trial (data not shown).⁹⁵ Please refer to the Ottawa Panel article.⁹⁷

Study Characteristics

Most of the studies chosen for this project presented an aerobic walking program where the participants from experimental groups were supervised by at least 1 therapist. Of the 10 included trials, 9 were RCTs. Only 1 study⁹⁸ was a controlled clinical trial (CCT). All studies included patients who presented radiographic and/or clinical criteria for primary OA of the knee.^{25-27,98-104} All the participants were aged 40 years old or older. One CCT⁹⁸ compared a control group where participants were asked to continue their normal daily activities with a walking program group. Two RCTs^{100,103} presented educational sessions for the control group, where phone contacts were added with the patient education,¹⁰³ and compared this group to a walking program combined with strength training group. Three RCTs^{27,99,104} presented educational sessions for the control group, where phone contacts were added with patient education,^{27,99} and compared this group to a walking program with health education and behavioral components group. Two other RCTs^{25,102} compared a walking program including a multicomponent exercise group with a control group, where the participants followed educational sessions with phone contacts¹⁰² and gentle active range of motion, isometric strengthening, and relaxation exercises.²⁵ Finally, 2 RCTs^{100,101} presented educational sessions for the control

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group, and compared this group to a walking program with multicomponent exercises and health education group. See appendices 1 and 3 for more details on the characteristics of the interventions of all included studies.

Results of the Studies

Methodologic quality/risk of bias within studies. The Jadad scale scores revealed that 3 out of 10 studies^{98,100,102} had poor methodologic quality (<3 points). Although they achieved a low score, the 3 studies presented respectable methods and were therefore included in our database (see appendices 1 and 3). The other trials showed high methodologic quality by receiving a result of 3 out of 5 points and 2 of the articles were from the same study. All articles had a score of 0 for the second question of the Jadad scale score, because none of the investigators used the double-blinding method during the intervention.²⁴

Effectiveness of aerobic walking programs for the management of OA of the knee. Seven RCTs with high methodologic quality (3 points according to the Jadad scale) will be described in the following section, and 3 figures from these studies were selected (see appendix 1 and fig 1B and 1C). The first pool of 3 RCTs²⁵⁻²⁷ was done by evaluating aerobic walking programs versus the control: pain relief with AIMS.²⁵⁻²⁷ The results showed homogeneity between the studies of high quality, because the *P* value was higher than .10 (*P*=.96) and the *I*² value was less than 50% (0%). According to the global effect, the standardized mean difference (SMD) was -0.47 (95% confidence interval -0.71 to -0.23) and demonstrated statistical significance (see fig 1A and table 3). See appendix 1 for more information on the results. The second pool consisted of 2 RCTs of high quality that evaluated aerobic walking programs versus control: endurance walking with a 6-minute walk test²⁷ or five-minute walk test.²⁶ The results demonstrated homogeneity between the RCTs of high quality, because the *P* value was higher than 0.10 (*P*=.17) and the *I*² value was under 50% (46%). According to the global effect, the SMD was -0.68 (-0.96 to -0.41) and demonstrated statistical significance (see fig 1B and table 4). See appendix 1 for

more details. We developed a recommendation for each of the 4 aerobic walking interventions: (1) walking program alone versus control (grade B for function, pain relief, QOL); (2) walking program with strengthening training versus control (grade A for QOL, function); (3) walking program with health education and behavioral components versus control (grade A for pain relief and QOL); (4) walking program with multicomponent exercises versus control (grade A for pain relief, QOL); and (5) walking program with multicomponent exercises and health education versus control (grade A for function, QOL). The Ottawa Panel also found strong evidence that demonstrated clinically important benefits with statistical significance of an aerobic walking program versus control²⁵ (1 RCT, N=83, high quality with a Jadad scale score of 3/5) for improved aerobic capacity (Naughton protocol) (relative difference in change from baseline =19.83%) at the end of treatment (12wk). No improvements in aerobic capacity (Naughton protocol) were measured at 9-month follow-up (FU) (see fig 1C and table 5). See also appendix 1 for more information on the results.

DISCUSSION

The Ottawa Panel created an EBCPG with this systematic review of aerobic walking programs in the management of OA of the knee. In this systematic review, the Ottawa Panel developed recommendations based on 7 out of 10 comparative controlled studies with higher quality (with a Jadad scale score of 3/5).^{25-27,99,101,103,104} The Ottawa Panel concluded that aerobic walking combined with stretching and strengthening exercises, education, and/or behavior programs are recommended to improve pain relief, functional status, and QOL of adult individuals with OA. These recommendations had both clinical importance and statistical significance; therefore, they were given grades of A. Furthermore, positive recommendations for improvement in stiffness relief, strength in extensors of both lower extremities, and mobility (stairs climbing, number of steps) received a grade of C+. Therefore, among higher quality studies (Jadad score of 3/5 or higher), there were a total of 16 positive recommendations: 9 with a grade A (strongly recom-

Table 3: Results for the Relative Difference and SMD for an Aerobic Walking Program Versus Control: Pain Relief

Study	Treatment Group	Outcome	No. of Patients	Baseline Mean	End of Study Mean	Absolute Benefit	Relative Difference in Change From Baseline (%)	SMD (95% CI)
Kovar et al ²⁷	Aerobic walking program with strengthening and stretching exercises, and educational/support session	AIMS pain Lower better End of Tx: 2mo	47	5.15	3.77	-1.28	-26	-0.51 (-0.94 to -0.10)
	Control		45	4.87	4.77			
Minor et al ²⁵	Aerobic walking program with strengthening and stretching exercises, education, and behavioral intervention	AIMS pain Lower better End of Tx: 3mo	28	5.10	3.90	-0.50	-9	-0.47 (-1.00 to 0.06)
	Control		28	5.50	4.80			
Péloquin et al ²⁶	Aerobic walking program with strengthening and stretching exercises	AIMS pain Lower better End of Tx: 3mo	59	4.53	3.09	-0.85	-19	-0.44 (-0.80 to -0.08)
	Control		65	4.53	3.94			

Abbreviations: CI, confidence interval; Tx, treatment.

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Table 4: Results for the Relative Difference and SMD for an Aerobic Walking Program Versus Control: Walking Endurance

Study	Treatment Group	Outcome	No. of Patients	Baseline Mean	End of Study Mean	Absolute Benefit	Relative Difference in Change From Baseline (%)	SMD (95% CI)
Kovar et al ²⁷	Aerobic walking program with strengthening and stretching exercises, and educational/support session	Six-minute walk test (min) Higher better End of Tx: 2mo	47	381.00	451.00	87.00	24	-0.91 (-1.34 to -.048)
	Control		45	356.00	339.00			
Péloquin et al ²⁶	Aerobic walking program with strengthening and stretching exercises	Five-minute walk test (min) Higher better End of Tx: 3mo	59	419.19	467.77	29.93	7	-0.52 (-0.88 to -0.17)
	Control		65	406.93	425.58			

Abbreviations: CI, confidence interval; SMD, standardized mean difference; Tx, treatment.

mended) and 7 with a grade C+ (suggested used). This article shows that an aerobic walking program is beneficial, especially for pain relief (2 grade A and 1 C+), improved QOL (4 grade A and 3 grade C+), and for functional status (2 grade A) in adults aged over 40 years and diagnosed with OA of the knee. Among the remaining recommendations, 16 were graded C, 6 were graded D, and 4 were graded D+.

Several aerobic walking programs showed significant and beneficial effects on QOL compared with a control.^{25,99,101} This effect, however, was not maintained after an unsupervised period of walking program at 9 months.²⁵ Patients who suffered from OA felt less pain in their lower extremities.^{25,26,99} Among these studies, the duration of the programs varied between 2 and 6 months. The literature has consistently shown that aerobic walking programs ranging from 2 to 9 months in duration are highly effective for people with OA of the lower extremities. Significant changes have been observed in the performance of daily living activities,^{99,101,103} walking distance,^{27,99,104} and gait velocity.^{25,99} Long-term, facility-based walking studies (18-mo FU) using behavioral intervention (BI) components demonstrated major improvements for walking distance and QOL²⁵ when compared with a control.^{27,99} Regarding the considerable resources used for the majority of the included studies, 1 trial proved that a home-based, pedometer-driven walking program represented an inexpensive alternative to supervised and structured aerobic walking programs, by simply incorporating into everyday life of subjects a pedometer for monitoring their daily steps. Furthermore, this home-based

walking study combined with an education program showed clinically important benefits for functional status, walking efficiency, and muscle strength.¹⁰⁴

Aerobic walking programs are effective with individuals diagnosed with OA of the knee, because they help relieve pain and promote nutrition and remodeling without increasing stress in the affected joint.¹⁰⁵ Aerobic exercise can increase endorphin production, generating an analgesic effect, which gradually induces a decrease in pain.^{52,105} These positive changes are attributed to improving knee joint loads, stability, joint biomechanics, neuromuscular function, and possible improved training of cardiovascular efficiency, aerobic capacity, and activity tolerance.^{52,105} Therefore, the stability of the affected joint assists persons with OA to be more functional in everyday living, which will progressively improve their QOL.¹⁰⁶ The significant improvements in QOL may be in relation with physical activity, by helping patients reduce fatigue, anxiety, and recover their self-esteem, motivation, and mental health. Also, participation in physical activity with other patients may help individuals to improve social networks and increase community cohesion.⁹⁷ Behavioral strategies, such as patient education, health counseling, and phone contacts, in combination with aerobic walking programs can facilitate OA management and allow individuals to increase their exercise levels.¹⁰⁵ Literature research also suggests that encouraging self-management,²⁵ improving self-efficacy, providing reinforcement,⁹⁸ and offering education about the benefits of physical activity, are other effective behavioral strategies. It is important to know

Table 5: Results for the Relative Difference and Weighted Mean Difference for an Aerobic Walking Program Versus Control

Study	Treatment Group	Outcome	No. of Patients	Baseline Mean	End of Study Mean	Absolute Benefit	Relative Difference in Change From Baseline (%)	WMD (95% CI)
Minor et al ²⁵	Aerobic walking program with strengthening and stretching exercises, education, and BI	Aerobic capacity (mL/kg/min) Lower better End of Tx: 12wk	28	18.9	22.40	3.6	19.83	-5.10 (-7.32 to -2.88)
	Control		28	17.4	17.30			
Minor et al ²⁵	Aerobic walking program with strengthening and stretching exercises, education, and BI	Aerobic capacity (mL/kg/min) Lower better FU: 9mo	26	18.9	23.62	1.13	6.19	-2.63 (-5.49 to -0.23)
	Control		20	17.4	20.99			

Abbreviations: CI, confidence interval; Tx, treatment; WMD, weighted mean difference.

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that when performing 10 minutes or more of aerobic walking, a warm-up period and a cool-down session of at least 3 minutes each are both necessary for flexibility, strength, and pain management.¹⁰⁵ Strengthening exercises of the lower extremity are known to improve neuromuscular activity, joint protection and function, and decrease pain in the affected knee.¹⁰⁶ High-intensity activities are considered risk factors for injury and relapse; therefore, an individual with OA should always maintain intensity at a safe level.¹⁰⁵ An aerobic walking period should be performed for at least 30 minutes, at a level of exercise intensity above normal daily activities and at a minimal frequency of 3 to 4 times a week, in order to obtain cardiovascular fitness.¹⁰⁵

This systematic review supports the conclusions found by the American College of Rheumatology¹¹ regarding the management of OA of the knee. This guideline concluded that older participants with symptomatic knee OA, who participated in an aerobic or resistance exercise program, demonstrated better performance measures of function with constant improvements in self-reported pain relief and disability.⁵⁹

The European League Against Rheumatism¹⁰⁷ also demonstrated that strengthening exercise programs and aerobic walking training were both successful over 18-months FU. The Osteoarthritis Research Society International instead recommended that subjects should participate in a regular aerobic walking program and also perform quadriceps muscle strengthening exercises at home, in order to improve mainly their functional status. Moreover, they confirmed what has been found in this current review, by proving that monthly telephone contacts combined with a walking program had enhanced the clinical status of individuals diagnosed with OA of the knee. However, this systematic review refutes that combining pharmacologic therapies with non-pharmacologic interventions, such as walking programs, showed more beneficial effects.¹⁰⁸

The attrition of the participants with OA enrolled in short-term RCTs in which they had to follow an aerobic physical intervention including an aerobic walking program is high with dropout rates ranging from 20% to 39%.^{100,101} Long-term studies will usually combine an aerobic walking program with BI components, such as log books, sessions of education, social/peer support, telephone support, goal setting, use of a pedometer to monitor daily steps, and positive feedback.^{25-27,99,101-104} Moreover, the most effective method in terms of long-term compliance rates consisted of a multifaceted approach that incorporated social support with aerobic walking programs.²⁵ Therefore, the long-term trials that used BI generally demonstrated lower dropout rates at FU compared with short-term studies: (1) 10% to 15% at 2 to 4 months FU; (2) 9% to 25% at 6 to 9 months FU; and (3) 10% to 49% at 10 to 18 months FU. However, walking programs at home that are combined with only telephone contacts had less improved short-term and long-term adherence rates.²⁵

Study Limitations

A common limitation inherent to the EBCPGs is the heterogeneity of studies included with regards to the characteristics of the PICOPS strategy. Some studies presented an intervention based only on an aerobic walking program, but the majority included a variety of therapies combined with the aerobic walking program, such as complementary strengthening, stretching, and/or stabilization exercises. Some investigators proposed a home-based walking program,^{25,104} others proposed a facility-based program,^{25,101} and/or a hospital-based program.^{27,99,101} Some studies^{25,27,99,104} added a BI to ensure that the participants remained active during the walking program for a longer study duration.

Most of the time, when there is appearance of conflicting findings about the same outcome across different studies, it can be related to the use of a different PICOPS strategy among the eligible studies of this systematic review (see table 1). However, studies of high quality were combined by evaluating studies with the same outcome measures. See the Results of Studies section and figures 1B and C for more details. Some of the studies demonstrated an inadequate or unclear concealment of allocation. Eight of the studies selected^{25-27,99,101-104} presented adequate randomization procedures and no selection bias.¹⁰⁹ One of the 10 included studies²⁵ demonstrated possible withdrawal bias, as the dropout rate was 20%. Studies were not included if they demonstrated more than 20% of withdrawals of subjects. Also, it is important to note that the average withdrawal rate of the selected trials was 12.2% (excluding 3 studies that did not mention the number of participants that withdrew from the study). Some studies lacked information concerning the intervention (eg, duration, intensity, progression). Six studies had included patients with conditions of OA according to the radiologic and the clinical assessment of OA. Three trials had confirmed the diagnosis of primary OA of their participants considering only the clinical criteria, and 1 study included patients who presented only radiographic criteria for primary OA of the knee.

Given the above limitations in many of the included studies, the Ottawa Panel based their final recommendation on only 7 comparative controlled studies with higher quality (with a Jadad scale score of 3/5).^{25-27,99,101,103,104} In other words, the selected studies couldn't follow the procedure of double-blinding, because they had no choice of informing their participants regarding which group of interventions they will be allocated to, in order to adequately execute the exercises. Therefore, all of the included articles had a score of 0 for the second question of the Jadad scale score, because none of the investigators used the double-blinding method during the intervention. However, according to the study of Olivo et al,²³ the Jadad score scale was not originally developed for studies evaluating physical interventions, but is often used in different systematic reviews. Moreover, the Jadad score scale was assessed by the criteria list of Terwee et al¹¹⁰ and obtained the same quality score as the PEDro, known as the criterion standard—a valid measure of methodologic quality of clinical trials in the domain of physiotherapy.

Finally, it is important to mention that the reason why it has been decided to only include studies that selected participants with healthy weight ($BMI < 25 \text{ kg/m}^2$) was to eliminate all the trials that were combining walking programs with diet interventions, in order to evaluate adequately the effect of walking on the symptoms of OA. Also, this article is already quite lengthy; therefore, this other reason led us to exclude studies that added a diet intervention to walking programs (already considered in the Ottawa Panel article on obesity and OA in 2011).¹¹¹ Given that many people with OA are overweight, by presenting a BMI greater than 25 kg/m^2 , this significantly reduces the clinical applicability of the study and subsequent findings.

CONCLUSIONS/CLINICAL IMPLICATIONS

The Ottawa Panel found important evidence to support the use of aerobic walking programs in the management of OA, for subjects aged over 40 years who are diagnosed with mild to moderate OA of 1 or both knees. Evidence from 7 high-quality studies demonstrates that facility, hospital, and home-based aerobic walking programs with other therapies are effective interventions in the shorter term for the management of patients with OA to improve stiffness, strength, mobility, and endur-

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ance. Moreover, the greatest improvements were found in pain, QOL, and functional status. In summary, it would be strongly recommended to use the Cochrane Risk of Bias Summary assessment to evaluate the methodologic quality of the studies. Moreover, it would be interesting to consider other avenues for future research on how aerobic walking programs would be beneficial in the management of OA of the hip, because OA most often affects the weight-bearing articulations, thus the knees and the hips. Moreover, 30% to 40% of individuals diagnosed with knee OA have concomitant hip OA.¹¹¹ Also, in view of the fact that a number of individuals diagnosed with OA are overweight, another area for further work would be to perform a literature review by including studies that selected participants with a BMI greater than 25kg/m² in walking pro-

grams. Finally, given the lack of long-term trials selected in this review, it would be interesting to examine further the long-term effects of the aerobic walking programs in the overall management of OA.

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APPENDIX 1: EBCPGs RELATED TO AEROBIC WALKING PROGRAM INTERVENTIONS FOR THE MANAGEMENT OF OA OF THE KNEE

1. EBCPGs related to a walking program alone vs control (normal daily activities), level II (1 CCT, N=81, low quality [1,0,0]) (Evcik and Sonel⁹⁸): grade B for physical function (WOMAC physical function at 3-mo FU), pain relief (NHP pain and WOMAC pain at 3-mo FU), and quality of life (NHP energy, physical mobility, and sleep at 3-mo FU) (clinically important benefit). Patients with a diagnosis of OA of the knee met the only inclusion criteria.
2. EBCPGs related to a walking program with strengthening training vs control (patient education), level I (2 RCTs, n=374, high quality [2,0,1]) (Péloquin et al,²⁶ Penninx et al¹⁰³): grade A for quality of life (AIMS mobility, walking and bending, and arthritis pain at end of treatment at 12wk) (Péloquin) and functional status (incidence of disability on ADLs) (Penninx) (clinically important benefit); grade C+ for quality of life (AIMS2 work, hand, and finger function, arm function, self-care tasks, and AIMS2 household tasks at end of treatment at 12wk) (Péloquin) (clinically important benefit demonstrated without statistical significance); grade C for flexibility (hamstrings and low back flexion at end of treatment at 12wk) (Péloquin), torque (QIT at 60° for the most and least affected leg, HIT at 60° for the most and least affected leg, HIKT at 30°/s for the most and least affected leg at end of treatment at 12wk) (Péloquin), quality of life (AIMS2 social activity, support from friends, level of tension, and mood at the end of 12wk of treatment) (no benefit) (Péloquin), and functional status (disability in transferring from bed to chair, bathing, and eating) (Penninx); grade D for endurance (five-minute walk test at end of treatment at 12wk) (Péloquin) and quality of life (disability in toileting and in dressing at 18-mo FU) (no benefit demonstrated but favoring control) (Penninx); and grade D+ for functional status (incidence of disability on ADLs, transferring from bed to chair, and bathing at 18-mo FU) (clinically important benefit demonstrated favoring control) (Penninx). Patients who met the following criteria: (1) were aged ≥60; (2) had pain in the knee(s) on most days of the month; (3) had difficulty with at least 1 of the following because of knee pain: walking 0.4km; climbing stairs; getting in and out of a car, bath, or bed; rising from a chair; or performing shopping, cleaning, or self-care activities; and (4) showed radiographic evidence of knee OA.
3. EBCPGs related to a walking program with health education and behavioral components vs control (normal daily activities), level I (3 RCTs, n=126, high quality [2,0,1]) (Kovar et al,²⁷ Peterson et al,⁹⁹ Talbot et al¹⁰⁴): grade A for pain relief (AIMS pain at end of treatment at 8wk) (Kovar), endurance (six-minute walk test at end of treatment at 8wk) (Kovar), quality of life (AIMS physical activity at end of treatment at 8 wk) (Kovar), and AIMS pain and AIMS medication use at end of treatment at 8wk (Peterson) (clinically important benefit); grade C+ for pain relief (McGill Pain Questionnaire present pain intensity at 12-wk FU) (Talbot), AIMS arthritis impact at end of treatment at 8wk (Kovar), mobility (steps per day, timed stair climb at end of treatment at 12wk) (Talbot), and torque (right knee extensor isometric peak torque at 120° at end of treatment at 12wk, left knee extensor isometric peak torque at 140°, right knee extensor isometric peak torque at 140° at end of treatment at 12wk) (Talbot) (clinically important benefit demonstrated without statistical significance); and grade C for pain relief (McGill Pain Questionnaire pain rating index total [0–45] at end of treatment at 12wk) (Talbot), mobility (timed chair rise, 100-foot timed turn walk usual speed, and 100-foot timed walk-turn-walk fast pace at end of treatment at 12wk) (Talbot), mobility (free walking speed and fast walking speed at end of treatment at 8wk) (Peterson), quality of life (AIMS arthritis impact at end of treatment at 8wk, AIMS pain at end of treatment at 12wk and 9-mo FU) (Peterson), and torque (left knee extensor isometric peak torque at 120° at end of treatment at 12wk and 3-mo FU, left knee extensor isometric peak torque at 140° at 3-mo FU) (Talbot) (no benefit). Patients who were ≥40y; had a documented diagnosis of chronic, stable, primary OA of 1 or both knee joints in association with at least 4-mo history of symptomatic knee pain occurring during weight-bearing activities (patients with multiple joint involvement, those who had undergone major joint surgery, or had a lower joint prosthesis were also eligible); who had radiographic evidence of primary OA of 1 or both knee joints, as demonstrated by joint space narrowing, marginal spur formation, or subchondral cyst formation; who used any of the various common, over-the-counter NSAIDs ≥2d/wk; and who were not participating in a regular program of physical activity at the time of enrollment.

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APPENDIX 1 (CONT'D): EBCPGs RELATED TO AEROBIC WALKING PROGRAM INTERVENTIONS FOR THE MANAGEMENT OF OA OF THE KNEE

4. EBCPGs related to a walking program with multicomponent exercises vs control (patient education), level I (2 RCTs, n=186, 1 low quality [2,0,0] and 1 high quality [2,0,1]) (Messier et al.¹⁰² Minor et al.²⁵): grade A for pain relief (pain intensity in transfer at 3mo, 9mo, end of treatment 18mo, and pain frequency in transfer at 3mo) (Messier) and quality of life (AIMS physical activity at end of treatment at 12wk) (Minor) (clinically important benefit); grade C+ for pain relief (pain intensity ambulation and pain frequency in ambulation at 3mo, pain frequency in transfer at 9mo) (Messier), quality of life (AIMS physical activity at 9-mo FU) (Minor), and stiffness (morning stiffness at end of treatment at 12wk) (Minor) (clinically important benefit demonstrated without statistical significance); grade C for pain relief (pain intensity ambulation and pain frequency in ambulation at 9mo and end of treatment at 18mo, pain frequency in transfer at end of treatment at 18mo) (Messier), pain relief (AIMS pain at end of treatment at 12wk) (Minor), mobility (walking speed at 3mo, 9mo, and end of treatment at 18mo) (Messier), mobility (50-foot walking time at end of treatment at 12wk and at 9-mo FU) (Minor), endurance (exercise endurance at end of treatment at 12wk) (Minor), stiffness (morning stiffness at end of treatment at 12wk) (Minor), and force (grip force at end of treatment at 12wk and 9-mo FU) (Minor) (no benefit); grade D for flexibility (trunk flexibility at end of treatment at 12wk) (Minor), endurance (exercise endurance at 9-mo FU) (Minor), and cardiopulmonary function (maximum oxygen consumption at 9-mo FU) (Minor) (no benefit demonstrated but favoring control); and grade D+ for flexibility (trunk flexibility at 9-mo FU), pain relief (AIMS pain at 9-mo FU) (Minor), and cardiopulmonary function (maximum oxygen consumption at 12wk) (Minor) (clinically important benefit demonstrated favoring control). Patients who met the following criteria: (1) were ≥ 60 y old, (2) had pain on most days of the month in 1 or both knees, (3) showed radiographic evidence of knee OA in the tibial-femoral compartments of the painful knee, and (4) had difficulty with at least 1 of the following activities because of knee pain—walking 0.4km, climbing stairs, getting in and out of a car, rising from a chair, lifting and carrying groceries, getting out of bed, getting out of a bathtub, shopping, cleaning, or self-care.
5. EBCPGs related to a walking program with multicomponent exercises and health education vs control (health education), level I (1 RCT, N=77, 1 low quality [1,0,0] and 1 high quality [2,0,1]) (Bautch et al.¹⁰⁰ Dias et al.¹⁰¹): grade A for functional status (Health Assessment Questionnaire at end of treatment at 3mo and at 3-mo FU) (Dias), functional status (LI at end of treatment at 3mo and at 3-mo FU) (Dias), and quality of life (SF-36 functional capacity, SF-36 physical role limitation, SF-36 bodily pain at end of treatment at 3mo and at 3-mo FU, and SF-36 general health at 3-mo FU) (Dias) (clinically important benefit); grade C+ for pain relief of past week (0–10 visual analog scale at end of treatment at 12wk) (Bautch) (clinically important benefit demonstrated without statistical significance); grade C for quality of life (SF-36 vitality at 3-mo FU) (Dias), quality of life (SF-36 general health at end of treatment at 3mo) (Dias) (no benefit); and grade D for quality of life (SF-36 vitality at end of treatment at 3mo) (Dias) and quality of life (AIMS total at end of treatment at 12wk) (Bautch) (no benefit demonstrated but favoring control). Patients who met the following criteria: ACR clinical and radiographic criteria for primary OA of the knee; were ≥ 58 y old and living independently, without physical or medical problems for which exercise program would be contraindicated; were not currently enrolled in a regular exercise program; had not received intraarticular or systematic steroids within the past 2y; and did not routinely use NSAIDs.

Abbreviations: ACR, American College of Rheumatology; ADLs, activities of daily living; AIMS2, Arthritis Impact Measurement Scales 2 (2nd version); HIKT, hamstrings isokinetic torque; HIT, hamstrings isometric torque; LI, Lequesne index; NHP, Nottingham Health Profile; NSAID, nonsteroidal anti-inflammatory drug; QIT, quadriceps isometric torque; SF-36, Medical Outcomes Study 36-Item Short-Form Health Survey; WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index.

APPENDIX 2: LITERATURE SEARCH STRATEGY

The systematic literature search strategy used was as follows:

1. Osteoarthritis/(24341)
2. osteoarthritis, knee/(6688)
3. osteoarthritis, hip/(4209)
4. arthrit* knee.ti,ab. (185)
5. arthrit* hip.ti,ab. (72)
6. osteoarthritis.ti,ab. (25565)
7. 1 or 2 or 3 or 4 or 5 or 6 (42257)
8. walking/(13257)
9. exercise therapy/(20413)
10. walking program*.ti,ab. (318)
11. aerobic.ti,ab. (43065)
12. 8 or 9 or 10 or 11 (74491)
13. cost benefit analysis/(49718)
14. exp health care costs/(36692)
15. cost effectiveness*.ti,ab. (25875)
16. cost benefit analys*.ti,ab. (2579)
17. health care cost*.ti,ab. (6934)
18. Quality-Adjusted Life Years/(4769)
19. quality of life/(87463)
20. economics.fs. (278576)
21. health care utilization.ti,ab. (2678)
22. quality of life.ti,ab. (102532)

APPENDIX 2 (CONT'D): LITERATURE SEARCH STRATEGY (CONT'D)

23. 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 (431448)
24. randomized controlled trial.pt. (299739)
25. controlled clinical trial.pt. (81734)
26. randomized.ab. (216087)
27. clinical trials as topic.sh. (152139)
28. randomly.ab. (159587)
29. trial.ti. (92501)
30. 24 or 25 or 26 or 27 or 28 or 29 (692948)
31. 7 and 12 and 23 (116)
32. 7 and 12 and 23 and 30 (65)
33. limit 31 to systematic reviews (15)
34. 32 or 33 (75)
35. limit 34 to updatelrange="prmez[20100901-]" (3)

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APPENDIX 3: SUMMARY OF THE INCLUDED STUDIES

Author	Population Details	Symptom Duration	Age	Treatment	Comparison Group	Concurrent Therapy	Session/Week	Follow-Up
Bauch et al ¹⁰⁰	Inclusion: ACR clinical and radiographic criteria for primary OA of the knee; were ≥ 68 y old and living independently, physically and medically stable; were not enrolled in a regular exercise program; had not received intra-articular or systematic steroids within the past 2y; and did not use NSAIDs. Exclusion: having intra-articular injections in the past 6mo, being involved in regular physical activity and physiotherapy, unable to exercise, having chronic condition, and using any assistive equipment.	NA	68y	Group 1: 1h of walking on treadmill, with range of motion and strengthening exercises (trunk, upper and lower extremities muscles). Intensity: individualized low intensity walking on treadmill, beginning at 3.22km/h and grade 0, increasing by 1% each minute.	Group 2: educational session.	Educational program consisting of content related to health, exercise, and arthritis.	Frequency: 3 times a wk for 12wk.	NA
Dias et al ¹⁰¹	Inclusion: aged ≥ 65 y of age, clinical diagnosis of knee OA with knee pain during the past month, and no cognitive deficits. Exclusion: previous knee surgery, hip or knee arthroplasty, and unable to participate.	NA	Medians (interquartile range): Group 1: 74y (70–78y) Group 2: 76y (70–78y)	Group 1: 40min of walking, with concentric/eccentric/isotonic progressive resistance exercises, closed kinetic chain weight-bearing exercises, stretching exercises, and cooling off exercises. Supervised facility based by a physiotherapist. Intensity: at a self-selected pace.	Group 2: educational session.	1-h educational session about disease characteristics, joint protection, pain management, and strategies to overcome difficulties in ADLs.	Frequency: Group 1: 3 times per week for walking, 2 times per wk for other exercises for 24wk. Group 2: 6-mo period.	3mo
Evick and Sonel ⁹⁸	Inclusion: knee OA, ages between 48–71y, x-rays of the knees confirming the diagnosis. Exclusion: grade 4 OA according to Kellgren-Lawrence criteria, quads exercises during the past 6mo, effusion on knees, previous knee replacement, severe cardiovascular diseases.	Disease duration Group 1: 8 $\pm$ 3.5 Group 2: 7.9 $\pm$ 3.7 Group 3: 8.2 $\pm$ 2.7	Group 1: 56.3 $\pm$ 6.1 Group 2: 56.9 $\pm$ 6.5 Group 3: 55.8 $\pm$ 6.9	Group 1: home exercise program (isometric straight leg lifts, isometric quads contraction, and isotonic quads exercises progressed with weight from 0.5–5kg). 10 reps 2 times a d for 3mo. Group 2: regular walking program (10min, 3 times a wk for 3mo, gradually increased walking time up to 30min). Intensity: not indicated.	Group 3: continue their normal daily activities.	NA	Frequency: Group 1: 2 times a d for 3mo. Group 2: 3 times a wk for 3mo	3mo
Kovar et al ⁹⁷ and Peterson et al ⁹⁹	Inclusion: aged ≥ 40 y; diagnosis of primary OA of 1 or both knees; at least 4mo symptomatic knee pain during weight-bearing activities (clinical diagnosis); had radiographic evidence of OA by joint space narrowing, spur formation, subchondral cyst formation; use of NSAID ≥ 2 times per week; not participating in a regular program of physical activity. Exclusion: exercise is contraindicated, symptomatic primary OA of 1 or both knees, inability to give informed consent, nonambulation, and involvement in another treatment program or study protocol.	Group 1: 12y $\pm$ 11.8y Group 2: 11.4y $\pm$ 10.9 (mean $\pm$ SD)	Group 1: 70.38 $\pm$ 9.11y Group 2: 68.48 $\pm$ 11.32y	Group 1: 24 sessions: 30-min of walking with strengthening and stretching exercises, with 1h of educational and encouragement and support session (medical aspect of OA and exercise, group discussion about barriers and benefits of walking, instruction in the proper walking techniques and the maintenance of a walking program, supportive encouragement). Intensity: at a self-selected pace for intensity.	Group 2: each week, telephone contacts to discuss the nature of their ADLs.	NA	Frequency: 3 times a wk for 8wk	NA

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APPENDIX 3 (CONT'D): SUMMARY OF THE INCLUDED STUDIES

Author	Population Details	Symptom Duration	Age	Treatment	Comparison Group	Concurrent Therapy	Session/Week	Follow-Up
Messier et al ¹⁰²	Inclusion: aged ≥ 60 y, pain on most days of the month in 1 or both knees (clinical diagnosis), radiographic evidence of knee OA in the tibio-femoral compartments of the painful knee, and had difficulty with activities, eg, walking 0.4km, climbing stairs, getting in and out of a car, rising from a chair, lifting and carrying groceries, getting out of bed, getting out of a bathtub, shopping, cleaning, or self-care. Exclusion: dementia, active cancer, anemia, several renal insufficiencies, hepatic disease, and inability to walk, unassisted, at least 128m in 6min.	NA	Group 1: 70.3 $\pm$ 1.3 y Group 2: 67.2 $\pm$ 0.9y Group 3: 69.2 $\pm$ 1.0y	Group 1: 40-min walking phase with 5-min warm-up (slow walk, arm circles, trunk rotations, shoulder and chest stretch, side stretch) and 5-min cool-down (slow walk, hamstring stretch, lower back stretch, chest stretch). Intensity: equal to 50%–85% of the subjects' heart rate reserve. Group 2: warm-up (arm circles, trunk rotations, shoulder and chest stretch, chest stretch), 9 upper and lower body exercises using dumbbells and cuff weights (leg extension, leg curl, step-up, heel raise, chest fly, upright row, military press, bicep curls, and pelvic tilt) and a cool-down phase (hamstring stretch, lower back stretch, chest stretch). Two sets of 10–12 reps were performed for each exercise.	Group 3: regularly scheduled contacts similar to those of the 2 interventions groups. Subjects were divided into groups of 12–15 to participate in monthly onsite health education sessions during months 1–3. Each session was 1h and presentation of material concerning arthritis followed by a socialization period. During the transition phase (4–6mo), biweekly telephone contact was made. The maintenance phase (7–18mo) consisted of monthly phone calls similar to those of the transition phase 3 times per wk for 18mo.	For Groups 1 and 2: 18-mo period. 3-mo facility-based program followed by a 15-mo home-based program: (1) 3-mo transitory phase of biweekly contacts (4 home visits and 6 telephone calls and (2) 12-mo maintenance phase of triweekly telephone contacts during the first 3mo and monthly contact during months 9–18.	Frequency: 3 times a wk for 3mo.	NA
Minor et al ²⁵	Inclusion: symptoms of chronic pain and stiffness in involved weight-bearing joints with OA, evidence of joint pain and crepitation with passive ROM, and roentgenographic signs of hypertrophic changes, subchondral sclerosis, or nonuniform joint space narrowing in involved joints (clinical diagnosis). Exclusion criteria: only upper extremity or spine symptoms or only roentgenographic signs of OA.	Duration of arthritis (y): OA patients: 14.6 $\pm$ 10.7y (1–40)	Age: OA patients: 63.8y $\pm$ 8.6y (36–83y) (mean $\pm$ SD [range])	Group 1: 10–30min of walking, with warm-up, general flexibility and isometric strengthening of postural muscles, aerobic stimulus period progressing to 30-min of continuous activity and a cool-down of 10-min of active. ROM and stretching exercises proposed with education and BI. Group 2: jogging in shallow and deep water and modified calisthenics performed in chest-high water.	Group 3: Gentle, active ROM and isometric strengthening and relaxation exercises with no aerobic stimulus period.	Groups 1 and 2: Exercise heart rate ranges of 60%–80% of maximum heart rate. Classes included a warm-up, general flexibility and isometric strengthening of postural muscles, an aerobic stimulus period progressing to 30min of continuous activity, and a cool down of 10min of active ROM and stretching.	Frequency: 3d per week for 12wk	9mo
Péloquin et al ²⁶	Inclusion: aged ≥ 50 y; diagnosis of minimal to moderate idiopathic OA of 1 or both knees; had no contraindications to exercise; not absent from city for more than 2wk; independent, noninstitutional lifestyle; no intra-articular steroid or viscoelastic device injections within the previous 2mo; stable regimen using analgesics or NSAIDs for at least 2wk before the beginning of the study; $<15^\circ$ fixed-flexion deformity; $<10^\circ$ of genu varum or valgum; and no joint blocking (clinical diagnosis). Exclusion: inability to walk, unassisted, at least 128m in 6min.	Group 1: 7.92 $\pm$ 7.9y Group 2: 6.38 $\pm$ 6.05y	Group 1: 65.64 $\pm$ 7.41y Group 2: 66.43 $\pm$ 6.39y	Group 1: <50 min of aerobic brisk walking, with 5-min warm-up, muscle strengthening, resistance program (isometric contractions) and 5- min cool-down. Intensity: not indicated.	Group 2: 1-h education sessions twice a wk.	NA		

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APPENDIX 3 (CONT'D): SUMMARY OF THE INCLUDED STUDIES

Author	Population Details	Symptom Duration	Age	Treatment	Comparison Group	Concurrent Therapy	Session/Week	Follow-Up
Penninx et al ¹⁰³	Inclusion: aged ≥ 60 y; radiographic evidence of knee OA; pain in the knee(s) on most days of the month; difficulty with at least 1 of the following activities: walking 0.4km; climbing stairs; getting in and out of a car, bath, or bed; rising from a chair; or performing shopping, cleaning, or self-care activities. Exclusion: medical condition that precluded safe participation in an exercise program, inflammatory arthritis, regular exercise participation (>1 time per wk for at least 20min), and inability to walk on a treadmill or walk, unassisted 128m in 6min.	NA	Group 1: 68.8 ± 5.2 y Group 2: 69.9 ± 5.8 y Group 3: 68.5 ± 5.4 y	Group 1: 10-min warm-up and cool-down phase and 40-min phase consisting of 2 sets of 12 reps of 9 exercises: leg extension, leg curl, step up, heel raise, chest fly, upright row, military press, bicep curls, and pelvic tilt. Upper body exercises were performed with dumbbells and lower body exercises with cuff weights. During the home-based phase (3–18mo), patients continue their exercises at home (1-h session, 3 times per wk). Intensity: beginning with a low resistance, weight was increased in a stepwise fashion as long as participants could complete 2 sets of 12 reps. Group 2: 0–3mo: facility-based walking program 3 times a wk for 1h, 10-min warm-up and cool-down phase, including slow walking and flexibility stretches; and a 40-min period of walking. During 3–18mo: home-based walking program. During 4–6mo, the exercise leader visited participants 4 times and called 6 times to offer assistance and support in the development of a walking exercise program in their home environment. For the remainder of the exercise program, telephone contacts were made every 3wk (7–9mo) or monthly (10–18mo). Intensity: equivalent to 50%–70% of the participants' heart rate reserve.	Group 3: the first 3mo: monthly group sessions on education related to arthritis management, including time for discussions and social gatherings. Later, participants were called bimonthly (mo 4–6) or monthly (mo 7–18) to maintain health updates and provide support.	NA	Frequency: 3 times a wk 3-mo supervised facility-based program, and 15-mo home-based program	NA
Talbot et al ¹⁰⁴	Inclusion: aged ≥ 60 y, symptomatic knee OA (pain in 1 or both knees on most days) (clinical diagnosis), difficulty performing at least 1 functional task and radiographic evidence of OA, community-dwelling adults. Exclusion: participation in an exercise study, exercise is contraindicated, and a score of <24 on the Mini-Mental State Examination.	NA	Group 1: 69.59 ± 6.74 y Group 2: 70.76 ± 4.71 y	Group 1: walking at home, with instruction in the use of a pedometer and written activity logs. Intensity: goal of increasing the step count by 30% of the baseline count.	Group 2: educational sessions.	12h of arthritis self-management education (the use of a pedometer to monitor daily steps; how to write activity logs to mark and monitor progress; booklet explaining principles of exercise and arthritis).	Frequency: group 1: daily for 12wk	3mo (home-based)

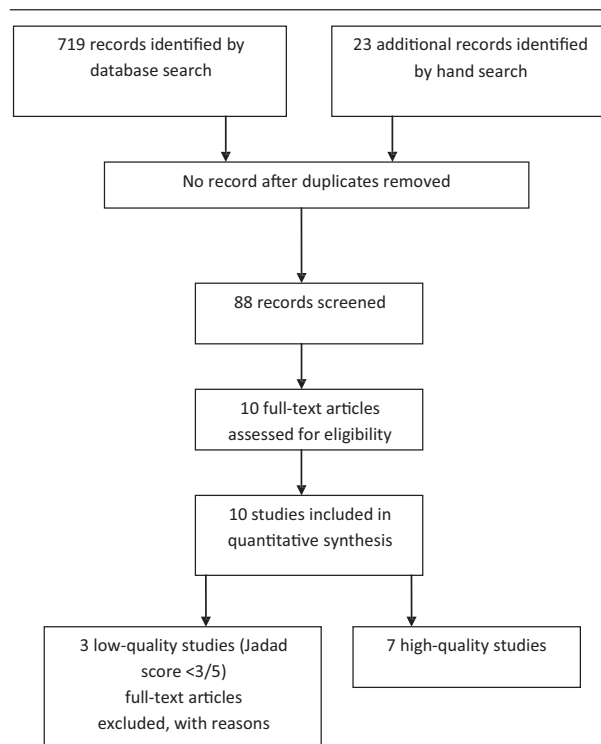
Abbreviations: ACR, American College of Rheumatology; ADLs, activities of daily living; NA, not applicable; NSAID, nonsteroidal anti-inflammatory drug; reps, repetitions; ROM, range of motion.

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APPENDIX 4: FLOW DIAGRAM



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110. Terwee CB, Bot SD, de Boer MR, et al. Quality criteria were proposed for measurement properties of health status questionnaires. *J Clin Epidemiol* 2007;60:34-42.
111. Aigner T, Dudhia J. Genomics of osteoarthritis. *Curr Opin Rheumatol* 2003;15:634-40.

SECTION IV : ANNEXE 2

Stratégie de recherche lors de la création des connaissances, soit les LDC intitulées:
Ottawa Panel evidence-based clinical practice guidelines for walking programs in the treatment of osteoarthritis
(Loew, 2012)

RESULT NUMBERS BY DATABASE

113 AMED

259 CINAHL

7 Cochrane Library of Systematic Reviews

1209 Embase

625 Medline

139 PsycINFO

TOTAL before duplicates removed: 2352

TOTAL after duplicates removed: 1438

Database: Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R)
<1946 to Present>

Search Strategy:

1 concordance.ti,ab. (22463)

2 (adhere* or adhering or nonadhere* or nonadhering or non adhere* or non adhering).ti,ab.
(104276)

3 (complan* or complying).ti,ab,de. (78707)

4 ((TREAT\$ or therapy or therapeutic) adj REFUS\$).ti,ab. (259)

5 cooperat*.ti,ab. (88268)

6 refusal*.ti,ab. (6641)

7 (incentiv* or disincentiv*).ti,ab. (15838)

SECTION IV : ANNEXE 2

- 8 motivat*.ti,ab. (62510)
- 9 barrier*.ti,ab. (136016)
- 10 belief*.ti,ab. (43828)
- 11 (PERCEIVE\$ or PERCEPTION\$).ti,ab. (199848)
- 12 ((CHANGE or CHANGES or CHANGING) adj2 (BEHAVIOUR or BEHAVIOR)).ti,ab. (11737)
- 13 ((MODIFY or MODIFIES or MODIFYING or MODIFICATION) adj2 (BEHAVIOUR or BEHAVIOR)).ti,ab. (3452)
- 14 (ANXIETY# or BOREDOM or FEAR# or FRUSTRATION).ti,ab. (11986)
- 15 (drop out or dropout).ti,ab. (6730)
- 16 SELF EFFICACY.ti,ab,de. (15474)
- 17 EMPOWER\$.ti,ab. (10323)
- 18 ATTITUDE\$.mp. (277711)
- 19 (ACHIEVEMENT or DRIVE# or GOALS or INTENTION).ti,ab. (208967)
- 20 PATIENT-PARTICIPATION.de. (16080)
- 21 PATIENT-ACCEPTANCE-OF-HEALTH-CARE.de. (27159)
- 22 ADAPTATION PSYCHOLOGICAL*.de. (68048)
- 23 or/1-22 (1182619)
- 24 walking.mp. (41825)
- 25 (walk\$ or stroll\$ or treadmill\$ or locomot\$ or stride\$ or pace\$ or pacing).tw. (174462)
- 26 exercis*.ti,ab. (176479)
- 27 (exercise adj2 therap*).de. (51)
- 28 exertion.mp. (57567)
- 29 movement.mp. (256956)
- 30 leisure activit*.mp. (6802)
- 31 physical fitness.mp. (21609)
- 32 (FUNCTIONAL adj (THERAPY or RESTORE or RESTORING or RESTORATION)).ti,ab. (1236)

SECTION IV : ANNEXE 2

- 33 (PHYSICAL\$ adj (ACTIVE or ACTIVITY or ACTIVITIES)).ti,ab. (48033)
- 34 aerobic*.ti,ab. (50525)
- 35 (physiotherapy or physiotherapeutic or physiotherapies).ti,ab. (10510)
- 36 (REHAB or REHABILITATION).ti,ab,de. (95911)
- 37 intervention*.ti,ab. (453871)
- 38 or/24-37 (1174991)
- 39 osteophytosis.ti,ab,de. (330)
- 40 osteoarthr*.ti,ab,de. (52820)
- 41 or/39-40 (52995)
- 42 23 and 38 and 41 (884)
- 43 limit 42 to ("in data review" or in process) (33)
- 44 limit 42 to (english or french) (817)
- 45 limit 44 to ("all infant (birth to 23 months)" or "all child (0 to 18 years)" or "newborn infant (birth to 1 month)" or "infant (1 to 23 months)" or "preschool child (2 to 5 years)" or "child (6 to 12 years)" or "adolescent (13 to 18 years)" or "young adult (19 to 24 years)" or "young adult and adult (19-24 and 19-44)") (195)
- 46 44 not 45 (622)
- 47 43 or 46 (625)

Database: Embase Classic+Embase <1947 to 2012 July 06>

Search Strategy:

-
- 1 concordance.ti,ab. (29862)
 - 2 (adhere* or adhering or nonadhere* or nonadhering or non adhere* or non adhering).ti,ab. (134546)

SECTION IV : ANNEXE 2

- 3 (complan* or complying).ti,ab,de. (108883)
- 4 ((TREAT\$ or therapy or therapeutic) adj REFUS\$).ti,ab. (326)
- 5 cooperat*.ti,ab. (112719)
- 6 refusal*.ti,ab. (9167)
- 7 (incentiv* or disincentiv*).ti,ab. (19190)
- 8 motivat*.ti,ab. (76507)
- 9 barrier*.ti,ab. (164994)
- 10 belief*.ti,ab. (54511)
- 11 (PERCEIVE\$ or PERCEPTION\$).ti,ab. (245357)
- 12 ((CHANGE or CHANGES or CHANGING) adj2 (BEHAVIOUR or BEHAVIOR)).ti,ab. (14583)
- 13 ((MODIFY or MODIFIES or MODIFYING or MODIFICATION) adj2 (BEHAVIOUR or BEHAVIOR)).ti,ab. (4546)
- 14 (ANXIETY# or BOREDOM or FEAR# or FRUSTRATION).ti,ab. (16072)
- 15 (drop out or dropout).ti,ab. (8971)
- 16 SELF EFFICACY.ti,ab,de. (11896)
- 17 EMPOWER\$.ti,ab. (12110)
- 18 ATTITUDE\$.mp. (342077)
- 19 (ACHIEVEMENT or DRIVE# or GOALS or INTENTION).ti,ab. (254638)
- 20 exp *patient attitude/ (52070)
- 21 *adaptive behavior/ (18281)
- 22 or/1-21 (1431204)
- 23 walking.ti,ab,de. (57602)
- 24 (walk\$ or stroll\$ or treadmill\$ or locomot\$ or stride\$ or pace\$ or pacing).ti,ab,de. (257379)
- 25 exercis*.ti,ab. (237783)
- 26 (exercise adj2 therap*).de. (7660)
- 27 exertion.ti,ab,de. (13632)

SECTION IV : ANNEXE 2

- 28 movement.ti,ab,de. (182071)
- 29 leisure activit*.ti,ab,de. (2476)
- 30 physical fitness.ti,ab,de. (6732)
- 31 (FUNCTIONAL adj (THERAPY or RESTORE or RESTORING or RESTORATION)).ti,ab. (1934)
- 32 (PHYSICAL\$ adj (ACTIVE or ACTIVITY or ACTIVITIES)).ti,ab. (61871)
- 33 aerobic*.ti,ab. (65163)
- 34 (physiotherapy or physiotherapeutic or physiotherapies).ti,ab. (19045)
- 35 (REHAB or REHABILITATION).ti,ab,de. (154105)
- 36 intervention*.ti,ab. (588134)
- 37 or/23-36 (1403553)
- 38 osteophytosis.ti,ab,de. (573)
- 39 osteoarthr*.ti,ab,de. (77749)
- 40 or/38-39 (78085)
- 41 22 and 37 and 40 (1349)
- 42 limit 41 to (english or french) (1239)
- 43 limit 42 to (embryo <first trimester> or infant <to one year> or child <unspecified age> or preschool child <1 to 6 years> or school child <7 to 12 years> or adolescent <13 to 17 years>) (30)
- 44 42 not 43 (1209)

Database: PsycINFO <1806 to July Week 1 2012>

Search Strategy:

-
- 1 concordance.ti,ab. (3921)

SECTION IV : ANNEXE 2

- 2 (adhere* or adhering or nonadhere* or nonadhering or non adhere* or non adhering).ti,ab. (18301)
- 3 (complan* or complying).ti,ab,de. (17412)
- 4 ((TREAT\$ or therapy or therapeutic) adj REFUS\$).ti,ab. (186)
- 5 cooperat*.ti,ab. (29097)
- 6 refusal*.ti,ab. (4258)
- 7 (incentiv* or disincentiv*).ti,ab. (11831)
- 8 motivat*.ti,ab. (95475)
- 9 barrier*.ti,ab. (31754)
- 10 belief*.ti,ab. (77376)
- 11 (PERCEIVE\$ or PERCEPTION\$).ti,ab. (274921)
- 12 ((CHANGE or CHANGES or CHANGING) adj2 (BEHAVIOUR or BEHAVIOR)).ti,ab. (12186)
- 13 ((MODIFY or MODIFIES or MODIFYING or MODIFICATION) adj2 (BEHAVIOUR or BEHAVIOR)).ti,ab. (5276)
- 14 (ANXIETY# or BOREDOM or FEAR# or FRUSTRATION).ti,ab. (19154)
- 15 (drop out or dropout).ti,ab. (5780)
- 16 SELF EFFICACY.ti,ab,de. (21216)
- 17 EMPOWER\$.ti,ab. (14198)
- 18 ATTITUDE\$.mp. (300081)
- 19 (ACHIEVEMENT or DRIVE# or GOALS or INTENTION).ti,ab. (159881)
- 20 or/1-18 (733457)
- 21 walking.mp. (8629)
- 22 (walk\$ or stroll\$ or treadmill\$ or locomot\$ or stride\$ or pace\$ or pacing).tw. (42833)
- 23 exercis*.ti,ab. (39446)
- 24 (exercise adj2 therap*).de. (63)
- 25 exertion.mp. (1706)

SECTION IV : ANNEXE 2

- 26 movement.mp. (68565)
- 27 leisure activit*.mp. (2467)
- 28 physical fitness.mp. (3517)
- 29 (FUNCTIONAL adj (THERAPY or RESTORE or RESTORING or RESTORATION)).ti,ab. (133)
- 30 (PHYSICAL\$ adj (ACTIVE or ACTIVITY or ACTIVITIES)).ti,ab. (14378)
- 31 aerobic*.ti,ab. (2315)
- 32 (physiotherapy or physiotherapeutic or physiotherapies).ti,ab. (1032)
- 33 (REHAB or REHABILITATION).ti,ab,de. (36105)
- 34 intervention*.ti,ab. (191475)
- 35 or/21-34 (366546)
- 36 osteophytosis.ti,ab,de. (0)
- 37 osteoarthr*.ti,ab,de. (962)
- 38 or/36-37 (962)
- 39 20 and 35 and 38 (141)
- 40 limit 39 to (english or french) (139)

Database: AMED (Allied and Complementary Medicine) <1985 to July 2012>

Search Strategy:

- 1 concordance.ti,ab. (196)
- 2 (adhere* or adhering or nonadhere* or nonadhering or non adhere* or non adhering).ti,ab. (1026)
- 3 (complan* or complying).ti,ab,de. (1397)
- 4 ((TREAT\$ or therapy or therapeutic) adj REFUS\$).ti,ab. (9)

SECTION IV : ANNEXE 2

- 5 cooperat*.ti,ab. (712)
- 6 refusal*.ti,ab. (123)
- 7 (incentiv* or disincentiv*).ti,ab. (247)
- 8 motivat*.ti,ab. (1579)
- 9 barrier*.ti,ab. (2161)
- 10 belief*.ti,ab. (2034)
- 11 (PERCEIVE\$ or PERCEPTION\$).ti,ab. (8963)
- 12 ((CHANGE or CHANGES or CHANGING) adj2 (BEHAVIOUR or BEHAVIOR)).ti,ab. (321)
- 13 ((MODIFY or MODIFIES or MODIFYING or MODIFICATION) adj2 (BEHAVIOUR or BEHAVIOR)).ti,ab. (94)
- 14 (ANXIETY# or BOREDOM or FEAR# or FRUSTRATION).ti,ab. (398)
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- 16 SELF EFFICACY.ti,ab,de. (792)
- 17 EMPOWER\$.ti,ab. (745)
- 18 ATTITUDE\$.mp. (10459)
- 19 (ACHIEVEMENT or DRIVE# or GOALS or INTENTION).ti,ab. (4349)
- 20 or/1-18 (26016)
- 21 walking.mp. (6170)
- 22 (walk\$ or stroll\$ or treadmill\$ or locomot\$ or stride\$ or pace\$ or pacing).tw. (9612)
- 23 exercis*.ti,ab. (13701)
- 24 [(exercise adj2 therap*).de.] (0)
- 25 exertion.mp. (973)
- 26 movement.mp. (9357)
- 27 leisure activit*.mp. (593)
- 28 physical fitness.mp. (1865)
- 29 (FUNCTIONAL adj (THERAPY or RESTORE or RESTORING or RESTORATION)).ti,ab. (134)

SECTION IV : ANNEXE 2

- 30 (PHYSICAL\$ adj (ACTIVE or ACTIVITY or ACTIVITIES)).ti,ab. (2819)
- 31 aerobic*.ti,ab. (1661)
- 32 (physiotherapy or physiotherapeutic or physiotherapies).ti,ab. (3930)
- 33 (REHAB or REHABILITATION).ti,ab,de. (20887)
- 34 intervention*.ti,ab. (18502)
- 35 or/21-34 (62788)
- 36 osteophytosis.ti,ab,de. (9)
- 37 osteoarthr*.ti,ab,de. (2089)
- 38 or/36-37 (2094)
- 39 20 and 35 and 38 (117)
- 40 limit 39 to (english or french) (113)

Database: EBM Reviews - Cochrane Database of Systematic Reviews <2005 to June 2012>

Search Strategy:

-
- 1 concordance.ti,ab. (5)
 - 2 (adhere* or adhering or nonadhere* or nonadhering or non adhere* or non adhering).ti,ab. (121)
 - 3 (complan* or complying).ti,ab,de. (117)
 - 4 ((TREAT\$ or therapy or therapeutic) adj REFUS\$).ti,ab. (1)
 - 5 cooperat*.ti,ab. (5)
 - 6 refusal*.ti,ab. (2)
 - 7 (incentiv* or disincentiv*).ti,ab. (30)
 - 8 motivat*.ti,ab. (39)

SECTION IV : ANNEXE 2

- 9 barrier*.ti,ab. (45)
- 10 belief*.ti,ab. (26)
- 11 (PERCEIVE\$ or PERCEPTION\$).ti,ab. (111)
- 12 ((CHANGE or CHANGES or CHANGING) adj2 (BEHAVIOUR or BEHAVIOR)).ti,ab. (44)
- 13 ((MODIFY or MODIFIES or MODIFYING or MODIFICATION) adj2 (BEHAVIOUR or BEHAVIOR)).ti,ab. (4)
- 14 (ANXIETY# or BOREDOM or FEAR# or FRUSTRATION).ti,ab. (3)
- 15 (drop out or dropout).ti,ab. (125)
- 16 SELF EFFICACY.ti,ab,de. (18)
- 17 EMPOWER\$.ti,ab. (7)
- 18 ATTITUDE\$.mp. (489)
- 19 (ACHIEVEMENT or DRIVE# or GOALS or INTENTION).ti,ab. (487)
- 20 or/1-18 (983)
- 21 walking.mp. (488)
- 22 (walk\$ or stroll\$ or treadmill\$ or locomot\$ or stride\$ or pace\$ or pacing).tw. (1063)
- 23 exercis*.ti,ab. (275)
- 24 [(exercise adj2 therap*).de.] (0)
- 25 exertion.mp. (142)
- 26 movement.mp. (963)
- 27 leisure activit*.mp. (55)
- 28 physical fitness.mp. (95)
- 29 (FUNCTIONAL adj (THERAPY or RESTORE or RESTORING or RESTORATION)).ti,ab. (2)
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- 31 aerobic*.ti,ab. (29)
- 32 (physiotherapy or physiotherapeutic or physiotherapies).ti,ab. (89)
- 33 (REHAB or REHABILITATION).ti,ab,de. (166)

SECTION IV : ANNEXE 2

- 34 intervention*.ti,ab. (2748)
- 35 or/21-34 (3820)
- 36 osteophytosis.ti,ab,de. (0)
- 37 osteoarthr*.ti,ab,de. (73)
- 38 or/36-37 (73)
- 39 20 and 35 and 38 (7)*****



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The Implementation of an Effective Aerobic Walking Program Based on Ottawa Panel Guidelines for Older Individuals with Mild to Moderate Osteoarthritis: A Participant Exercise Preference Pilot Randomized Clinical Trial Protocol Design

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Ottawa, Ottawa, Ontario, Canada.*

Authors' contributions

Author Laurianne Loew is a Ph.D. candidate at the School of Rehabilitation Sciences, Faculty of Health Sciences, University of Ottawa. Under the supervision of LB and GAW, LL will: 1) recruit participants, 2) coordinate the selection, and invitation of participants, 3) develop the evaluation questionnaires and obtain ethics documents, 4) coordinate the data entry and analysis of the collected data, and 5) produce the final versions of scientific report and publications for her doctoral thesis. The director, author Lucie Brosseau, is a Full Professor, an epidemiologist and holds a University Research Chair in Evidence-Based Practice in rehabilitation. She has expertise in the management of rheumatic conditions using exercise and other physical rehabilitation interventions. She also has expertise developing and disseminating clinical practice guidelines, carrying out meta-analyses, and was the principal investigator (PI) in several RCTs in rheumatology. She is co-supervising LL for her Ph.D. degree. The co-director, author George A. Wells, is senior biostatistician and co-director, Cardiovascular Research Methods Centre at the University of Ottawa Heart Institute, and is a leading expert in the design and analysis of RCTs. He will provide assistance with the methodology and statistical analysis of the pilot RCT. He is co-supervising LL for her Ph.D. degree. The two Ph.D. thesis committee members: Authors Glen Kenny (Exercise Physiologist & RCT Investigator) and Natalie Durand-Bush (Exercise Behaviourist) from the School of Human Kinetics as well as the external proposal reviewer; author Stéphane Poitras (Physiotherapy, Health Promotion & OA Specialist) are acknowledged to be co-investigators of this pilot RCT. The Data Safety Monitoring Board (DSMB) will be constituted of a chair and two members. The chair will have expertise in

kinesiology and the members in rheumatology and biostatistics. A charter governing the process and the frequency of the DSMB meeting, as well as content of the reports, will be determined as part of the study start-up in conjunction with the DSMB and principal investigators.

Study Protocols

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ABSTRACT

Aims: Osteoarthritis is the most common disabling disorder affecting particularly knees. A recent systematic review demonstrated the efficacy of walking programs for improving pain, functional status, endurance, and quality of life, in the management of knee osteoarthritis. Even though evidence suggests that walking provides numerous clinical benefits, older people diagnosed with osteoarthritis avoid physical activity. General objective is to evaluate the effect of participants' exercise preference. We expect to encourage osteoarthritis participants to adhere successfully to a proven effective walking program.

Study Design: This is a 9-month supervised walking program with a 3-month follow-up period using a preference trial design which consists of three single blind randomized clinical trials, based on a participant exercise preference model, to elicit preferences independently of randomization.

Place and Duration: Indoor Walking Club in the City of Ottawa, Billings Bridge Shopping Centre, next door to The Arthritis Society Ottawa office.

Methodology: A total of 69 participants with a confirmed diagnosis of osteoarthritis of the knee will be recruited from the general public from the Ottawa area. We are implementing a knowledge translation strategy, in order to improve adherence and consequently ensure the maintenance of pain relief, functional status and quality of life, among older individuals diagnosed with mild to moderate osteoarthritis. This article summarizes the study protocol of the walking study, by explaining the methods and interventions selected and discussing on the need for this trial.

Conclusion: This proposed pilot randomized controlled trial will address a new knowledge gap by concentrating on questions of clinical and scientific importance to improve the understanding related to the efficacy of strategies to promote the adoption and long-term adherence of community-based walking programs.

Keywords: Osteoarthritis; knee; walking; evidence-based practice; preference; knowledge translation; behavioural intervention; randomized clinical trial.

ABBREVIATIONS

ACR: American College of Rheumatology, ACSM: American College of Sports Medicine, ANCOVA: Analysis of COV Ariance, ANOVA: Analysis Of Variance, BI: Behavioural Intervention, CONSORT: Consolidated Standards Of Reporting Trials, CSER: Canadian Society for Exercise Physiology, DSMB: Data Safety Monitoring Board, EBCPG: Evidence-Based Clinical Practice Guideline, EF: Effect Size, EQ: Euro QoL,

HSD: Honestly Significant Difference, ITT: Intention-To-Treat,
 KT: Knowledge Translation, KTAC: Knowledge-To-Action Cycle,
 MCID: Minimal Clinically Important Difference, MI: Multiple Imputation,
 MMRM: Mixed Model Repeated Measures, OA: Osteoarthritis, PA: Physical Activity,
 PAR: Physical Activity Recall, PGrip : People getting a Grip on arthritis, QoL: Quality of Life,
 RCT: Randomized Controlled Trial, S: Supervised, SD: Standard Deviation,
 SPIRIT: Standard Protocol Items: Recommendations for Interventional Trials,
 TAS: The Arthritis Society, TUG: Time-Up-and-Go, U: Unsupervised,
 WBI: Walking program combined with a Behavioural Intervention component,
 WOMAC: Western Ontario and McMaster Universities Arthritis Index.

1. INTRODUCTION

1.1 Problem

Osteoarthritis (OA) is the most common disabling disorder affecting joints, such as knees and hips. The prevalence of this degenerative disease significantly increases after the age of 40 and is seen principally among older individuals, in relation to the impact of a global ageing population [1]. OA is recognized as the primary cause of long-term disability, worldwide. Indeed, the impairments, disabilities and handicaps associated with knee OA can lead to devastating personal consequences as well as negative effects on the health care system and society at large [2,3]. The Bulletin of the World Health Organization confirmed that approximately 9.6% men and 18.0% women, aged over 60 years old, are diagnosed with OA, in the world [3]. A recent comprehensive systematic review by The Ottawa Panel on Evidence-Based Clinical Practice Guidelines (EBCPGs) Walking Programs in the Management of Osteoarthritis [4] found strong scientific short-term evidence (Grade A recommendations) for improving pain, functional status, endurance, and quality of life on the efficacy of walking programs, either supervised or unsupervised, in the management of mild to moderate OA of the knee. Although evidence suggests that walking provides numerous clinical benefits [4], unfortunately individuals diagnosed with OA gradually become sedentary [5,6] and tend to avoid physical activity (PA) [7]. As a result, the majority of individuals with OA are approximately three times more likely to have difficulties walking more than 0.4 km because of pain [8] and have five or more functional disabilities, such as climbing stairs and performing activities of daily living, compared to healthy individuals [9]. Inactivity leads to decreased endurance and mobility, thus reducing quality of life [10-12].

Although aerobic PA programs, such as walking, can improve short-term effects on clinical, physiological and quality of life outcomes for OA [4,13], enrolment in these types of programs do not guarantee adherence and long-term maintenance. An ongoing concern in research is the high attrition rate (i.e. drop-out rate) ranging from 20% to 39% among OA participants recruited in short-term studies involving PA [4,14,15,44,45]. Of further concern, remaining participants in the short-term intervention trials demonstrated poor adherence (27% to 64%) [14,16,17]. A recently completed randomized controlled trials (RCT) concurs with previous walking studies, demonstrating poor adherence rates of 44.5% for the supervised walking program combined with a behavioural intervention (BI) component and 49.0% for the self-directed walking program (control group) without considering participant preferences, at the 12-month follow-up [18,19]. The term "adherence" means the action of a participant attending all scheduled sessions for a specific treatment in a particular trial [20,21]. Long term RCTs (study period of more than 6 months) involving aerobic PA programs for OA have typically included BI components (e.g. goal settings, participant

education, telephone contacts, face-to-face visits, social/peer support or positive feedback) [6,11,17,22,23]. These studies exhibited lower drop-out rates at follow-up compared to short-term studies which did not use BI (10% to 15% between 2 to 4 months and 10% to 49% between 10 and 18 months). Higher adherence rates were also demonstrated between 2 to 4 months (85% to 90%) and between 10 and 18 months (50% to 90%). Unfortunately, BIs are still rarely included in walking programs [4]. Since long-term RCTs have typically combined BIs, and demonstrated higher adherence rates [22,2], there is a need to further explore long-term community-based aerobic walking programs as recommended by international expert committees for OA [24]. Therefore, the critical challenge is to develop programs that will encourage participants to not only initiate, but also to adhere to a long-term walking program in order to maximize the benefits of walking.

1.2 Objectives

In this proposal, we will emphasize on the importance of focusing on Evidence-Based Clinical Practice and Knowledge Translation (KT) implementation. The literature shows that considering participants' exercise preference [21] improves clinical outcomes. In fact, Cahill et al. [25] confirmed that the inclusion of participant exercise preference increases participants' satisfaction with care and consequently may enhance adherence to treatment, since it has shown to prevent discouragement and desire to drop-out of the study [26,27]. The term 'participant exercise preference' reveals the individual's personal expression of a value following informed reflection on pros (benefits) and cons (risks) of the interventions proposed, based on his/her values, beliefs and needs [28]. Therefore, preference is a promising element to enhance walking adherence, that has not yet been applied to a long-term RCT consisting of aerobic walking programs [21], not been studied among older adults with OA and has not been investigated with adherence as the primary outcome. It is likely that participants' exercise preference will offer a promising avenue if used as a KT strategy to implement successfully a proven walking program, in terms of improving adherence over the long-term [18,19].

The main objective of this pilot RCT is to evaluate the effect of participants' exercise preference. We will examine the hypothesis that participants who follow their preferred aerobic walking program: 1) supervised (S) or 2) unsupervised (U), combined with a BI component, will be more encouraged and satisfied, thus enhancing their walking adherence through the 9-month study period, compared to individuals who do not obtain their preferred choice of aerobic walking program, among people diagnosed with knee OA. Moreover, when there is no preference for a specific aerobic walking program (supervised vs. unsupervised), it is hypothesized that the supervised aerobic walking program (S) with a BI component will demonstrate an improvement in walking adherence compared to the unsupervised aerobic walking program (U) with an identical BI component through the 9-month study period, among people diagnosed with knee OA. We will secondly evaluate if favorable effects on pain, functional status, quality of life, physiological and economic outcomes [29] will be demonstrated among participants who present a preference, either supervised or unsupervised and who obtain their preferred choice of program compared to participants who did not obtain their preferred choice of program through the 9-month study period. We will be conducting a pilot RCT which is powered enough to measure an effect of the primary outcome (walking adherence) but could serve as a feasibility study, by 1) demonstrating if the recruitment process and rate, design, interventions and selected outcome measures are feasible and by 2) determining the variance of our primary outcome measure (walking adherence). If it is not demonstrated feasible, we will use these data to plan a larger and more rigorous RCT.

2. MATERIALS AND METHOD

2.1 Study Design

This is a 6-month supervised walking program with a 3-month follow-up period using a preference trial design which consists of two single blind RCTs, based on a participant exercise preference model [25], to elicit preferences independently of randomization (Fig. 1). Before randomization, each participant will be informed of their choice of walking supervision (supervised or unsupervised) using the same effective walking program in terms of frequency, duration, and walking intensity (Table 1). All outcomes are reliable and validated and are based on The Ottawa Panel guidelines (2012) [4]. Eligible and consenting participants, recruited from the city of Ottawa, will be stratified on whether they do or do not have a preference for supervision of the walking program (preference for supervised or unsupervised, or no preference). Within each of these three groups, based on their stated exercise preference, participants will then be randomized to one of the two modes of supervision for the effective walking program: (a) a supervised walking program supplemented with a multifaceted BI (at a walking club, supervised by an exercise therapist) (S), or (b) a self-directed unsupervised walking program combined with an identical BI (no supervision) (U) (Fig. 1 for more details).

The term 'adherence' refers to the extent to which a person follows an intervention recommended by his health professional. Therefore, a participant will be described as non-adherent if not attending and completing the treatment sessions prescribed [31,15]. It is important to mention that health behaviour is defined as any activity undertaken by a person to preserve good health [21]. Given that health behaviours are beneficial only if they are maintained over the long-term, the most important challenge is to develop strategies that will encourage people to adhere permanently to a pattern of behaviour to maximize the benefits of the intervention. This strong protocol is based on the SPIRIT statements.

2.2 Sample Size Calculation

The goal of this trial is to compare the primary outcome 'adherence with the intervention' for: a) the group of participants with a preference for a supervised walking program (S) who obtain their preferred choice of program compared to the group of participants with the same preference who did not obtain their preferred choice of program; b) the group of participants with a preference for an unsupervised walking program (U) who obtain their preferred choice of program compared to the group of participants with the same preference who did not obtain their preferred choice of program. It is expected that adherence will be high among participants with a preference and who will obtain their choice of exercise program, and low among participants with a preference that will not obtain their exercise program of choice. It is expected that adherence levels among participants with no preference will be better in the supervised group compared to the unsupervised group. Nevertheless, all tests will be two-sided. Based on previous experience with arthritis patients, our preliminary results concur with existing literature that 2/3rds of the study participants sample have a preference [21]. A total of 46 participants with a preference for the supervised (S) or unsupervised (U) program will be recruited. Twenty-three participants with a preference for supervised program (S) will be recruited, and after randomization, half of the group will obtain their preferred exercise program of choice (S) while the other half of participants will not obtain their preferred exercise program of choice (U). Similarly 23 participants with a preference for unsupervised program (U) will be recruited, and after randomization, half of the group will obtain their

preferred exercise program of choice (U) while the rest will not obtain their preferred exercise program of choice (S). Within the no preference group (n=23), after randomization, half of the group will be randomly allocated in the supervised program (S) while the other half of participants will be allocated to the unsupervised program (U) (Fig. 1). The two primary comparison groups are: a) preference for S group obtaining their choice (S) vs. preference for S group not obtaining their choice (U); b) preference for U group obtaining their choice (U) vs. preference for U group not obtaining their choice (S). For each of these primary comparisons, we will be able to detect a moderate effect size of 0.5 for adherence with a significance level of 0.05 ($0.05/2=0.025$; the alpha was adjusted to accommodate the two primary objectives) and power of 80% based on a two sided Student's t-test. A moderate effect size of 0.5 is necessary in order to justify a greater clinical impact of this EBCPG implementation, depending on its relative costs and benefits, since the supervised program will be more expensive to conduct than the unsupervised approach [46]. In particular, for a standard deviation of 0.433 [18,19] for the adherence to intervention outcome, a moderate effect size corresponds to a difference in adherence of 0.22 (i.e 22%) (Effect size (EF) = Minimal clinically important difference (MCID) / Standard deviation (SD)). Brosseau et al. [18,19] performed a similar study and confirmed that the adherence (based on attendance marked in logbooks) of a supervised aerobic walking program with behavioural interventions decreased from 80% at the initial evaluation (0-3 months) to 45% at the end of the study (9-12 months). According to Rejeski et al. [32], a difference of 22% in adherence is considered an important difference when an exercise logbook was used for self-reporting the percentage of total exercise sessions performed in aerobic exercise program for osteoarthritis of the knee [33,32]. Therefore, the evidence supports the plausibility of seeing a difference in adherence of 22%.

2.3 Study Sample

Sixty-nine older adults with knee OA who are not already engaged in regular PA will be recruited (Fig. 1). Potential participants will be assessed through an admission questionnaire and a face-to-face interview by the Research Coordinator to ensure that they meet the study's selection criteria [2,22,34]. The inclusion criteria include: 1) Diagnosed with OA of the knee, based on the clinical symptoms of OA following the American College of Rheumatology (ACR) criteria for knee, including radiographic evidence according to the Kellgren-Lawrence grading scale during a radiological assessment of OA (1 - 3) [35,36], 2) Aged between 55 and 80 years old [1], 3) Able to walk for a minimum of 20 minutes at their own pace and 4) Available three times a week over a period of 9 months for 45 minutes (Supervised group: during the operating hours of the Walking Club; i.e. 7:30 to 10:00 am) [37], 5) No evidence of other illness judged by the physician to make participation in this study inadvisable, 6) No evidence of mental health condition.

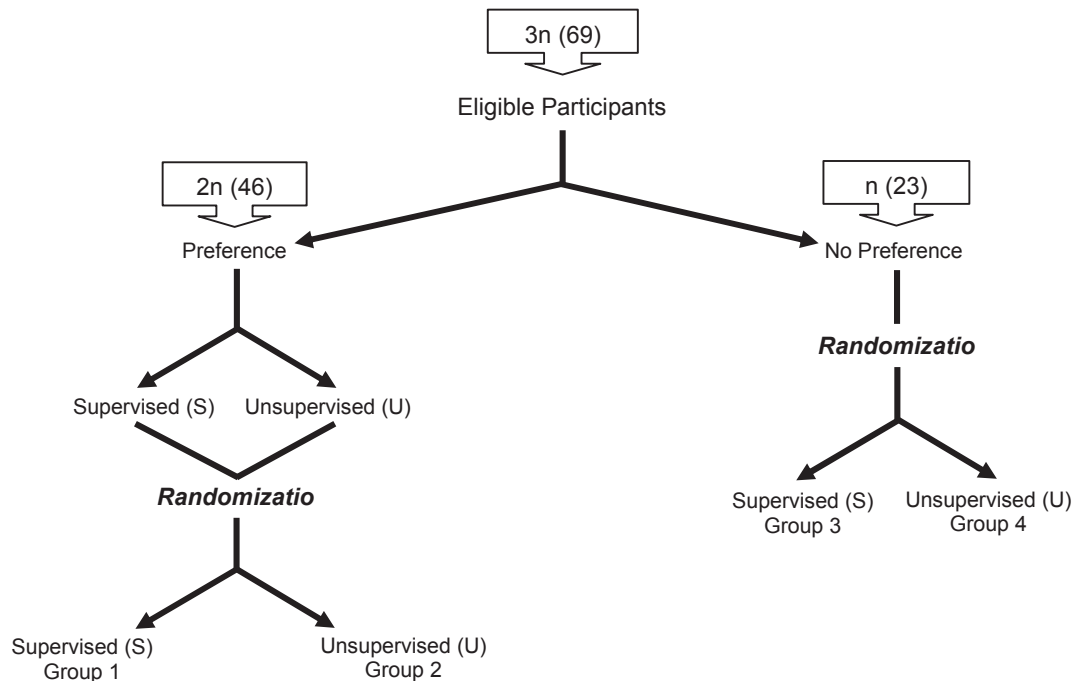


Fig. 1. The adapted randomized participant-preference design

Used with permission from *Patient's Preference and Randomization: New Paradigm of Evidence-based Clinical Research*. Millat B, et al. *World Journal of Surgery*, 29. Copyright © 2005 [30]. Sample size calculation performed according to current literature (2/3rds of study participants sample have a preference [27]).

2.4 Interventions

2.4.1 Supervised aerobic walking program (S)

All the participants in the supervised aerobic walking program based on the Ottawa Panel guidelines (2012) [4] and PGrip (People getting a Grip on arthritis) program will walk three days per week, for 6 months in an indoor Walking Club in the City of Ottawa, next door to The Arthritis Society Ottawa office (in addition to the 3-month follow-up period where they are free to walk according to their preference). Each participant will receive a pedometer, to monitor the number of steps per walking session [2]. Since the group is supervised, an exercise therapist with certification from either the Canadian Society for Exercise Physiology (CSEP) (Certified Exercise Physiologist), or American College of Sports Medicine (ACSM) (Clinical Exercise Specialist) will supervise all walking sessions. Therefore, the exercise therapist will perform the following tasks: 1) provide pedometers and heart rate monitors, 2) record attendance, number of steps, and vital signs, and will 3) give instructions on how to complete individual daily logbooks. He/she will provide a detailed orientation of the walking club and the walking program for each participant. Each walking session will start with a 5-minute warm-up period, including stretching exercises of the upper and lower extremities. Participants will subsequently be required to walk for 45 minutes in the shopping mall. At the end of the walking session, participants will perform a 5-minute cool-down period [39]. Regarding the intensity of the walking period, the participants will stay between 60-80% of

their maximum heart rate (220-age), using a heart rate monitor offered during the walking sessions (Table 1).

2.4.2 Unsupervised aerobic walking program (U)

Participants from the unsupervised walking program will be involved in the same training progression related to the effective walking program [4] (Table 1), but will be invited to walk by themselves, without supervision, i.e. at anytime and anywhere except at the Billings Bridge Shopping Centre, for 6 months (in addition to the 3-month follow-up period where they are free to walk according to their preference). The research coordinator will offer one introductory session to describe how the pedometers work so that they can carry out a self-directed walking program. She or he will also explain how to record the number of walking sessions and the daily step count (pedometer) in their log books. An independent evaluator will review the log books at the measurement sessions. To avoid potential contamination, individuals in group U will have no contact with the individuals in group S, who are registered at The Pace Setters Walking Club, next door to The Arthritis Society Ottawa office.

		INDIVIDUAL AEROBIC WALKING TRAINING		
Week No.	Phase	Duration (min/day)	Intensity (% HRmax)	Frequency (days/wk)
1-4	Progression	25	60	3
5-8	Progression	30	65	3
9-12	Progression	35	70	3
13-16	Progression	40	75	3
17-20	Progression	45	80	3
21-26	Maintenance	45	80	3
27-38				

Progression Phase

Follow-Up Phase

Table 1. Individual aerobic walking training progression

Participants' aerobic walking training, related to the progression of their walking duration, intensity and frequency, throughout the study period, based on the Ottawa Panel et al., 2012 [4]

2.4.3 Behavioural intervention (BI)

The exercise therapist will be trained before implementing the existing evidence-based structured education program developed by The Arthritis Society (TAS) educational program: "Stay Active/Manage your OA pain". Combined with a multifaceted BI, the education program will ensure participants' adherence, through the 6-month progression phase of the study period (Table 1). Based on a variety of sources of evidence including the Ottawa Panel CPGs [4], the BI will consist of the following components: (1) short- and long-term goal setting, according to other physical activities or functional concerns, at the walking

club each 3 months (at baseline, 3, 6 and 9 months); (2) moral support to continue walking every 3 months; (3) number of steps measured 3x/week with a pedometer; (4) daily walking logbooks to record the duration (min/day), frequency (days/week) and intensity of their walking sessions using the calendar included in the PA [2,18,19]. Barriers will also be identified and documented, as well as strategies to overcome them, in order to ensure long-term maintenance of walking.

2.4.4 Strategies to improve adherence

The term 'adherence' will be used throughout this protocol, even though other studies only used the term 'compliance'. The reason is that compliance seems to reflect negative connotations, by indicating a more passive role of the participant following only the medical instructions. Since adherence means the action of a participant attending and participating in all scheduled treatment sessions, in a particular trial [25], generally a participant will have less than 100% adherence to interventions and study procedures. From an adherence viewpoint, the more control over the administration of the intervention the better. There are various reasons for non-adherence, such as the participant experiencing side effects and is unwilling to change his/her behaviour, the instructions are not understood, there is a lack of family support, or even if the individual changes his/her mind to participate [25].

Based on previous work, different steps will be taken prior to enrolment to improve adherence among all participants. Therefore, since we are performing a 6-month supervised walking program (+ 3-month follow-up period), we will encourage participants to follow the structured walking program considering exercise preference. In addition, other relevant actions such as: (1) selecting participants likely to follow the protocol, according to the inclusion criteria, and (2) optimizing participant's experience, by involving them more in the decision-making process and respecting their exercise preference can improve adherence. If participants in the unsupervised group state a preference to be supervised at the beginning of the study, they will be offered a free membership to the affiliated indoor Walking Club, at the end of the follow-up. To ensure participant retention and complete follow-up, we will track the data in the logbooks from participants who choose to withdraw from the study and identify personal factors influencing their low adherence and/or intention to drop-out. They will still receive reasonable compensation, relevant to their levels of participation.

Finally, we will consider participant adherence to other aspects of the study such as their attendance to measurement sessions. To perform this task, the exercise therapist will take attendance following the appropriate list of participants, each walking session.

2.5 Measurements

Measurement sessions will be scheduled every three months over the course of the 9-month study (i.e. at baseline, 3, 6, and 9 months). The blinded independent evaluator will assess the four main outcomes (adherence, quality of life, pain and functional status), and other relevant information. The evaluator will meet with each participant individually and will assist them with the questionnaire. The outcome assessment will be completed at the Walking club in a closed and private room after opening hours. The primary outcome will be participants' adherence to their respective walking program (S vs. U). Secondary outcomes measures will include: pain, stiffness, functional status, gait speed, number of steps completed during the walking sessions, self-efficacy, PA behaviour, walking endurance, change in blood pressure and heart rate, level of physical fitness, long term goal attainment, and stair climbing difficulty.

A follow-up period of 3 months will directly follow the 6-month intervention period. Given our target sample size and the study period, data collection is estimated to take 39 months (36 months to measure the short-term effects and three months to measure the long-term effects) and data analysis is estimated to take 3 months.

2.5.1 Screening measurement

At the first visit, the eligible participant will provide his/her written informed consent [38]. Study participants will be assessed and classified according to the American College of Rheumatology functional classification [15]. A complete medical history and examination will also be performed. A questionnaire will be completed concerning factors that could influence adherence to the walking programs, such as occupation, previous PA, proximity to the walking club, use of medications and non-pharmaceutical interventions, etc.

The participant will then be asked by the research coordinator to express his/her walking supervision preference and all the reasons behind his/her choice: 1) preference for supervised (S) or unsupervised (U) walking program or 2) no preference. The participants' exercise preference level will be estimated using a visual analogue scale, where 50-100% will represent a strong preference for one type of walking supervision (participating in a supervised or unsupervised walking program), 1-49% weak preference, and where 0% will represent a no preference for one mode of walking supervision (supervised or unsupervised) (Fig. 2).

According to this measurement, study participants will be randomly allocated to one of the two walking programs (S and U). Therefore, the participants' stated exercise preference will be independent of randomization [39] (Fig. 1).

2.5.2 Primary measurement

Adherence will be measured to determine the effect of the type of supervision (supervised vs. unsupervised) on the sustainability of the walking program. Program adherence to treatment will be monitored and calculated as a proportion of the number of walking sessions attended and completed divided by the number of walking sessions prescribed (3 times a week as recommended in the Ottawa Panel guidelines, 2012) [4] and recorded in the participants' logbooks [6,18,19,21,23,32]. The calendar proposed by the 7-Day Physical Activity Recall (PAR) [40] incorporated in the logbooks will be used as a self-report questionnaire, to calculate the number of walking sessions each participant will complete every week. For the supervised group (S), we will take the attendance at the walking club to confirm what is written in the walkers' logbooks. The logbook will also be used as a tool to measure other valid measurements of the physical activity level, using METS, pedometric and walking endurance measurements. It is important to note that this method of assessment was used in various RCTs that studied the impact of walking programs in the management of OA among older individuals [18,19,23].

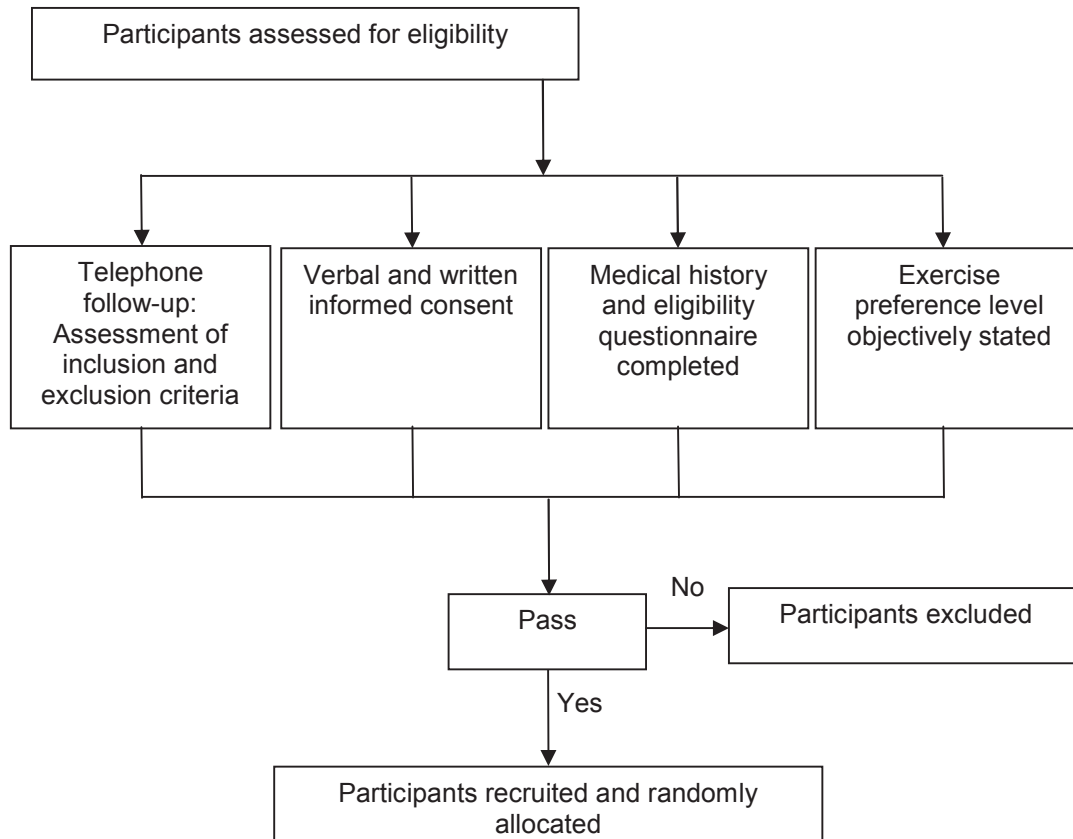


Fig. 2. Eligibility and screening
Different steps for screening eligible participants.

2.5.3 Secondary measurements

a) Behavioural outcomes: Self-efficacy will be measured with the Chronic Disease Self-Efficacy Scale (www.patienteducation.stanford.edu/) which is a multidimensional scale including 1) Self-Efficacy to Perform Self-Management Behaviours, 2) General Self-Efficacy, and 3) Self-Efficacy to Achieve Outcomes. In addition, PA behaviour will be measured with an adapted PACE instrument (www.paceproject.org/Measures.html). The PACE instrument measures PA behaviours: 1) PA stages, 2) PA Change Strategies, 3) PA pros and cons, 4) PA confidence, 5) PA family support, 6) PA friend support, 7) PA closest friend support, PA enjoyment, 8) PA recreation choices, 9) PA environment factors [41]. Walking endurance (6-min walk-test) as well as change in blood pressure and heart rate [24] will also be measured. The level of physical fitness will be evaluated through the 7-Day (PAR), a generic instrument [40] principally created to measure the level of physical activity. Finally, an Adherence questionnaire will first be developed, based on current literature, and then completed by the participants in order to identify combined positive, negative and no influence factors, on a scale between -1 to +1, that can generally determine participants' walking adherence. Exercise preference may change during the 9-month period of the study for many reasons (e.g. weather, holidays, work, family commitment) therefore we will evaluate if the preference has changed over time, and use the data in the subsequent analysis. Long Term Goal

Attainment Scaling, a validated tool, will measure participants' long term goal attainment levels. This tool includes five goal attainment levels: 1) -2 (much worse than expected), 2) -1 (somewhat less than expected), 3) 0 (expected level), 4)+1 (somewhat better than expected) and 5)+2 (much better than expected) [21,42].

b) Clinical outcomes: Quality of life will be assessed using the 'EuroQoL Index (EQ-5D-5L)'. This generic instrument is the most commonly used and extensively validated measure of health-related quality of life. Five domains are included in this measure: 1) mobility, 2) self-care, 3) usual activities, 4) pain/discomfort, 5) anxiety/depression. Each dimension has 5 levels: no problems, slight problems, moderate problems, severe problems, and extreme problems. It is important to mention that the EQ-5D-5L was used to measure quality of life in various RCTs that studied the impact of walking programs in the management of OA, in older people [43]. Three secondary outcomes, pain, stiffness and functional status, will be examined using the 'Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC)' questionnaire. This five-point questionnaire contains 3 dimensions: pain (5 questions), stiffness (2) and function (17). The WOMAC instrument has been used to report pain and functional status [44] in several previous RCTs involving walking programs designed for individuals with OA.

Other quantitative continuous functional outcomes will be measured such as: Gait speed (time to walk 6 meters) [23,47], Timed-up-and-Go (TUG) test [48] and the Number of steps completed during the walking sessions measured with a pedometer. A Stair Climbing questionnaire will finally be completed during the evaluation sessions to assess the level of difficulty to go up and down the stairs [19]. All these measures were extensively used in RCTs and are validated.

2.6 Trial Conduct

2.6.1 Recruitment process

All aspects of participant recruitment explained below will be discussed among all research staff. Strategic plan will consist of posting recruitment posters at the Ottawa office of TAS located at The Billings Bridge Shopping Centre in order to seek contact referral groups at the early stage of the study, with the help of health professionals (physiotherapists, occupational therapist, etc.) dealing everyday with arthritic people. We will also contact the Division of Rheumatology based in the Riverside Campus of the Ottawa Hospital to recruit patients from rheumatology clinics. A letter describing the rationale of our study will be sent to each physician, followed-up with a visit at their office, in order to refer participants. As a complementary source of recruitment, we will use media advertising such local newspapers to recruit participants and disseminate information about the trial, given the success of recruitment through the use of media advertising in previous RCT (85%) [18,19,47,49]. Consequently, a recruitment of 69 participants during 3 consecutive months is realistic for the proposed pilot RCT. Based on previous similar RCTs, the study of Brosseau et al. (2012a, b) [18,19] demonstrated a successful recruitment of 80 participants with mild to moderate OA of the knee in 4 months.

2.6.2 Screening and Allocation

Participants who are interested in participating in the study will contact the principal investigator directly. Telephone follow-up will be provided by the study coordinator to assess inclusion/exclusion criteria. Fig. 2 presents more information on the eligibility and screening

process of this walking study. If deemed eligible, the research coordinator will contact the Methods Center. Prior to running the randomization software, the Methods Center employee will document each participant's study ID. After running the randomization software, the Methods Center employee will document the treatment assignment. To perform a stratified block randomization, the research coordinator will obtain two series of opaque envelopes from the Methods Center according to the randomly generated sequence for each of the two blinded comparisons (preference for supervised (S) or unsupervised (U) vs. no preference). Research staff and the evaluator will be unaware of the treatment. Study participants will then be randomly allocated to one of the two walking programs (S and U), using the central randomization scheme [19].

All information obtained will be kept secret at all times. Rather than using names, code numbers will be given to identify each participant. The same code will be used on each questionnaire. All the questionnaires will be kept in a locked filing cabinet in the research lab of the director. Only the research staff will know the secret code and will have access to the filing cabinet.

2.7 Statistical Methods

2.7.1 Statistical analysis

Descriptive statistics including means, medians, standard deviations and interquartile ranges for continuous outcomes and proportions for discrete outcomes will be used to summarize the baseline variables in the study groups. Also, the analytic procedures will determine if the recruitment flow and rate, design, interventions and selected outcome measures are feasible for a large-scale RCT and to identify the variance of walking adherence in order to calculate the sample size required for the future large-scale RCT. The purpose of this analysis is threefold: to provide a descriptive summary of the variables; to provide summaries of the variables on which to compare the study groups; and to assess whether the distributions of the variables satisfy the underlying assumptions of the statistical methods to be considered, using SPSS software. An intention-to-treat basis (ITT) for efficacy will be conducted. Multiple imputation (MI) and mixed model repeated measures (MMRM) procedures will be used for accommodating missing data.

2.7.2 Primary analysis

1) Participants with a preference for a supervised walking program (S) and who obtain their preferred choice of program vs. participants with the same preference who did not obtain their preferred choice of program will be compared on program 'adherence' at 9 months using the Student's t-test. If significant baseline imbalances between these two study groups are found, adherence to treatment comparisons will be made using analysis of covariance (ANCOVA) adjusting for baseline differences (past studies have identified five important covariates, namely: age, sex, severity of OA, external support and, level of education [34]). In addition, a repeated measure analysis of variance (ANOVA) with the between factor preference group (S vs. U) and the within factor assessment time (0, 3, 6, 9 months) will be used to assess differences in adherence between the supervised (S) and unsupervised (U) groups over time. Tukey's honestly significant difference (HSD) multi-parameter test for comparing the pair wise differences and orthogonal polynomials for trend analysis will be considered. The above analyses will be repeated using ANCOVA to control for these covariates if they were not balanced at baseline. 2) This analysis will be repeated for participants with a preference for an unsupervised walking program (U) who obtained their

preferred choice of program vs. participants with the same preference who did not obtain their preferred choice of program.

2.7.3 Secondary analysis

A similar plan to the above primary analysis will be conducted for the three secondary research questions: 1) When there is no preference, participants receiving the S vs. U will be compared as in the primary analysis 2.7.2 above; 2) When there is a preference for a supervised walking program (S) and participants obtain their preferred choice of program, a similar analytical strategy as in 2.7.2 will be used for the continuous secondary outcomes (i.e. WOMAC pain and functional status, QoL), and for the discrete secondary outcomes (i.e. Long Term Goal Attainment Scaling, Stair Climbing), chi-square analysis techniques will be used for comparing groups and assessing trends over time and logistic regression will be used if significant baseline imbalances in important covariates are found; 3) This similar analytical strategy (i.e. 2.7.3, number 2) will be used for the continuous secondary outcomes (i.e. WOMAC pain and functional status, QoL) when there is a preference for an unsupervised walking program (S) and participants obtain their preferred choice of program.

3. DISCUSSION

The Ottawa Panel experts, related to the Ottawa Panel EBCPGs [4] on effective walking programs in the management of knee, are in agreements with other studies and reviews, since the evidence strongly recommends to OA people to perform a low-impact aerobic physical activity, particularly walking, for a minimum of 3 times a week at a moderate pace, in order to minimize any related limitations [8,17].

BI strategies have been used in other chronic health conditions to improve long-term maintenance of PA programs, such as walking, with varying success. The scientific literature demonstrated that multifaceted BIs seem to have the greatest results on long-term adherence to treatments, the level of physical activity performed, and the quality of life [27]. The systematic review by Tilbrook et al. [21] found conclusive results when considering participants' preferences in 11 selected RCTs for musculoskeletal conditions. In other words, the authors stated that participants who were allocated to their preferred treatment demonstrated improved clinical outcomes compared to participants who did not receive their preferred treatment. Both the consideration of participants' exercise preference [27] and behavioural strategies such as goal setting, face-to-face visits, social/peer support, or positive feedback [50] are key components that may enhance adherence rates, since the belief that physical activity causes an increase in pain to the affected joint is often strongly expressed by the majority of OA individuals and results in a negative chain reaction. The current literature also confirmed that participants' expectation toward efficacy of a treatment represents an important factor to consider when measuring adherence. As explained by the theory of planned behaviour, if an individual demonstrates negative attitudes (risks, time commitment, laziness, etc.) toward a particular treatment, before randomization, he or she will be less motivated in performing or following the intervention [51]. In our proposed RCT, these components mentioned above will be identified and applied to better understand their effects on long-term adherence.

Given that the data on the efficacy of BIs are more limited than those on OA aerobic training, it is likely that participants' exercise preference will offer a promising avenue in terms of improving adherence over the long-term [18,19]. Participants' exercise preference will be evaluated as a KT strategy to implement an evidence-based long-term walking intervention,

in which adherence will represent the primary outcome. Surprisingly, this outcome has not yet been examined in previous RCTs focussing on participant preference [8]. To fill this new knowledge gap in the scientific literature, the first step is to identify the most effective intervention, based on EBCPGs (i.e. Knowledge Creation of the KTAC framework). Afterwards, it is important to ensure the integration of recommendations of the Ottawa Panel guidelines into the interventions, by implementing innovative KT strategies, such as participant's exercise preference (Action Cycle concepts of the KTAC framework) (Fig. 3) [52].

We will monitor knowledge use, i.e. conceptual knowledge use (e.g. level of intention to continue walking, identification of perceived motivators/reasons to continue walking, level of importance to follow walking goal, etc.) and instrumental knowledge use (e.g. adoption of new strategies to maintain walking goal, etc.) as well as clinical outcomes to measure the impact on participants of using and applying the knowledge (e.g. pain, functional status, quality of life, etc.).

Some limitations of the walking study should be addressed. First of all, this is a 6-month supervised walking program with a 3-month follow-up period using a preference trial design which consists of two single blind RCTs, based on a participant exercise preference model [25], to elicit preferences independently of randomization. As known, RCTs are considered the gold standard for assessing the effectiveness of interventions [28]. The main concern is that participants' exercise preference could influence adherence, when it is not possible to blind the participants to the physical interventions [30], like in this walking study. However, an innovative robust approach is to use the randomization process and consider the exercise preference before randomization, using the data in the subsequent analysis. This approach will allow for an unbiased evaluation of the effects of exercise preference on walking adherence, avoiding any selection bias.

Moreover, previous RCT on walking programs for older individuals with OA of the knee attained a poor consent rate of 54.4% [18] (accepted to enrol in the study). We expect a similar consent rate for the pilot RCT proposed. Therefore, it will be essential to support the decision-making process of the participant, before the beginning of the study, by giving him/her all the relevant information to help him/her easily assess the advantages and disadvantages of joining the pilot RCT.

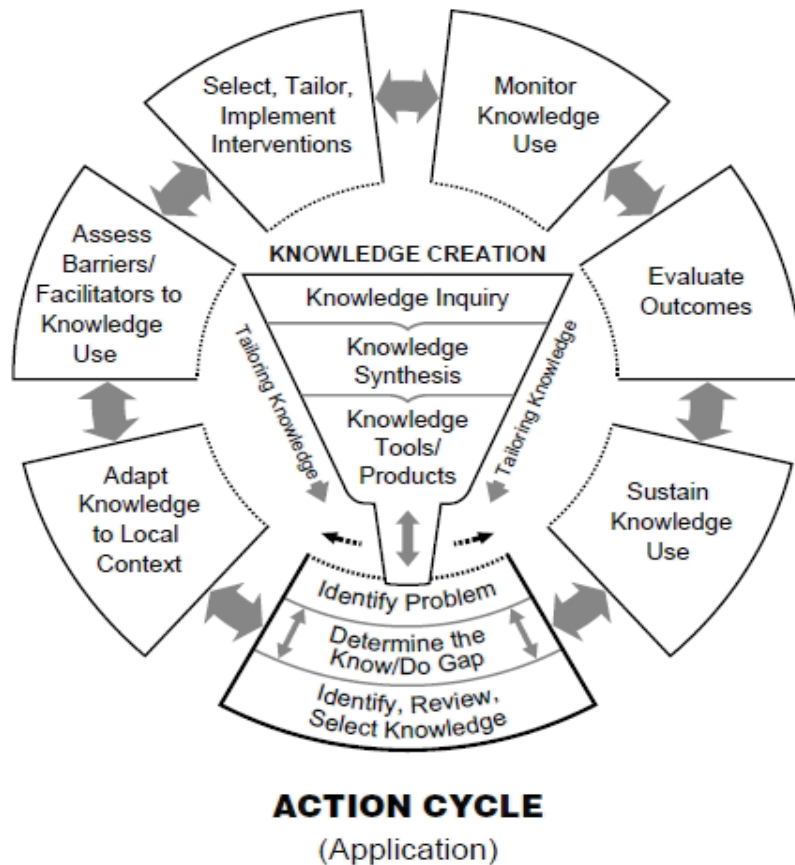


Fig. 3. The knowledge translation in health care action cycle

Used with permission from Straus SE, Tetroe, J & Graham ID. *Introduction Knowledge translation: What it is and what it isn't*, in *Knowledge Translation in Health Care: Moving from Evidence to Practice* (eds SE Straus, J Tetroe and ID Graham), John Wiley & Sons, Ltd, Chichester, UK. 2013. doi: 10.1002/9781118413555.ch01 [52].

Finally, the 7-Day Physical Activity Recall (PAR) will be used as a self-recorded questionnaire, to assess the duration (min/day) of doing moderate physical activities (such as walking). Even though, it represents a self-management measurement, Rauh et al. [53] showed that the PAR appeared to be administratively feasible and demonstrated relevant validity. Several trials confirmed that a daily recording is more accurate among an older population when self-reporting. Also, the use of pedometers to monitor walking adherence in older adults appears to be another reliable and valid instrument [54]. Generally used by elderly people, pedometers are easy to use and provide an objective measurement of walking adherence [23,55]. Therefore, we will be using pedometers as a second tool to measure objectively the adherence rate, as well as a motivational tool for the participants. In fact, the study of Motl et al. [56] demonstrated evidence of strong and statistically significant correlations between scores from the 7-Day PAR self-report measure and the objective device, pedometer step counts, based on a multi-method analysis. More sophisticated tools are also available to replace pedometers, such as accelerometers. Even if accelerometers give more relevant information other than just daily steps count, they are very costly and

seem to have similar problems than pedometers, i.e. replacing the batteries often and wearing the device insufficiently or not at all [57].

4. DISSEMINATION AND CONCLUSION

This proposed pilot RCT is based on solid methods, since it will follow the SPIRIT recommendations. The reporting of the pilot study will be eventually based on the CONSORT guidelines also. It will address questions of clinical and scientific importance to identify the main strategies to promote the long-term adherence of community-based walking program. It will also guide clinical decision-making of health professionals in rehabilitation sciences, by disseminating scientific results through professional scientific journals. If results of this study show this is indeed advantageous, it will finally assist the health care providers through their decision-making process, by 1) implementing an evidence-based walking program in existing health organizations (e.g. Public Health: City of Ottawa) and 2) referring OA patients, who prefer to walk inside with a group, to walking clubs in Ottawa walking. Moreover, the Walking Club at The Billings Bridge Shopping Centre has a strategic location, since next door to TAS Ottawa office. The sustained goals are to encourage: 1) Shopping Centre to promote better communication between TAS and the existing walking club, 2) the health professionals from TAS to refer OA patients to the existing walking club (to become new members), by respecting their exercise preference, and 3) the current members from the walking club to welcome participants from the study to continue walking with members of the walking club and, implement the same effective aerobic walking program beyond the study.

KEY MESSAGE

Preference is an innovative approach for improving walking adherence, not yet studied among OA population.

CONSENT

All authors declare that written informed consent was obtained from each participant.

ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and have therefore been performed in accordance with the ethical standards.

The Research Ethics Board from the University of Ottawa approved this pilot study (#H01-07-08C) and will be available if urgent changes need to be made on the proposal. The clinical study has been also registered with the International Standard Randomised Controlled Trial Number Register (ISRCTN) and Current Controlled Trials.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

TRIAL REGISTRATION: ISRCTN, <http://www.controlled-trials.com/ISRCTN51981241/>, ISRCTN51981241

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University of Ottawa
Office of Research Ethics and Integrity

Ethics Approval Notice

Health Sciences and Science REB

Principal Investigator / Supervisor / Co-investigator(s) / Student(s)

<u>First Name</u>	<u>Last Name</u>	<u>Affiliation</u>	<u>Role</u>
Lucie	Brousseau	Health Sciences / Physiotherapy	Principal Investigator
Glen	Kenny	Health Sciences / Human Kinetics	Co-investigator
Judy	King	Health Sciences / Physiotherapy	Co-investigator
Laurianne	Loew		Co-investigator
Stephane	Poitras	Health Sciences / Physiotherapy	Co-investigator
Robert	Reid	Medicine / Medicine	Co-investigator
George	Wells	Medicine / Medicine	Co-investigator

File Number: H01-07-08C

Type of Project: Professor

Title: The Implementation of Ottawa Panel Evidence-Based Clinical Practice Guidelines for Aerobic Walking Programs in the Management of Osteoarthritis using a Multifaceted Intervention

Renewal Date (mm/dd/yyyy)	Expiry Date (mm/dd/yyyy)	Approval Type
01/23/2013	01/22/2014	Ia

(Ia: Approval, Ib: Approval for initial stage only)

Special Conditions / Comments:

N/A

**Université d'Ottawa**

Bureau d'éthique et d'intégrité de la recherche

University of Ottawa

Office of Research Ethics and Integrity

This is to confirm that the University of Ottawa Research Ethics Board identified above, which operates in accordance with the Tri-Council Policy Statement and other applicable laws and regulations in Ontario, has examined and approved the application for ethical approval for the above named research project as of the Ethics Approval Date indicated for the period above and subject to the conditions listed the section above entitled "Special Conditions / Comments".

During the course of the study the protocol may not be modified without prior written approval from the REB except when necessary to remove subjects from immediate endangerment or when the modification(s) pertain to only administrative or logistical components of the study (e.g. change of telephone number). Investigators must also promptly alert the REB of any changes which increase the risk to participant(s), any changes which considerably affect the conduct of the project, all unanticipated and harmful events that occur, and new information that may negatively affect the conduct of the project and safety of the participant(s).

Modifications to the project, information/consent documentation, and/or recruitment documentation, should be submitted to this office for approval using the "Modification to research project" form available at: <http://www.research.uottawa.ca/ethics/forms.html>

Please submit an annual status report to the Protocol Officer four weeks before the above-referenced expiry date to either close the file or request a renewal of ethics approval. This document can be found at: <http://www.research.uottawa.ca/ethics/forms.html>

If you have any questions, please do not hesitate to contact the Ethics Office at extension 5387 or by e-mail at: ethics@uOttawa.ca.

Signature:

Mélanie Rioux

Ethics Coordinator

For Gilles Morier, Acting Director of the Office of Research Ethics and Integrity

**Université d'Ottawa**

Bureau d'éthique et d'intégrité de la recherche

University of Ottawa

Office of Research Ethics and Integrity

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Signature:

Kim Thompson
Protocol Officer for Ethics in Research
For Daniel Lagarec, Chair of the Sciences and Health Sciences REB



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University of Ottawa

Office of Research Ethics and Integrity

Ethics Approval Notice

Health Sciences and Science REB

Principal Investigator / Supervisor / Co-investigator(s) / Student(s)

<u>First Name</u>	<u>Last Name</u>	<u>Affiliation</u>	<u>Role</u>
Lucie	Brosseau	Health Sciences / Physiotherapy	Principal Investigator
Glen	Kenny	Health Sciences / Human Kinetics	Co-investigator
Judy	King	Health Sciences / Physiotherapy	Co-investigator
Laurianne	Loew		Co-investigator
Stephane	Poitras	Health Sciences / Physiotherapy	Co-investigator
Robert	Reid	Medicine / Medicine	Co-investigator
George	Wells	Medicine / Medicine	Co-investigator

File Number: H01-07-08C

SECTION IV : ANNEXE 3

Type of Project: Professor

Title: The Implementation of Ottawa Panel Evidence-Based Clinical Practice Guidelines for Aerobic Walking Programs in the Management of Osteoarthritis using a Multifaceted Intervention

Renewal Date (mm/dd/yyyy)	Expiry Date (mm/dd/yyyy)	Approval Type
01/23/2014	01/22/2015	Ia
(Ia: Approval, Ib: Approval for initial stage only)		

Special Conditions / Comments:

N/A

Letter of Information

Title of the Study

The implementation of an effective aerobic walking program based on Ottawa Panel guidelines for older individuals with mild to moderate osteoarthritis: a pilot study

This letter is to inform you of a research study being performed at the City of Ottawa Walking Club, and to help you make an informed decision as to whether you would like to participate. Please read this letter thoroughly and feel free to ask questions.

Purpose of the Study

The purpose of this study is to implement a scientifically proven effective supervised community-based aerobic walking program combined with a multifaceted behavioral intervention to a local walking club and The Arthritis Society's "*Stay Active/ Manage Your OA Pain*" program.

The specific objectives are to examine effective ways to improve your adherence to this evidence based supervised community-based aerobic walking program and, further to investigate the effects of an intensive walking program on the pain, functional status and, quality of life of individuals with osteoarthritis (OA).

Study Subjects

Approximately 69 research subjects will be recruited from the general public and The Arthritis Society who have received a confirmed diagnosis of OA from a rheumatologist or family physician.

To be eligible for this study, you must meet the following criteria: 1) Male or female; 2) Diagnosed with mild to moderate OA of the knee (according to the American College of Rheumatology clinical and radiographic criteria) in at least one knee joint and having experienced pain symptoms for at least 3 months; 3) Reported no pain at night; 4) Not actually involved in rehabilitation treatments including corticosteroids injections and surgery; 5) Minimum age of 40 years; 6) Medication not expected to change during the study period; 7) No evidence of mental condition; 8) No evidence of cardiac conditions (such as uncontrolled high blood pressure) or any other conditions contraindicating participation in this study; 9) Able to walk at a comfortable, self-set speed without pain for a minimum 20-minute period (with appropriate footwear or necessary adapted insoles) and able to be treated as an out-patient; 10) Able to follow instructions and to communicate in English; 11) Give consent and received written approval from their physician to allow participation in the study; 12) Available for at least 3 times a week for 6 months and for a 3 month follow-up period after the completion of the program.

Study Procedure

This study requires a 9-month involvement of your participation. You will be involved in a supervised and intensive walking program (Mondays, Wednesdays and Fridays) for 9 months at the Walking Club with other persons with OA. This walking program will be progressive and will be supervised by a physical activity specialist (community-based Walking Club). Measurements and questionnaires will be administered every three months during your participation in this study. You will also be asked to complete a monthly journal, recording performed daily physical activities.

SECTION IV : ANNEXE 5

A computer will randomly assign you to one of two groups: 1) a structured/supervised walking program, 2) structured unsupervised home walking program. Each group will undergo a different type of treatment:

Supervised Walking Program: The intensive walking intervention will take place at a Walking Club in Ottawa. Feedback and monitoring will be provided from an exercise specialist.

Unsupervised Walking Program: The study subjects will be invited to walk by themselves at home. All participants in the two groups will be given multifaceted behavioural approach, implemented by a physiotherapist using the existing TAS educational program and, measured the PACE instrument.

Risks

This study will involve minimal risks. Since the use of medication intake is likely to occur, we recommend that you consult your family physician or rheumatologist who prescribed your medication to discuss potential risks.

Participant can feel muscle or joint discomfort and knee pain during and after walking. You can reduce the pace and duration of your walking session or stop at anytime.

A physical activity specialist will be present for a minimum of three scheduled sessions weekly (Monday, Wednesday and Friday) and will supervise the aerobic walking programs during 6 months.

Repetitive measures taken during the study duration (5 consecutive months) could also be considered as inconvenient.

Benefits of Participating in the Study

The results of this study may contribute to the future improvement of patient care. This research project may also improve physiotherapy practice by investigating the benefits of physical activity on the quality of life of patients with OA.

Voluntary Participation

Your participation in this study is entirely voluntary. You have the right to choose not to participate or to choose to withdraw from the study at any time without it affecting the care you receive now or will receive in the future at this Institution.

Participants will be reimbursed \$10.00 each time they come in to complete an evaluation. If participants choose to withdraw from the study, they will still receive compensation (relevant to their levels of participation).

Confidentiality

All information obtained from you will be kept secret at all times. Rather than using names, code numbers will be given to identify each patient. The same code will be used on each questionnaire. All the questionnaires will be kept in a locked filing cabinet in the research lab of the researcher. Only the research assistant will know the secret code. Only the research assistant and the researcher will have access to the filing cabinet. Furthermore, any results that will be published will not include your name. Should you choose to withdraw from the study, your data will be kept unless requested otherwise.

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Participants are encouraged to disclose and discuss any health concerns identified during the aerobics testing with their treating physicians. Should a serious health concern come to light, the specialist who is present during the testing may write a letter describing the problem to the participant's treating physician, with the participant's consent.

Questions

If you agree to participate, you must clearly understand the nature of the study. The principal investigator, whose contact information is listed on the first page, will be more than happy to answer your questions or to discuss any concerns you may have. Please do not hesitate to contact her should you have questions or concerns. If you have any questions about your rights as a research participant, you may contact Review Officer, University of Ottawa, at 550, Cumberland Street, room # 154, Ottawa ON K1N 6N5, (613) 562-5387.

Obtaining Results from the Study

Researchers will provide an approximate date for the availability of results. At that time, you may request a copy of the results by writing to Dr. Brosseau at the address listed on the following page of this letter, or by phoning her at 613-562-5800 ext. 8015.

Laurianne Loew (MSc PT, Ph.D. candidate)
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Address: Faculty of Health Sciences
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Ottawa, Ontario, Canada K1H 8M5

Under the supervision of:

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External Proposal Reviewer:

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Consent Form

I have read this Letter of Information and have had the opportunity to ask my study doctor any questions I have about the study.

My questions and/or concerns have been answered to my satisfaction, and I agree to participate in this study. If I decide at a later stage in the study that I would like to withdraw my consent, I may do so at any time.

A copy of the Letter of Information will be provided to me should I want to review the information at a later date, should I need to contact someone about the study or about my participation in the study, or should I wish to keep a copy simply for my records.

During the walking tests, if a serious condition is identified :

☐ I agree that the study physician may contact my treating physician _____

☐ I do not agree that the study physician can contact my treating physician _____

Patient's name: _____

Patient's signature: _____

Date: _____

Investigator/Delegate's name: _____

Investigator/Delegate's signature: _____

Date: _____

Eligibility Questionnaire

Eligibility Questionnaire

* 1. Date of evaluation:

Date: DD / MM / YYYY

* 2. Research #

* 3. Name:

* 4. Age:

* 5. Gender :

☐ F

☐ M

* 6. Knee most affected by OA:

☐ Left

☐ Right

* 7. Occupation :

* 8. How far do you live from the walking club?

☐ a. 0-5 km

☐ b. 5-10 km

☐ c. 10-15 km

☐ d. 15-20 km

☐ e. more than 20 km

* 9. Weight (kg) :

* 10. Height (m) :

* 11. BMI:

Eligibility Questionnaire

* 12. Do you take any medication?

☐ Yes

☐ No

* 13. Do you wear an orthotic device?

☐ Yes

☐ No

* 14. Do you use a walking aid?

☐ Yes

☐ No

* 15. Do you have good footwear?

☐ Yes

☐ No

* 16. Have you ever had surgery of the lower extremities?

☐ Yes

☐ No

* 17. If yes, when? If no, please check "Not applicable"

☐ a. Less than 1 year ago

☐ b. 1-2 years ago

☐ c. 3-4 years ago

☐ d. 4-5 years ago

☐ e. more than 5 years ago

☐ f. Not applicable

* 18. If yes, what type of surgery? If no, please enter "No surgery"

* 19. Knee prosthesis

Yes

No

Do you have a knee
prosthesis?

☐

☐

Eligibility Questionnaire

* 20. If yes, which knee? If no, please check "Not applicable"

- ☐ Right
- ☐ Left
- ☐ Not applicable

* 21. Have you ever received cortisone injection in your lower extremity joints?

- ☐ Yes
- ☐ No

* 22. If yes, when? If no, please enter "No injection"

* 23. Are you planning to have cortisone injections?

- ☐ Yes
- ☐ No

* 24. Describe your pain level using a scale of 0-10

(0=no pain and 10=worst pain)

	0	1	2	3	4	5	6	7	8	9	10
Pain level	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

* 25. Can you walk at your pace for 20 minutes with little to no pain?

- ☐ Yes
- ☐ No

* 26. Do you wake at night with pain in your knees?

- ☐ Yes
- ☐ No

* 27. Do you have a confirmed diagnosis of mild to moderate OA of the knee?

- ☐ Yes
- ☐ No

* 28. Do you have an X-ray report confirming the diagnosis?

- ☐ Yes
- ☐ No

Eligibility Questionnaire

* 29. Have you had a diagnosis of OA for longer than 3 months?

☐ Yes

☐ No

* 30. Do you have severe arthritis in the lower extremities?

	Yes	No
Hip	☐	☐
Knee	☐	☐
Ankle	☐	☐

* 31. Are you available for treatment 3 times/week in the mornings and a follow-up 9 months later?

☐ Yes

☐ No

* 32. Cardiac condition:

	Yes	No
Do you have a cardiac condition, such as uncontrolled high blood pressure?	☐	☐
Have you received cardiac clearance from your attending physician?	☐	☐

* 33. Have you participated in any aerobic exercise in the past 6 months?

☐ Yes

☐ No

* 34. If yes, what type of aerobic exercise? If no, please enter "No exercise"

* 35. Do you have other illness or disability the would make participation in this study difficult? (e.g. rheumatoid arthritis). If not, please enter "No".

* 36. Do you have difficulty understanding or complying with instructions?

☐ Yes

☐ No

☐ Sometimes

Eligibility Questionnaire

* 37. Do you have adequate concentration?

☐ Yes

☐ No

* 38. Are you planning on surgery of the knee in the next 9 months?

☐ Yes

☐ No

* 39. Do you have the intention to move away from Ottawa area in the next 9 months?

☐ Yes

☐ No

* 40. Do you anticipate the need to use corticosteroid therapy for any reason during this study?

☐ Yes

☐ No

* 41. Do you foresee changing your medication dose during the study duration?

☐ Yes

☐ No

* 42. How did you hear about the study?

PAR-Q/COMORBIDITY/CONTACT INFO

1. Enter today's date

Date: DD / MM / YYYY

2. Study #:

3. Common sense is your best guide when you answer these questions. Please read the questions carefully and answer each one honestly: check YES or NO.

	Yes	No
Has your doctor ever said that you have a heart condition and that you should only do physical activity recommended by a doctor?	☐	☐
Do you feel pain in your chest when you do physical activity?	☐	☐
In the past month, have you had chest pain when you were not doing physical activity?	☐	☐
Do you lose your balance because of dizziness or do you ever lose consciousness?	☐	☐
Do you have a bone or joint problem (for example, back, knee or hip) that could be made worse by a change in your physical activity?	☐	☐
Is your doctor currently prescribing drugs (for example, water pills) for your blood pressure or heart condition?	☐	☐
Do you know of any other reason why you should not do physical activity?	☐	☐

Comment

COMORBID CONDITIONS

PAR-Q/COMORBIDITY/CONTACT INFO

4. Over the past week, how much of a problem have the following conditions been to you when performing your regular activities?

	Does not apply to me	None	Mild	Moderate	Severe	Do not know
Chronic back pain	☐	☐	☐	☐	☐	☐
Chronic neck pain	☐	☐	☐	☐	☐	☐
Chronic migraine	☐	☐	☐	☐	☐	☐
Chronic abdomen pain	☐	☐	☐	☐	☐	☐
Chronic chest pain	☐	☐	☐	☐	☐	☐
Other chronic pain	☐	☐	☐	☐	☐	☐
Serious problems with joints or bones (Paget's)	☐	☐	☐	☐	☐	☐
Osteoporosis	☐	☐	☐	☐	☐	☐
Osteoarthritis	☐	☐	☐	☐	☐	☐
Rheumatoid Arthritis	☐	☐	☐	☐	☐	☐
Other Arthritic Condition	☐	☐	☐	☐	☐	☐
Circulatory Problems	☐	☐	☐	☐	☐	☐
High Blood Pressure	☐	☐	☐	☐	☐	☐
Heart disease	☐	☐	☐	☐	☐	☐
Emphysema / Bronchitis / Persistent cough	☐	☐	☐	☐	☐	☐
Asthma	☐	☐	☐	☐	☐	☐
Cancer	☐	☐	☐	☐	☐	☐
Digestive problems	☐	☐	☐	☐	☐	☐
Stomach ulcer	☐	☐	☐	☐	☐	☐
Diabetes	☐	☐	☐	☐	☐	☐
Severe Diabetes (with organ involment)	☐	☐	☐	☐	☐	☐
Goiter or thyroid trouble	☐	☐	☐	☐	☐	☐
Kidney disease	☐	☐	☐	☐	☐	☐
Liver disease	☐	☐	☐	☐	☐	☐
Moderate/severe liver disease (cirrhosis)	☐	☐	☐	☐	☐	☐
Allergies	☐	☐	☐	☐	☐	☐
Eye problem	☐	☐	☐	☐	☐	☐
Trouble hearing / deafness	☐	☐	☐	☐	☐	☐
Epilepsy	☐	☐	☐	☐	☐	☐
Paralysis / speech problems due to stroke	☐	☐	☐	☐	☐	☐
Urinary incontinence	☐	☐	☐	☐	☐	☐
Alzheimer's disease / dementia	☐	☐	☐	☐	☐	☐
Depression	☐	☐	☐	☐	☐	☐
Anxiety	☐	☐	☐	☐	☐	☐

PAR-Q/COMORBIDITY/CONTACT INFO

Panic	☐	☐	☐	☐	☐	☐
Multiple sclerosis	☐	☐	☐	☐	☐	☐
Parkinson's	☐	☐	☐	☐	☐	☐
Post polio syndrome	☐	☐	☐	☐	☐	☐
Other long term conditions	☐	☐	☐	☐	☐	☐

Contact information

5. Personal info

Name:

Address:

City/Town:

Province:

Postal Code:

Phone Number:

6. Your doctor's info

Name:

Address:

City/Town:

Province:

Postal Code:

Phone Number:

Part 1 - Questionnaires

Identification

*** 1. Evaluation Period**

- ☐ Initial
- ☐ 3 months
- ☐ 6 months
- ☐ 9 months

*** 2. Date of evaluation:**

Date: DD MM YYYY
 / /

*** 3. Initials:**

*** 4. Research # :**

Treatment Preferences

*** 5. Please respond "Yes" or "No" to the following question.**

Do you have a preference for participating in a supervised or unsupervised walking program?

- ☐ Yes
- ☐ No

6. If no, please say why? If yes, please say 'Not applicable' and answer the next questions..

Part 1 - Questionnaires

* 7. If no to question 5, please check "Not applicable".

If yes, which type of walking program do you prefer to participate in?

Given the nature of the study, we cannot guarantee that you will be assigned to your group of choice.

- ☐ Supervised walking program
- ☐ Unsupervised walking program
- ☐ Not applicable

* 8. If no to question 5, please check "Not applicable".

If you answered "Supervised walking program" to question 6, please state the main reason of your choice? Because ...

- ☐ It is supervised by a therapist
- ☐ I can engage in physical activity with others / social contact
- ☐ It offers scheduled sessions
- ☐ Not applicable

* 9. Other reason (if no, please enter "No"):

* 10. If no to question 5, please check "Not applicable".

If you answered "Unsupervised walking program" to question 6, please state the main reason of your choice? Because ...

- ☐ It is flexible hours / schedule
- ☐ I don't need to travel
- ☐ Not applicable

* 11. Other reason (if no, please enter "No"):

Provider participatory decision-making (PDMstyle)

Part 1 - Questionnaires

* 12. Please rate from 0-100 your satisfaction regarding your level of participation when we:

Discussed with you pros and cons of each walking programs (intervention groups)

Got you to state which choice (which walking program) you prefer

Goal Attainment

* 13. Three months from now I wanted to (regarding physical activity):

* 14. Barriers: What factors (2) make it hard for you to reach this goal?

1.

2.

* 15. Facilitators : What factors (2) can help you reach this goal?

1.

2.

* 16. My new goal will be to (regarding walking):

What (type of walking):

When (what time in the day):

How many (# days/week):

How much (minutes):

* 17. My plan to reach my goal (2 strategies)

1.

2.

* 18. How certain are you that you can complete the 2 strategies you have listed in your plan (%)?

Part 1 - Questionnaires

7 DAY PAR

19. Enter today's date

Date: DD MM YYYY
 / /

20. Study #:

21. Interviewer's name

INSTRUCTIONS

Include:

- Walks ≥ 10 mins
- Walking at normal pace to do an errand
- Occupational, house work, sports that feel $\geq$ normal pace walk & ≥ 10 mins in duration

Do NOT Include

- Stop & g walking (e.g. window shopping)
- Light activities (e.g. desk work, standing, light house work, softball & bowling)
- Rest periods

Moderate activities: Similar level exertion as a normal paced walk

Hard activities: Harder than walking, but not as strenuous as jogging or running.

Very Hard activities: Similar level exertion as running or jogging.

Strength & Flexibility: Only record if it was planned and the participants intention was to increase his/her strength or flexibility (e.g. moving furniture is not strength training)

-Strength examples: push-ups, pull-ups, sit-ups, lifting free weights etc.

-Flexibility examples: Stretching, yoga etc.

22. How many hours of sleep did you have in each day of the past week?

Day 1	
Day 2	
Day 3	
Day 4	
Day 5	
Day 6	
Day 7	

Part 1 - Questionnaires

23. How many MINUTES of MODERATE leisure-time physical activity did you do in each day of the past week?

Day 1	
Day 2	
Day 3	
Day 4	
Day 5	
Day 6	
Day 7	

24. How many MINUTES of HARD leisure-time physical activity did you do in each day of the past week?

Day 1	
Day 2	
Day 3	
Day 4	
Day 5	
Day 6	
Day 7	

25. How many MINUTES of VERY HARD leisure-time physical activity did you do in each day of the past week?

Day 1	
Day 2	
Day 3	
Day 4	
Day 5	
Day 6	
Day 7	

Part 1 - Questionnaires

26. How many MINUTES of MODERATE Occupational / Domestic Activity did you do in each day of the past week?

Day 1	
Day 2	
Day 3	
Day 4	
Day 5	
Day 6	
Day 7	

27. How many MINUTES of HARD Occupational / Domestic Activity did you do in each day of the past week?

Day 1	
Day 2	
Day 3	
Day 4	
Day 5	
Day 6	
Day 7	

28. How many MINUTES of VERY HARD Occupational / Domestic Activity did you do in each day of the past week?

Day 1	
Day 2	
Day 3	
Day 4	
Day 5	
Day 6	
Day 7	

29. How many MINUTES of Strength exercises did you do in each day of the past week?

Day 1	
Day 2	
Day 3	
Day 4	
Day 5	
Day 6	
Day 7	

Part 1 - Questionnaires

30. How many MINUTES of Flexibility exercises did you do in each day of the past week?

Day 1	
Day 2	
Day 3	
Day 4	
Day 5	
Day 6	
Day 7	

31. Time Up and Go (TUG) Time in seconds

32. Comments

Part 1 - Questionnaires

STAIR CLIMBING

33. Please answer YES to every statement that both applies to your current situation and is also connected with your health. Circle one number on each line.

	a. Yes	b. No	c. Don't know
1. I go up the stairs but it takes longer	☐	☐	☐
2. I go up the stairs but in a different way, e.g. I pull up one leg at a time	☐	☐	☐
3. I go up the stairs but with (some) difficulty	☐	☐	☐
4. I go up the stairs and (almost) always hold on the banister	☐	☐	☐
5. I go up the stairs and (almost) always use a walking aid, e.g. a walking stick or a crutch	☐	☐	☐
6. I go up the stairs and (almost) always helped by someone	☐	☐	☐
7. I go down the stairs but it takes longer	☐	☐	☐
8. I go down the stairs but in a different way, e.g. I pull down one leg at a time of I go down "backward"	☐	☐	☐
9. I go down the stairs but with (some) difficulty	☐	☐	☐
10. I go down the stairs and (almost) always hold on the banister	☐	☐	☐
11. I go down the stairs and (almost) always use a walking aid, e.g. a walking stick or a crutch	☐	☐	☐
12. I go down the stairs and (almost) always helped by someone	☐	☐	☐
13. I do go up and down stairs but less often	☐	☐	☐
14. I do go up and down stairs but I avoid them	☐	☐	☐
15. I do go up and down stairs but less strains/floors	☐	☐	☐

Part 1 - Questionnaires

WOMAC

34. INSTRUCTIONS: This questionnaire asks about pain, stiffness and function related to your arthritis of the knee. Some of the activities may not apply to you, in that case you should try to answer them anyway (as if). If you are unable to think of an appropriate answer you may leave it blank.

These questions are about the amount of pain you are currently experiencing due to your knee.

How much pain have you had during the past four weeks?

	a. None	b. Mild	c. Moderate	d. Severe	e. Extreme
1. Walking on a flat surface?	☐	☐	☐	☐	☐
2. Going up or down stairs?	☐	☐	☐	☐	☐
3. At night while in bed?	☐	☐	☐	☐	☐
4. Sitting or lying?	☐	☐	☐	☐	☐
5. Standing upright?	☐	☐	☐	☐	☐

35. These question are about the amount of joint stiffness (not pain) you are currently experiencing due to your knee. Stiffness is a sensation of restriction or slowness in the ease with which you move your joints.

	a. None	b. Mild	c. Moderate	d. Severe	e. Extreme
1. How severe is your stiffness after first awakening?	☐	☐	☐	☐	☐
2. How severe is your stiffness after sitting, lying or resting later in the day?	☐	☐	☐	☐	☐

Part 1 - Questionnaires

*** 36.** These questions are about physical function, that is your ability to move about and look after yourself.

Please indicate the degree of difficulty your are currently experiencing due to your knee:

	a. None	b. Mild	c. Moderate	d. Severe	e. Extreme
1. Descending stairs?	☐	☐	☐	☐	☐
2. Ascending stairs?	☐	☐	☐	☐	☐
3. Rising from sitting?	☐	☐	☐	☐	☐
4. Standing?	☐	☐	☐	☐	☐
5. Bending on the floor?	☐	☐	☐	☐	☐
6. Walking on a flat surface?	☐	☐	☐	☐	☐
7. Getting in/out of the car?	☐	☐	☐	☐	☐
8. Going shopping?	☐	☐	☐	☐	☐
9. Putting on socks/stockings?	☐	☐	☐	☐	☐
10. Rising from bed?	☐	☐	☐	☐	☐
11. Taking off socks/stockings?	☐	☐	☐	☐	☐
12. Lying in bed?	☐	☐	☐	☐	☐
13. Getting in/out of the bath?	☐	☐	☐	☐	☐
14. Sitting?	☐	☐	☐	☐	☐
15. Getting on/ off toilet?	☐	☐	☐	☐	☐
16. Heavy domestic duties?	☐	☐	☐	☐	☐
17. Light domestic duties?	☐	☐	☐	☐	☐

EQ-5D-5L

*** 37.** Please tick the ONE box that best describes your health TODAY

MOBILITY

- ☐ I have no problems in walking about
- ☐ I have slight problems in walking about
- ☐ I have moderate problems in walking about
- ☐ I have severe problems in walking about
- ☐ I am unable to walk about

Part 1 - Questionnaires

*** 38.** Please tick the ONE box that best describes your health TODAY

SELF-CARE

- ☐ I have no problems washing or dressing myself
- ☐ I have slight problems washing or dressing myself
- ☐ I have moderate problems washing or dressing myself
- ☐ I have severe problems washing or dressing myself
- ☐ I am unable to wash or dress myself

*** 39.** Please tick the ONE box that best describes your health TODAY

USUAL ACTIVITIES (e.g. work, study, housework, family or leisure activities)

- ☐ I have no problems doing my usual activities
- ☐ I have slight problems doing my usual activities
- ☐ I have moderate problems doing my usual activities
- ☐ I have severe problems doing my usual activities
- ☐ I am unable to do my usual activities

*** 40.** Please tick the ONE box that best describes your health TODAY

PAIN/DISCOMFORT

- ☐ I have no pain or discomfort
- ☐ I have slight pain or discomfort
- ☐ I have moderate pain or discomfort
- ☐ I have severe pain or discomfort
- ☐ I have extreme pain or discomfort

Part 1 - Questionnaires

*** 41.** Please tick the ONE box that best describes your health TODAY

ANXIETY/DEPRESSION

- ☐ I am not anxious or depressed
- ☐ I am slightly anxious or depressed
- ☐ I am moderately anxious or depressed
- ☐ I am severely anxious or depressed
- ☐ I am extremely anxious or depressed

*** 42.** We would like to know how good or bad your health is TODAY

In a scale from 0 to 100: Write the number in the box below.

(100 means the best health you can imagine and 0 means the worst health you can imagine)

YOUR HEALTH TODAY

Part 2 - Physical Observation

Identification

*** 1. Evaluation Period**

☐ Baseline, 3 months, 6 months, 9 months

*** 2. Date of evaluation:**

Date: DD / MM / YYYY

*** 3. Initials:**

*** 4. Research # :**

Body Measurements

*** 5. Height (m) :**

*** 6. Weight (kg) :**

*** 7. BMI (kg / m²):**

*** 8. Waist Circumference (cm):**

TUG

Part 2 - Physical Observation

* 9. TIMED "UP AND GO" TEST

INSTRUCTIONS: " The test measures, in seconds, the time taken by an individual to stand up from a standard arm chair (approximate seat height of 46 cm), walk a distance of 3 meters, turn, walk back to the chair and sit down again. The subject wears his regular footwear and uses his customary walking aid. No physical assistance is given. He starts with his back against the chair, his arms resting on the chair's arms, and his walking aid at hand. he is instructed that on the word "go" he is to get up and walk at a comfortable and safe pace to a line on the floor 3 meters away, turn, return to the chair, and sit down again. The subject walks through the test once before being timed in order to become familiar with the test. Either a wrist-watch with a second hand or a stop-watch can be used to time the performance."

Time in seconds:

6-min walk test

* 10. 6 MINUTE WALK TEST

Walking distance during the
6 minutes walk test (m)

* 11. Pedometer - Number of steps

* 12. Gait speed

Walking speed in
meter/second

Heart Rate

* 13. Maximum Heart Rate

220-age

* 14. Heart Rate before exercise

* 15. % of Maximum Heart Rate (before)

* 16. Heart Rate after exercise

Part 2 - Physical Observation

* 17. % of Maximum Heart Rate (after)

Blood Pressure

* 18. Blood Pressure (before exercise)

Systolic

Diastolic

* 19. Blood Pressure (after exercise)

Systolic

Diastolic

Borg Perceived Exertion

* 20. Borg Perceived Exertion

	6	No		7		Extremely		8		9	Very		10		11		12		13		14		15		16		17		18		19		20
		exertion				light				light					Light				Somewhat				Hard				Very				Extremely		Maximal
		at all				(7.5)													hard				(Heavy)				hard				hard		exertion
Please, check one of the following boxes.	☐		☐		☐		☐		☐		☐		☐		☐		☐		☐		☐		☐		☐		☐		☐		☐		☐

THE SEVEN-DAY PHYSICAL ACTIVITY RECALL

ID #:

--	--	--	--

Study # Initial 3M 6M 9M

Interviewer: _____ Date (dd/mm/yy): _____

- Include:**

 - Walks >= 10mins
 - Walking at normal pace to do an errand
 - Occupational, house work, sports that feel ≥ normal pace walk & ≥ 10mins in duration
- Do Not Include:**

 - Stop & go walking (e.g. window shopping)
 - Light activities (e.g. desk work, standing, light housework, softball, & bowling)
 - Rest periods

- Moderate Activities:**
Similar level exertion as a normal paced walk
- Hard Activities:**
Harder than walking, but not as strenuous as jogging or running.
- Very Hard Activities:**
Similar level exertion as running or jogging.

W= walk
O= other

Type of Activity	Activity Date:	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	Total (mins)
Sleeping	Approx. Hrs.								
Leisure-Time Physical Activity (minutes)	Moderate	W / O	W / O	W / O	W / O	W / O	W / O	W / O	
	Hard	W / O	W / O	W / O	W / O	W / O	W / O	W / O	
	Very Hard	W / O	W / O	W / O	W / O	W / O	W / O	W / O	
Occupational/ Domestic Activity (minutes)	Moderate	W / O	W / O	W / O	W / O	W / O	W / O	W / O	
	Hard	W / O	W / O	W / O	W / O	W / O	W / O	W / O	
	Very Hard	W / O	W / O	W / O	W / O	W / O	W / O	W / O	
Other (Minutes)	Strength								
	Flexibility								

Strength & Flexibility: Only recorded if it was planned and the participant's intention was to increase his/her strength or flexibility (i.e. moving furniture is not strength training)

- o Strength Examples: pushups, pull-ups, sit-ups, lifting free weights etc.
- o Flexibility Examples: Stretching, yoga etc.

CALCULATION OF PAR

Activity Type	INTENSITY	TOTAL MINUTES (mins)	TOTAL HOURS (Hrs)	INTENSITY MET FACTOR (Kcal/kg/wk)
Leisure-Time Physical Activity	Moderate		/60	Total hrs x 4 MET
	Hard		/60	Total hrs x 6 MET
	Very Hard		/60	Total hrs x 10 MET
TOTAL				
Occupational/Domestic Activity	Moderate		/60	Total hrs x 4 MET
	Hard		/60	Total hrs x 6 MET
	Very Hard		/60	Total hrs x 10 MET
TOTAL				

Note: Leisure-time physical activity and occupational/domestic activity to be recorded separately (Sarkin et al., 2000).

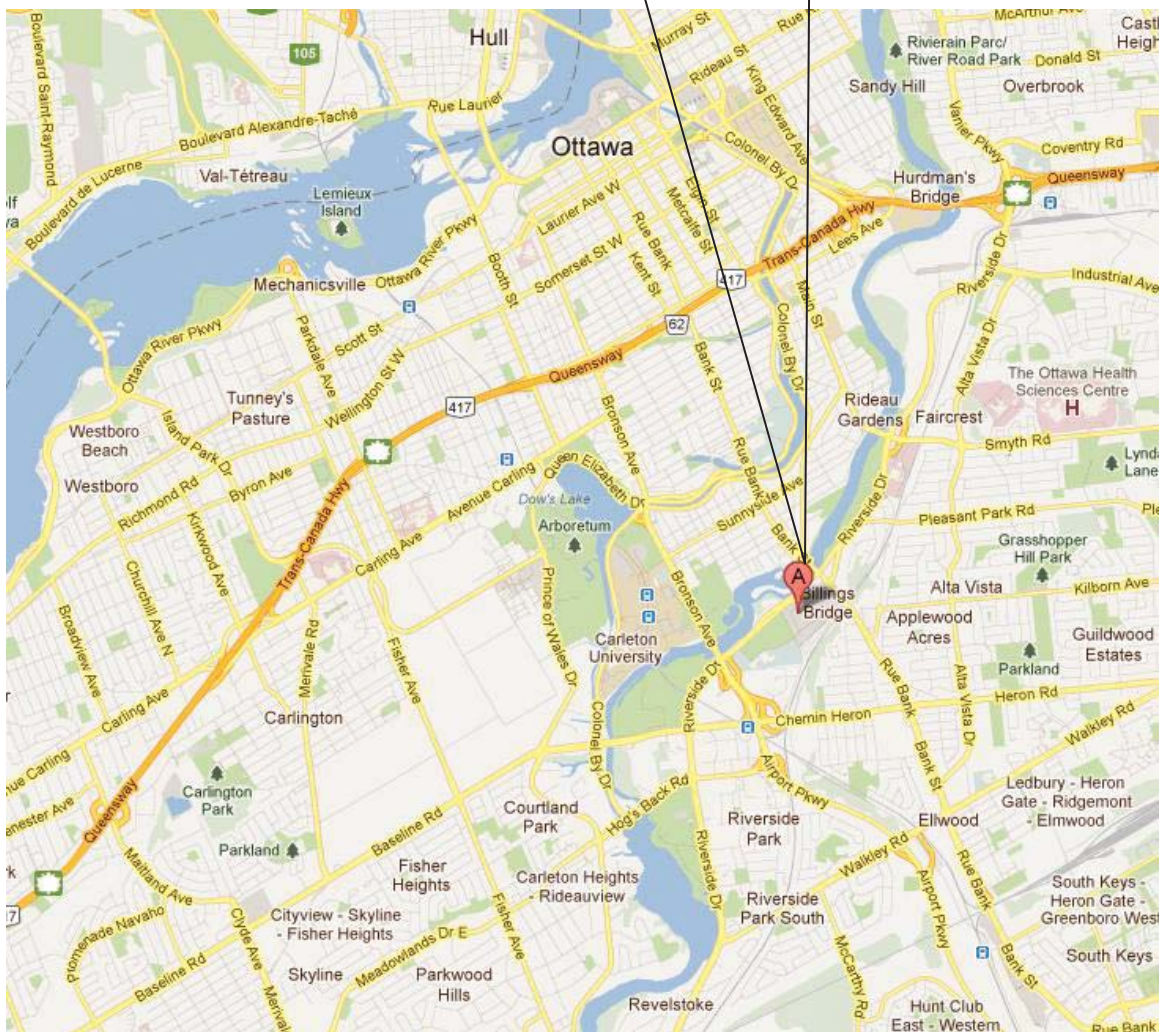
Directions & Maps - Billings Bridge Shopping Centre

Address:

2277 Riverside Drive #208

Ottawa, ON K1H 7X6

(613) 733-2595



Factors influencing adherence among older people with osteoarthritis

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Abstract This study aims to identify potential factors that could affect adherence and influence the implementation of an evidence-based structured walking program, among older adults diagnosed with knee osteoarthritis. A total of 69 participants with mild to moderate osteoarthritis of the knee fulfilled an online survey on potential factors that could affect their adherence to an evidence-based structured walking program. Adherence with regard to the influencing factors was explored using a logistic regression model. Results tend to show higher odds of adhering to the evidence-based walking program if the participants were supervised (more than 2.9 times as high), supported by family/friends (more than 3.7 times as high), and not influenced by emotional involvement (more than 11 times as high). The odds of adhering were 3.6 times lower for participants who indicated a change in their medication intake and 3.1 times lower for individuals who considered themselves as less physically active (95 % confidence interval (CI)). Our exploratory findings identified and defined

potential adherence factors that could guide health professionals in their practice to better identify positive influences and obstacles to treatment adherence, which would lead to the adoption of a more patient-centered approach. A large-scale study is required to clearly delineate the key factors that would influence adherence. We addressed a new knowledge gap by identifying the main strategies to promote the long-term adherence of community-based walking program.

Keywords Adherence · Factors · Implementation · Osteoarthritis · Preference · Walking

Introduction

Osteoarthritis (OA), a degenerative joint disease, frequently affects the knees. It is one of the most common causes of pain in older individuals [1]. Moderate-intensity physical activity, such as walking, is an effective intervention and has been linked to numerous health benefits [2]. However, people affected by this chronic health condition tend to avoid physical activity [3]. Therefore, it is essential to understand why this population commonly chooses to not adhere to a physical activity [4, 5] that could help circumvent the deleterious effects of OA on functional ability. As demonstrated in a recent systematic review of Loew et al. [2], studies involving physical activity interventions in individuals with OA reported low adherence rates ranging from 27 to 64 % [2]. Adherence is considered a key criterion to evaluate the therapeutic effectiveness of an exercise program. It refers to the extent to which a person follows and accepts a treatment recommended by health professionals [6, 7] and is able to successfully reach the therapeutic goals [7]. Poor adherence indicates that important internal as well as external barriers in the implementation or successful completion of a physical activity intervention

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exist. The success of implementing an evidence-based intervention may perhaps be affected by factors related to adherence [6]. Though previous researchers identified adherence factors impacting arthritis [8–10], a clear consensus of influencing factors to improve adherence has not yet been established. Thereby, there is a need to identify the factors related to adherence and to adopt new tailored strategies to promote the adherence of physical activity interventions or programs.

To date, there remains a significant gap in knowledge regarding the process through which individuals with OA fail to regulate physical activity over time. To address this knowledge gap, two main theoretical frameworks have been proposed to identify potential factors affecting adherence to physical activity in the management of chronic diseases [11–13]. The social cognitive theory of Bandura has shown that personal characteristics contribute to an individual's level of motivation to adhere to physical activity [12–14]. Behavior is regarded as a reciprocal interaction between personal and environmental components [15]. The latter is defined as social or physical factors that facilitate or hinder behavior. Given the importance of these concepts, a framework pertaining to physical activity behavior change was developed by the World Health Organization (WHO) [13], based on the concepts of social cognitive theory [15]. The WHO published a conceptual framework to better illustrate how adherence is a multi-dimensional phenomenon not only defined exclusively by personal determinants but also by important environmental determinants [13]. In fact, adherence incorporates the broader notions of an external determinant called “concordance” (i.e., influence of the health professional on an individual's treatment decision, while promoting harmony between the two parties) [16].

The five dimensions of adherence in this model illustrate that participant adherence is a multi-dimensional behavior construct, determined by five dimensions: (1) health system (e.g., community support, relationship with health professionals), (2) social/economic (e.g., social status, external environment), (3) therapy related (e.g., benefits, treatment effects), (4) condition related (e.g., illness related, level of physical/emotional disability), and (5) patient related (e.g., level of knowledge, beliefs) [13]. Therefore, this conceptual framework facilitates the theoretical understanding of adherence to physical activity behavior [13] and was used to guide the present study (see Fig. 1 for additional details).

Concerns regarding adherence still persist, even when the effectiveness of a physical activity intervention has been established [2]. When participants are not engaged in the clinical decision-making, they may feel less empowered, resulting in decreased adherence [12]. The treatment preferences of individuals thereby need to be considered, allowing the participants to express themselves. In fact, the term “participant exercise preference” (PEP) refers to the individual's personal

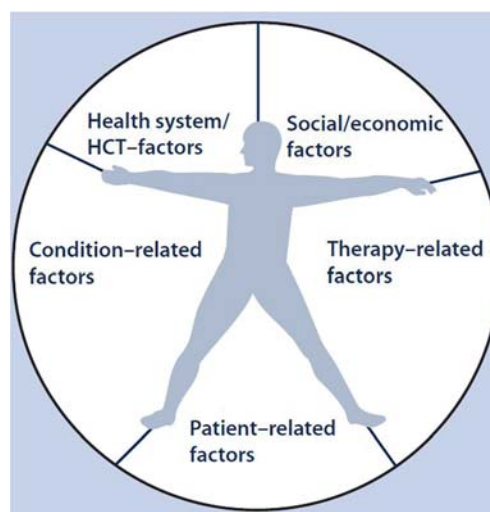


Fig. 1 Reproduced, with the permission of the publisher, from the World Health Organization ([13], Fig. 3, section II, chapter V, p. 41)

expression of a value following consideration of benefits and risks of the interventions proposed, based on his/her values, beliefs, and needs [17]. PEP can be used as a knowledge transfer strategy to implement an evidence-based intervention. This strategy has not yet been applied to an aerobic walking program trial [18] nor has it been studied among older people with OA and investigated with adherence as the primary outcome [19]. Given these gaps and the relevance of the PEP factor, adherence is considered an essential outcome to successfully transfer evidence-based guidelines into clinical practice and patient care but remains challenging for stakeholders [20].

Aim

The general objective of the present study was to identify potential factors that could affect adherence and consequently influence the implementation of an evidence-based structured walking program [2], among older individuals diagnosed with mild to moderate knee OA. Since the primary outcome measured in the main study—The PEP trial [21]—was walking adherence, we expected to encourage OA participants to successfully adhere to an evidence-based effective walking program, by implementing a PEP strategy based on the evidence-based clinical practice guidelines [2]. In the present study, we evaluated three main research questions:

1. Question 1: What are the most potential factors related to walking adherence?
2. Question 2a: What are the five most potential factors that best describe each of the five dimensions of adherence, based on the WHO conceptual framework?

Question 2b: What is the potential influence of participants' preference as it relates to walking adherence over and above the factors identified within each dimension of adherence, based on the WHO conceptual framework?

Materials and methods

Protocol

This study describes the findings from the first 3 months of a larger 9-month study using a preference study design [21]. The main objective of the larger study was to evaluate the effect of PEP, by examining the hypothesis that participants who followed their preferred intervention (supervised vs. unsupervised aerobic walking program) would be more likely to adhere throughout the 9-month study period. The inclusion criteria were participants (1) diagnosed with mild to moderate OA of the knee, (2) aged between 55 and 80 years old [1], (3) able to walk for a minimum of 20 min, (4) available to walk 3 times/week, and (5) give informed consent. A total of 69 adults were recruited (50 women (72.4 %) and 19 men (27.5 %)). Participants were stratified on whether they did or did not indicate a preference for supervision related to the walking program ((1) preference for supervised, (2) preference for unsupervised, or (3) no preference). The reader is referred to the larger study for a more detailed overview of the study methodology [21].

Primary outcomes

Walking adherence

Walking adherence was monitored as a percentage of the number of walking sessions attended and completed by each participant divided by the number of walking sessions recommended in the Ottawa Panel guidelines [2, 5]. Participants who completed at least on average two of three sessions (66 %) of the prescribed walking sessions per week were considered as adherent. This clinically relevant cut-off point was selected based on a previous physical activity study in which significant changes in health outcomes were demonstrated (e.g., improvement in pain, function, and overall health) among an OA population [22]. A review of aerobic activities for individuals with arthritis confirmed that walking demonstrated the highest clinical improvements with an adherence rate ranging between 68 and 88 %, compared with other modes of aerobic exercises (e.g., swimming, cycling, dance) [23]. To the best of our knowledge, only one study has used a participation threshold of 100 % [24].

Adherence factors

The purpose of this exploratory behavioral study was to identify factors that could potentially affect adherence and consequently influence the implementation of an evidence-based structured walking program [2]. To our knowledge, no detailed survey pertaining to physical activity adherence factors for individuals with knee OA has been published. To this end,

a self-reported survey was developed based on two main sources.

To date, few studies have provide a thorough description of adherence factors, with the majority either only provided keywords for adherence concepts or described factors without developing a survey [6, 25–27]. Nonetheless, some adherence factors (e.g., self-efficacy, motivation) have been recognized in the literature [8–10, 12–14, 17, 18] and were considered to develop this self-reported survey.

Since the literature on determinants influencing adherence to walking programs for individuals with OA is very limited, participants were therefore asked to complete an initial evaluation. The participants had to identify (a) barriers that limit their participation in physical activity and (2) facilitators that help them engage in physical activity. These responses were integrated when developing the proposed survey on adherence factors.

Whether the adherence factors were identified from the literature or by the participants, they were categorized according to the WHO's conceptual framework which integrates five key concepts (see Fig. 1) [13]: (1) social or economic, (2) health system, (3) therapy related, (4) condition related, and (5) patient related. See Table 1 for a list of all the potential adherence factors identified.

Data collection

Data were collected using the aforementioned survey. The compilation of data was verified independently by two members of the research staff. For the PEP, three types of preference were collected:

1. Initial preference: at baseline, preference was evaluated where the participants had to respond “yes” or “no”: Do you have a preference for participating in a supervised or unsupervised walking program?
2. Preferred choice: at baseline, the preferred choice was also examined, where the participants had to respond “yes” or “no”: Did you receive your preferred group?
3. Preference at 3 months: participants enrolled in the study completed the online survey at 3 months after enrolment to a walking program. They responded whether the preference factor (“I was enrolled in my preferred group”) influenced their adherence to the study negatively (−1), had no impact (0), or positively (+1).

Data analyses

The data analysis focused on the evaluation of factors identified as most important to potentially predict the adherence of older adults diagnosed with knee OA participating in an evidence-based walking program. The dependent variable (adherence) was considered as a dichotomous binary variable

Table 1 A summary of all the potential adherence influencing factors selected are listed below, where they are separated into five categories, based on the conceptual framework presented by WHO [13]

Categories					
Factors	Health system	Social/economic	Condition related	Therapy related	Patient related
	Supervised by exercise therapists	Family/friends support	Other health problems/comorbidities	Knowing the benefits of walking	Randomly assigned to group of intervention
	Constant feedback	Work/volunteering schedule	Joint pain	Level of satisfaction during walking	Level of motivation
	Incentives	Type of neighborhood	Joint stiffness	Perceived impact of the walking	Determination/perseverance
	Proximity of the walking area	Access to safe physical activity facilities	Joint instability	Health purposes (walking for health)	Morning attitude
	Group participation	Domestic responsibilities	Level of endurance	Difference in mobility	General mood
		Traveling (vacation/work)	Level of energy	Difference in balance control	Interest in walking
		Rush hours	Physical fitness level	Difference in quality of sleep	Habits
		Easy access to motorized vehicles	Aging	Different perception in ability to walk	Self-confidence
		Social contact	Psychological wellbeing	Change in medication use	Comparison with other walkers
		Weather	Physical wellbeing		Emotional involvement
			Weight control		Fear
			Quality of sleep		Perceived personal control of the risk factors affecting OA
					Attitude toward actual health condition
					Self-efficacy

since it was represented by two categories: 1, participant successfully attended and completed the walking program; 0, participant did not successfully attended but completed the walking program.

Adherence was influenced by variations in the independent variables, following a 3-point Likert ordinal scale: negative (−1), no impact (0), or positive (+1). This common rating scale was concise and allowed the participants to better express their opinion [28]. Adherence with regard to the influencing factors was determined using a polychotomous binary logistic regression model [29]. It evaluated the probability to adhere to the walking program in accordance to the explanatory variables, in this case, all the identified influencing factors. A multivariate analysis was performed using the variables that indicated a p value of ≤ 0.2 in order to identify the predictor variables, i.e., only the most important potential factors. As frequently selected in behavioral and social sciences research, this p value was used since a large number of categorical variables were entered in the equation [29]. Odds ratio could not be interpreted as a relative risk because adherence is not a rare event [29]. To be significant, the odds ratio of a factor needed to be in the range of 95 % (confidence interval (CI)), without including 1 within this range.

To assess research question 1, the most potential factors related to walking adherence were identified, among all the factors included in the online survey, using a univariate quantitative analysis to look at each factor separately. A set of the five most important variables reaching statistical significance was conserved.

To assess research question 2a, the five most important factors that best describe adherence were identified using a univariate analysis according to each dimension of adherence (WHO's conceptual framework [13]). A set of the five most potential variables was taken to do a stepwise procedure (one factor represented each dimension). To assess research question 2b, we determined the importance of PEP related to walking adherence, in conjunction with the five same potential variables, selected in question 2a, in order to perform a stepwise procedure with the three types of preference.

The most important potential factors related to walking adherence were assessed based on all of the participants who adhered (successfully or not), and those who dropped out ($n=69$) using the intention-to-treat approach, since the factors affecting an individual's decision to drop out [30] were significantly related to the factors identified as important for adherence, as demonstrated by a Chi-square test (Chi-square=39.403, $p<0.001$). In light of the fact that 20 participants withdrew from the study at 3 months, secondary analyses were performed with the 49 participants who completed the 3-month intervention.

Results

At baseline, 54 out of 69 (78 %) participants indicated a preference for participating in a supervised (20/54 (37 %)) or unsupervised (34/54 (63 %)) walking program. Based on their

stated exercise preference, participants were then assigned to one of the two modes of supervision for the effective walking program. Twenty-nine participants who indicated a preference were able to participate in their preferred walking supervision mode (54 %). Out of the 69 participants, 43 participants (62.3 %) successfully adhered to the walking program.

Among the 20 participants (18 women) who dropped out within 3 months, 19 did not adhere successfully prior to dropping out (95 %). At baseline, 95 % (19/20) of the participants indicated a preference for participating in a supervised or unsupervised walking program, and 11 of them who stated a preference did not obtain their preferred group after being assigned (58 %).

Since the range of value (95 % CI) included 1 in the results, evidence of the odd ratios was not statistically significant and tendencies were therefore suggested for each factor that were potentially important. By using the intention-to-treat approach, the most potential factors related to adherence were identified, at 9 months (p value ≤ 0.2): (1) change in medication use, (2) work/volunteering schedule, and (3) fear (fear of falling, walking causing pain). Results indicated a tendency that participants were 20 % less likely to adhere if change in medication use (p value, 0.236) and work/volunteering schedule (p value, 0.158) both represented a negative influence. Participants were 31 % less likely to adhere if their fear of falling negatively impacted their walking adherence (p value, 0.117) (see Table 2).

With regard to the 49 participants who completed the study at 3 months, 42 (85.7 %) successfully adhered to the walking program. Thirty-five (71 %) participants indicated a preference for participating in a supervised or unsupervised walking program, in which 21 of them were able to participate in their preferred group (60 %). At the end of the study program, the majority of participants (90 %) specified that participating in their preferred group had a positive influence on their adherence (44/49).

Table 3 shows the results according to research question 1. The five most important factors potentially influencing the adherence rate as determined from the survey response at 3 months were (p value ≤ 0.2) (1) level of satisfaction during walking and (2) emotional involvement. Specifically, participants were 3.4 times more likely to adhere if their level of satisfaction influenced their walking adherence in a positive way (p value, 0.293). Moreover, we observed a tendency that people were 53 % less likely to adhere to the walking program if they characterized the factor “emotional involvement” (i.e., attitude and unbearable emotions toward physical activity) as having a negative influence on their adherence.

With regard to research question 2a, the five most important potential factors influencing walking adherence representing each adherence dimension [13] were (p value ≤ 0.2) (see Table 4):

(A) Environmental factors:

1. Health system: participants were 2.9 times more likely to adhere if they felt being supervised by an exercise therapist had a positive impact on adherence (p value, 0.230).
2. Social/economic: participants who indicated that family or friend support had no impact on their walking adherence were 3.7 times more likely to adhere (p value, 0.246).
3. Therapy related: participants were 3.6 times less likely to adhere if they perceived a change in their medication use during the study. It seemed to have a negative influence on their adherence since it was a sign of more pain or additional health problems (p value, 0.073).

(B) Personal factors:

- (i) 4. Condition related: participants were 3.1 times less likely to adhere if they considered their physical fitness level as a negative influence on walking adherence (p value, 0.191).
- (ii) 5. Patient related: participants were 11 times more likely to adhere if unbearable feelings, to the point of losing

Table 2 Most important potential factors related to adherence

Factors		Sig.*	Exp(B) ^a	95 % CI for exp(B)	
				Lower	Upper
Most important potential factors	Work-volunteering schedule	0.158*	0.800	0.587	1.091
	Fear	0.117*	0.89	0.432	1.098
	Change in medication use	0.236*	0.796	0.546	1.161
	Comparison with other participants/walkers	0.728	0.921	0.579	1.464
	Joint instability	0.598	1.105	0.763	1.600

Data of 69 participants; intention-to-treat method

CI confidence interval

* p value ≤ 0.2

^a Odds ratios for the predictors

Table 3 Most important potential factors related to adherence

Factors		Sig.*	Exp(B) ^a	95 % CI for exp(B)	
				Lower	Upper
Most important potential factors	Emotional involvement	0.082*	0.467	0.198	1.101
	Level of satisfaction	0.293*	3.368	0.350	32.439
	Fear	0.993	1.003	0.549	1.832
	Physical fitness level	0.541	1.458	0.435	4.890
	Change in medication use	0.421	1.306	0.681	2.506

Data of 49 participants, without the 20 participants who dropped out

CI confidence interval

**p* value ≤0.2^aOdds ratios for the predictors

one's ability, had no influence on their walking adherence (*p* value: 0.133).

With respect to research question 2b, Table 4 details the influence of preference compared with the five most potential adherence factors identified above (according to each dimension of adherence; *p* value ≤0.2). Preference was not considered the most important factor; it pertained to medication use and emotional involvement. The logistic regression revealed a tendency that participants who indicated a strong preference for being supervised or unsupervised were 46 % less likely to adhere if emotional involvement seemed to have a negative influence on walking adherence, in comparison with preference at baseline. Participants who had a preference and did not obtain their choice were 49 % less likely to adhere if again the factor “emotional involvement” had a negative influence on their adherence. At 3 months, results showed a tendency that participants were 77 % less likely to adhere if change in medication use had a negative influence on adherence.

Discussion

The purpose of this study was to identify factors that could potentially affect adherence and consequently influence the implementation of an evidence-based structured walking program [2], among older adults diagnosed with knee OA. We found that the five following most potential factors were deemed important to walking adherence and were therefore linked to the overall success of the walking program: participants' (1) level of satisfaction during walking, (2) emotional involvement, (3) fear, (4) physical fitness level, and (5) change in medication use.

It has been established that adherence to physical activity is a multi-dimensional behavior construct, determined by the interaction between five dimensions of adherence [13]. The conceptual framework by the WHO [13] stipulates that physical activity behavioral change is influenced by both personal determinants and environmental factors, without identifying precise factors to better understand each dimension of adherence. Preliminary results delineate the key factors that had a

Table 4 Most potential factors identified to better understand the five dimensions of adherence compared with the PEP factor

Concepts	Dimensions	Most important factors	PEP factor	Sig.*	Exp(B) ^a	95 % CI for EXP(B)	
						Lower	Upper
Environmental	1. Health system	Supervised exercise therapist		0.230*	2.933	0.383	22.463
	2. Social/economic	Family/friends support		0.246*	3.692	0.406	33.547
	3. Therapy related	Change in medication use		0.073*	0.104	0.009	1.239
Personal	4. Condition related	Physical fitness level		0.119*	0.232	0.037	1.453
	5. Patient related	Emotional involvement		0.133*	11.000	0.482	250.865
			Initial preference	0.185*	0.544	0.221	1.338
			Preferred choice	0.136*	0.508	0.209	1.236
			Preference at 3 months	0.074*	0.023	0.000	1.439

Five dimensions of adherence are based on the conceptual framework presented by WHO [13]

CI confidence interval

**p* value ≤0.2^aOdds ratios for the predictors

greatest influence on adherence to physical activity in the context of the five dimensions. This was an innovative feature of the study, as it was never examined in studies with people diagnosed with OA. These are as follows:

(A) Environmental factors:

1. Health system: supervision by exercise therapists' seemed to have a positive impact on the participant's adherence.
2. Social/economic: adherence seemed to be positively influenced if the participant received support from his family or friends.
3. Therapy related: change in the medication use seemed to negatively influence the participant's adherence.

(B) Personal factors:

4. Condition related: high physical fitness level seemed to positively affect adherence.
5. Patient related: absence of emotional involvement seemed to have a positive impact on the participant's adherence.

The implementation of the innovative strategy using PEP was essential to address the recommendations of the Ottawa Panel guidelines, in order to successfully transfer evidence-based clinical practice guidelines into clinical practice [20]. Even though preference was not considered the most important factor, walking adherence was dependent on the PEP. Participants who stated that preference had a positive influence, were two times more likely to adhere ($n=69$). Preference should be considered as an important influencing factor related to dropout as well as adherence.

This exploratory study supports the results of other studies examining adherence and drop out related to physical activity programs [17–19, 31]. Crandall et al. [32] suggested that considering preference when determining which type of intervention the participant should follow, can improve adherence. Our aforementioned findings are in accordance with those of Henry et al.'s [33] since, the authors confirmed that perception of individual physical capacity, beliefs about physical activity and motivational approaches should be considered and examined when working with a physical activity population as they can influence their behavior [33]. According to several other authors, self-efficacy [14, 25, 34] and motivation [25, 34–39] are factors that can significantly influence adherence, albeit these same factors did not reach statistical significance in our analyses even though they were evaluated.

Moreover, a new observation emerged from the analyses. Participants who perceived a change in their medication use during the study seemed to adhere poorly. It is plausible that a change in their medication prescription implies poorer health status, and as a consequence, they do not view physical activity as being able to provide any health benefits. Without perceived benefits on health or beliefs in physical activity, individuals tend to be less motivated, which influences their

adherence. More research is warranted to examine this observation.

This study was novel in that it considered many factors to potentially impact adherence to physical activity, and a quantitative methodology was used to define the relative importance of each of these potential factors. However, since the majority of the factors influenced each other, a strong multicollinearity could be noticed, which may have decreased the significance of each factor. A strong multicollinearity increases the standard error and confidence intervals for the coefficients. Thus, multicollinearity may have to lead to some statistically non-significant analyses. To address this issue, a multivariate analysis commonly employed in behavioral and social sciences research was performed using only the variables that indicated a p value of ≤ 0.2 , in order to identify the predictor variables, i.e., most potential factors. This p value was selected since a large number of categorical variables were entered in the equation. While the sample size was relatively small, a power calculation was performed prior to the study to justify the sample size. Our findings allowed for the development of a new relevant survey that can guide health professionals in their practice. The survey can be used by health professionals to assess their patients' perceptions regarding adherence factors, and therefore adopt a more patient-centered approach. Ultimately, the goal is to help researchers and health care providers to better promote long-term adherence to a physical activity program and manage these potential factors in order to enable individuals with mild to moderate OA of the knee to participate in these exercise programs. Health professionals should also assess and respect their patients' preferences for treatments [40, 41]. This will, in turn, allow the health care practitioners to adopt a patient-centered approach, to better accommodate the need of their patients, and increase their chance of success [41].

Conclusion

This exploratory study identified different potential factors, such as supervision, social support, medication use, fitness level, and emotional involvement that can influence walking adherence in clinical practice and research. Future studies should adopt an equally rigorous methodology, but factors which are inter-related and have strong associations should be removed (by performing a multicollinearity test) to avoid multi-collinearity and a larger sample size must be considered to confirm the factors that influence adherence.

In conclusion, there are many factors influencing adherence to walking program designed specifically for individuals with knee OA. These should be considered when developing physical activity interventions with this population. The most important ones included emotional involvement, mode of

supervision, family/friends support, medication intake, and physical fitness level.

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Compliance with ethical standards This proposed study was in accordance with ethical standards for human research and was approved by the Research Ethics Board from the University of Ottawa (H01-07-08C).

Disclosures None.

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Adherence (compliance) Questionnaire

*** 1. Evaluation Period**

☐ 3 months

*** 2. Date of evaluation:**

Date: MM DD YYYY
 / /

*** 3. Initials:**

*** 4. Research # :**

How each of the following combined factors can generally determine your adherence?

How can they influence your approach to reach the goal of adhering to this walking study, by walking 3 times a week as recommended in the Ottawa Panel Guidelines?

Preferred group

*** 5. Please, rate on a scale between -1 to +1 the level of influence by selecting one answer for each factor.**

	-1 (Bad influence)	0 (No influence)	+1 (Good influence)	N/A
Randomly assigned to group of intervention	☐	☐	☐	☐

Behaviour, characteristics and personality

Adherence (compliance) Questionnaire

* 6. Please, rate on a scale between -1 to +1 the level of influence by selecting one answer for each factor.

	-1 (Bad influence)	0 (No influence)	+1 (Good influence)	N/A
Level of motivation	☐	☐	☐	☐
Determination/ Perseverance	☐	☐	☐	☐
Level of energy	☐	☐	☐	☐
Quality of sleep	☐	☐	☐	☐
Morning attitude	☐	☐	☐	☐
General mood	☐	☐	☐	☐
Interest in walking	☐	☐	☐	☐
Habits	☐	☐	☐	☐
Comparison with other walkers	☐	☐	☐	☐
Self-confidence	☐	☐	☐	☐
Self-efficacy	☐	☐	☐	☐
Level of satisfaction during walking	☐	☐	☐	☐
Emotional involvement	☐	☐	☐	☐
Fear	☐	☐	☐	☐
Perceived impact of the walking intervention	☐	☐	☐	☐
Perceived personal control of the risk factors affecting OA	☐	☐	☐	☐

Environmental factors

Adherence (compliance) Questionnaire

* 7. Please, rate on a scale between -1 to +1 the level of influence by selecting one answer for each factor.

	-1 (Bad influence)	0 (No influence)	+1 (Good influence)	N/A
Work/volunteering schedule	☐	☐	☐	☐
Domestic responsibilities	☐	☐	☐	☐
Travelling (vacation/work)	☐	☐	☐	☐
Weather	☐	☐	☐	☐
Proximity of the walking area	☐	☐	☐	☐
Type of neighbourhood	☐	☐	☐	☐
Access to safe physical activity facilities	☐	☐	☐	☐
Easy access to motorised vehicles	☐	☐	☐	☐
Family/friend support	☐	☐	☐	☐
Incentives	☐	☐	☐	☐
Rush hours	☐	☐	☐	☐

Health condition

* 8. Please, rate on a scale between -1 to +1 the level of influence by selecting one answer for each factor.

	-1 (Bad influence)	0 (No influence)	+1 (Good influence)	N/A
Other health problems/comorbidities	☐	☐	☐	☐
Attitude towards actual health condition	☐	☐	☐	☐
Joint pain	☐	☐	☐	☐
Joint stiffness	☐	☐	☐	☐
Joint instability	☐	☐	☐	☐
Level of endurance	☐	☐	☐	☐
Physical fitness level	☐	☐	☐	☐
Weight control	☐	☐	☐	☐
Aging	☐	☐	☐	☐

Benefits of walking

Adherence (compliance) Questionnaire

* 9. Please, rate on a scale between -1 to +1 the level of influence by selecting one answer for each factor.

	-1 (Bad influence)	0 (No influence)	+1 (Good influence)	N/A
Knowing the benefits of walking	☐	☐	☐	☐
Health purposes (walking for health)	☐	☐	☐	☐
Psychological well-being	☐	☐	☐	☐
Physical well-being	☐	☐	☐	☐
Difference in mobility	☐	☐	☐	☐
Difference in balance control	☐	☐	☐	☐
Difference in quality of sleep	☐	☐	☐	☐
Different perception in ability to walk	☐	☐	☐	☐
Change in medication intake	☐	☐	☐	☐

Adherence (compliance) Questionnaire

Other factors

*** 10.** Is there any other factors in determining your adherence, not mentioned above?

- 1)
- 2)
- 3)

*** 11.** Please, rate on a scale between -1 to +1 the level of influence for each factor.

	-1 (Bad influence)	0 (No influence)	+1 (Good influence)	N/A
1)	☐	☐	☐	☐
2)	☐	☐	☐	☐
3)	☐	☐	☐	☐



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