**A systematic review of menopause and sport: with special interest in psychological markers**

The menopause transition is an inevitable phase in the reproductive life of women affecting around one third of the female population for between 2-10years, with some reporting problematic symptoms for up to 15years (Menopause UK, 2015). Menopause is the cessation of the reproductive cycle, or menses, and is characterized by three main stages often described as a woman's menopausal status; pre, peri and post-menopause. Pre-menopause is the phase prior to cessation of menstruation with women generally reporting regular cycles in the past year, peri-menopause is characterised by irregular cycles (differing from the norm by anything from one week, early-peri, to three months, late-peri) and post-menopausal indicates the occurrence of menstruation has fully stopped for 12-24months; early-post menopausal, or over 24months; late post-menopausal (Elavsky & McAuley, 2007). During the first of these phases, pre and peri-menopausal women commonly experience hormonal, vasomotor (or climacteric) symptoms. These might include some or all of; hot flushes, cold sweats and night sweating, vaginal dryness and breast tenderness, altered levels of pain or sensitivity, tiredness, headaches and insomnia (Zapantis & Santoro, 2003). In terms of women's psychosomatic status; they may experience changes in their nervous and emotional state (mood), self-confidence, attitudes to work/life, ability to make decisions and concentrate and memory problems (Mishra & Kuh, 2006). As for the perceived effect of menopausal transition on psychological health and well-being, a lack of association, understanding or engagement with psychological symptoms (Mishra & Kuh, 2012) and their effect on health in women themselves, and by those around them, often results in pre- or mis-conceptions formed by negative, derogatory or deleterious conations. Anecdotal reporting in popular culture can present an inexplicably moody woman described as, "going through the change," or of a, "certain age," (Moorhead, The Guardian, 2011). Public Health initiatives

have, for many years, focused on improving general health in an ageing population (Government Office for Science, 2018) through inclusive programmes of physical activity, weight management and healthy eating and by promoting NHS initiatives such as the Live Well Physical Activity Guidelines (NHS, 2018). However, these guidelines can often be construed as instructive, disciplinary (Foucault, 1995, p.135) or punitive and if one chooses not to participate, the associated effects of non-conformism or social and idealistic physical comparisons (Lenneis & Pfister, 2017) can leave many feeling disheartened, lacking in motivation and isolated.

The question remains as to how to encourage women, and particularly those reaching menopause and mid-life to continue, or begin participating in sports, or related physical activity (PA) and exercise? Consider the recent BBC Sports Relief 2018 campaign, featuring female celebrity ambassadors of the aforementioned certain age (BBC Two, 2018), embarking on a competitive sporting challenge to enhance their own lives and those affected by poverty or other circumstances. Susannah Constantine was one half of fashion guru partnership, "Trinny and Susannah," and together they presented, "What Not To Wear," a BBC fashion and clothing show (2001- 2007). Susannah complained of general weight gain, lack of motivation, busy life/work balance and of feeling generally unattractive (to her family, others and self) and was openly emotional about the perceived impact of growing older (Constantine, 2018). The challenge was to train for and complete in the 'Tough Guy' obstacle race (Tough Guy, 2018). The documentary primarily addresses weight loss issues and healthy eating, through the medium of sport, but also tackles self-esteem (Sonstroem & Morgan, 1989), self-confidence, social physique anxiety and social comparisons (Eklund & Crawford, 1994, Hagger & Stevenson, 2010).

Of the many perceived or actual barriers to participation in sport experienced during the menopausal transition, i.e. demographic, physiological and psychosocial (Irwin et al, 2004),

women's cognitive behaviour towards exercise participation can be a challenging area to influence as highlighted by Caperchoine, Mummery and Joyner (2009). Furthermore, it requires perseverance to maintain adherence once it is begun (Irwin et al, 2004). Whilst women primarily consider their challenge is to get fitter, lose weight or establish a more balanced diet; the influence of psychosocial and socioeconomic barriers or cultural and ethnic characteristics (Im, Ko, Chee, Chee & Mao, 2017) may seem secondary or irrelevant to them. From the perspective of sport psychology, this cognitive processing (Smith, 2006) is of primary concern; finding ways to influence behaviour by mediating what or moderating how much of a delivered intervention is required, is critical to engage the individual (menopausal or mid-life woman) with sport and PA as a non-pharmacological treatment to improved health (Reed et al, 2014).

## Method

In examining the relationship between menopause and sport as the main focus of this systematic review, the medical definition of menopause takes into account the wider menopausal and mid-life status of women through pre, peri and post-menopausal stages. To clarify, mid-life is defined by Ogle & Damhorst (2005) as being marked by, "losses of reproductive capacity, the mothering role, sexuality, youth, and appearance." Sport is defined by the Council of Europe (2001), "Sport means all forms of physical activity which, through casual and organised participation, aim at expressing or improving physical fitness and mental well-being, forming social relationships or obtaining results in competition at all levels." Initial database searches indicated that by narrowing and adhering to a definition of sport, including an element of competition and/or gamesmanship, findings were limited. Use of the words sport, team/game, competition/competitive and/or naming a specific competitive sport within the text, abstract and keywords merited inclusion in the first categorical group of results. The first and primary focus category accounts for specific findings relevant to the

terms menopause and mid-life, sport and theoretically defined markers of psychology in sport and contains thirteen articles. I have named this set, "Inclusions; sport and psychology." The precise nature or description of the sport varied. To justify their inclusion in the review, an explanation of the extent of the criteria or descriptors found within the documents is given here[1], *Physical Activity and Team Games/Play*: Floorball. *Physical Activity*: sports/exercise, active living, occupational, household/caregiving. *Physical Activity and Sport*: high active living and sports/exercise group, high household/caregiving and occupational activity group, low active living and sports/exercise activity group. *Masters Sport*: Australian Masters Games, World Masters Games, track and field, swimming, cycling, weightlifting, triathlon, marathon, tennis, badminton, hockey, basketball, netball and softball. *Physical Activity:* competitive Masters swimming. *Sports/Exercise Physical Activities*: (a) Household/Caregiving Index, (b) Occupational Index, (c) Active Living Index, and (d) Sports/Exercise Index. *Physical Activity and Exercise:* aerobic floor classes, competition tennis, and regular brisk walking. *Leisure Time Physical Activity (LTPA)*: walking, low impact aerobics, lifted weights, danced or cycled, hiked, step aerobics, golf, aquarobics. *Physical Activity, Exercise and Sport*: walking, aerobics, swimming, flights of stairs climbed, blocks walked and information about recreation and sports played. *Sports Participation*: competitive recreational hockey and World Masters Games (described previously) and finally, *Exercise*: walking, jogging or running, swimming, racquet sport (tennis), aerobics classes, cycling, team sport (netball) or dancing. In my view, the authors have chosen sport-related themes and measures purposefully and I hope that this review will encourage specific interest in menopause and sport (as compared to PA or exercise). However, association with, description of, or evidence of involvement in sport in its true definition appears to be lacking in most cases. In light of this, and to enable a true reflection of menopause, mid-life

[1] See Table 1 for Study Number relative to descriptions

experiences and sport-relevant topics in association with psychological markers and Quality of Life (QOL) or general psychological health and well-being, inclusion of a broad definition of sport as PA and exercise seemed necessary. The findings from this group of studies will be briefly summarised in the second results category containing fifty four items, "Inclusions; physical activity, psychology and QOL, but a full review is beyond the scope of this document.

**Sources**

The search strategy and subsequent review process employed is based on the PRISMA Guidelines and Guidance offered in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement and The PRISMA Statement for Reporting Systematic Reviews and Meta-Analyses of Studies That Evaluate Health Care Interventions: Explanation and Elaboration (Moher, Liberati, Tetzlaff & Altman, 2009). In the first instance, three main locations were searched to find published studies relating to menopause and sport (1) internet/electronic online databases including Psycinfo, Web of Science (core collection), Web of Science (all databases), Sportdiscus, Scopus, Psycharticles, WorldCat, Science Direct, Zetoc, Medline and BIDS (Ingentia), (2) Stirling University Library Catalogue and (3) citations in papers defined by the PRISMA checklist as relevant based on the inclusion criteria. The PRISMA checklist ensures a robust and valid procedure of identifying, screening, establishing eligibility and subsequent inclusion.

**Procedure**

The keywords menopause and sport were included within the following databases; Pscyinfo, Web of Science, Sportdiscus and WorldCat, under the headings 'text' + 'text', 'subject ' + 'subject', 'topic' + 'topic', 'title' + title' or combinations as follows 'title' + 'topic', 'topic' + 'title', 'text' + 'title', 'title' + 'subject'. Within Scopus; they were searched for under 'article title, abstract and keywords'. Within ScienceDirect, under 'title, abstract

and keywords'. Within Zetoc, under 'any + title'. Within Medline, menopause and sport were searched for under 'text'. Finally in BIDS (Ingentia), they were searched for under 'title, keywords or abstract'. In Stirling University Library Catalogue a search for menopause and sport was carried out. Any citations that were subsequently uncovered from references in included papers were selected by visually checking article titles based on the inclusion criteria described, (1) articles focusing on menopause and sport or sport-relevant topics, (2) articles that pay special attention to and/or description or discussion around theoretically defined psychological constructs (markers) related to affect or effect of menopause, mid-life experiences and sport combined, (3) articles published in English and containing data pertinent to menopause and sport.

**General findings.** By following the PRISMA guidelines, online database search records identified were 1973, Stirling University Catalogue revealed 2508 records and 53 additional records were found from citations within the list of inclusions. After duplicate documents were removed from these lists, 1183 records remained. A further 1077 documents were excluded as unpublished work, poster session submissions, anecdotal opinions and commentaries, reviews, foreign language documents and documents pertaining to menopause and sport with no reference to psychological markers ie., physiological, physical or other biological markers only. Following this initial screening phase and to remain focussed on menopause and sport, the sixty nine remaining documents were categorised into a parallel system of coding criteria to produce two sets of results (described earlier). At the time of writing two documents remained inaccessible. (Figure 1)

## Results

### Inclusions; Sport and Psychology

Within this primary category, there are three qualitative and ten quantitative papers. The broad topical coding criteria included menopausal status or stage of life, psychological

**PRISMA 2009 Flow Diagram**

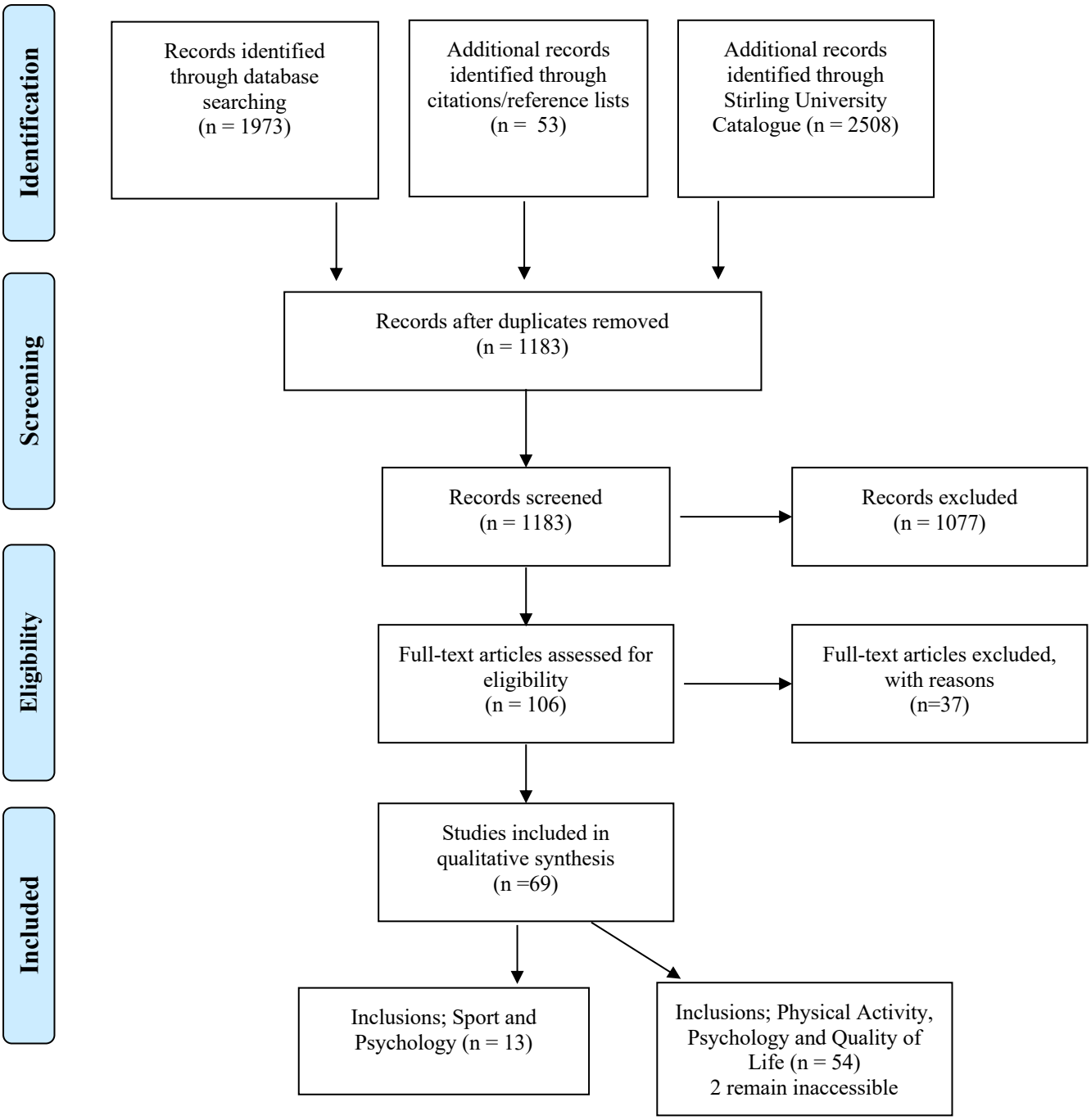


Figure 1

marker, construct or theory, physiological, physical or biological markers, sport or sport relevant descriptor and other variables.

**General findings.** The studies included in the Table 1 are described in terms of: menopausal status/life stage, sample size, age range and/or M, SD (where provided by the

author), sport or physical activity, psychological markers, socioeconomic status and study design. These categories are explored in greater detail in Tables 2-7. The tables were created following guidance presented in the PRISMA checklist (Moher et al, 2009), which helps researchers screen literature effectively, identifying bias and limitations and advising on appropriate data extraction. As the intended focus of this systematic review, the outcomes provide a concise indication of the current depth of information and understanding of how mid-life women's menopausal experiences relate to participation in sport and how their psychological health might be associated with this. The total number of women included in these studies is 6601, ranging in age from 35-90years. Specific samples of women were denoted in three articles relative to their age range or menopausal status; Litchfield and Dionigi (2012) interviewed eight mid-aged women, 35-52years (M=49years) and included comparative data from a group of fifteen older women aged 55-90years interviewed two years earlier, and Slaven and Lee (1994, 1997) included pre, peri and post-menopausal groups. The following three studies used multiple methods of sampling, resultant in data collection from two main sources; Lenneis and Pfister (2017), Litchfield and Dionigi (2012) and Dionigi (2010).

*Table 1. General findings; sport and psychology*

| Study Number* | Menopausal Status | Population/Sample Size | Age Range (M, SD) | Sport ** |
|---|---|---|---|---|
| 1 | Mid-Age (Pre, Peri, Post_Meno) | 23 -15 of whom were interviewed in-depth | 45-55 | PA, team games |
| 2 | Mid-Age (Pre, Peri, Post_Meno), Older (Post_Meno) | 8 case-study interviews +15 data comparison transcripts from previous study | Mid Age: 32-52, M=49<br>Older: 55-90 | SP |
| 3 | Older (Post_Meno) | 38 in-depth interviews + 55 short on-site interviews | 55-90 | MS |
| 4 | Pre + Peri + Meno + Post_Meno | 183 | M=49.2, SD=8.6 | PA, comp swim |

| | | | | |
|---|---|---|---|---|
| 5 | Pre + Peri + Post_Meno | 220 +47 (2 x studies) | S1 pre: M=42, peri: M=47, post: M=56 S2 pre: M=41, post(no HRT): M=57, post (HRT): M=58 | PA, E |
| 6 | Mid-Life, Pre + early/ late-Peri + Post_Meno | 542 | 40-60, M=49.01, SD=6.05 | PA, S |
| 7 | Mid-Life (Pre, Peri, Post) | 542 | 40-60, M=49.01, SD=6.05 | S, E, PA |
| 8 | Pre + Post_Meno | 60 +32 (2 x studies) | S1 pre: M=43.7, post: M=54.2 S2 pre: M=36.9, post: M=54.4 | E |
| 9 | Peri + Post_Meno | 213 | M=52.2, SD=5.9 | PA Behaviour |
| 10 | Post_Meno | 164 | 50-79 | LTPA |
| 11 | Post_Meno | 25 | M=53, SD=7.8 | PA, E, S |
| 12 | Meno_Trans | 2891 | 42-52, M=46 | PA |
| 13 | Meno | 1613 | 46-55, M=50.3, SD=2.8 | E |

*Table 1. General findings; sport and psychology (continued)*

| Study Number * | Main Psychological Variable/s** | Socioeconomic Status** | Study Design |
|---|---|---|---|
| 1 | Meaning, PhsS-Con, Inf, Barr (to PA), Gui, Norm, Enj, Behav | Danish, majority middle class, well educated | qualitative: intervention, semi-structured interviews |
| 2 | Ident, Inc, Eth, Comp | Australia, NSW: White, middle class | qualitative: purposive selection, interviews |
| 3 | Emp, Ident, Inc, Val, Abil, Self, Eth | Australia, NSW: mostly married, home-owners | qualitative: purposive selection, interviews |
| 4 | Psych-H, Eff +/-, S-Eff, Enj | Resident in Canada, USA, Australia, New Zealand, UK. 81% employed, well educated | quantitative: cross-sectional survey |
| 5 | Mood/Irr, Mem, Conc, Anx/Fear, Attr, Str, +/-Feel | S1 80% married/partner, 45% secondary/tertiary education, 74% employed. S2 94% married, 36% employed, 51% secondary/tertiary education. All Anglo-European | quantitative: cross-sectional survey |
| 6 | Att (to PA), Norm, (Perc) Cont, Behav-Int, PA S-Est | USA:157 White, 127 Hisp, 135 Afr-Am, 123 Asian | quantitative: secondary analysis, cluster |

| | | | |
|---|---|---|---|
| 7 | Dep, (int) Mot | USA:157 White, 127 Hisp, 135 Afr-Am, 123 Asian | quantitative: secondary analysis |
| 8 | Mood, Dep, +/-feel | Australia: community dwelling: regular exercisers: recruited from sports centre/organisations | quantitative: cross-sectional survey |
| 9 | Aff +/-, Soc-Inh, Res/Cop, Dep, Anx, S-Eff, S-Est, Cont | Australia: Caucasian 89%, employed full: 70.5%, part: 21.5%, 85% diploma/degree, relatively affluent | quantitative: cross-sectional survey |
| 10 | SPA, Dep, Anx, S-Est, Barr | USA: Pheonix. Predominantly Caucasian, married, well educated, mid/high socioeconomic | quantitative: cross-sectional survey |
| 11 | Mood, Anx, +/-feel | USA: Mid-West: White, Euro-Am | quantitative: observational, intervention |
| 12 | Dep | Afr-Am, Chi, Hisp, Jap, Caucasian (46%), well-educated: 77% college or higher | quantitative: longitudinal observation study |
| 13 | Pref | UK: West Midlands. White 92.4%, Non-smoker 83.7% | quantitative: survey |

*Key to Study Numbers: 1. Lenneis & Pfister (2017); 2. Litchfield & Dionigi (2012); 3.Dionigi (2010); 4. Ussher et al (2009); 5. Slaven and Lee (1997); 6. Im et al (2017); 7. Im et al (2015); 8. Slaven & Lee (1994); 9. Borkoles et al (2015); 10. Ransdell et al (2008); 11. Carels et al (2006); 12. Dugan et al (2015); 13. Daley et al (2014).

**Key to Abbreviations: Meno=Menopausal, PA=Physical Activity (Behaviour), S=Sport, SP=Sports Participation, MS=Masters Sport (competition swimming), E=Exercise, LTPA=Leisure Time Physical Activity, PhsS-Con=Physical Self-Concept, Inf=Influence, Barr (to PA)=Barriers, Gui=Guilt, Norm=Normative Behaviour, Enj=Enjoyment/Pleasure, Emp=Empowerment, Ident=Identity, Inc=Inclusiveness, Eth=Ethnicity/Culture, Comp=Competitiveness, Val=Values, Abil=Ability, Self=selfishness, Psych-H=Psychological Health, Eff+/-=Effect, S-Eff=Self Efficacy, Mood/Irr=Mood/Irritability, Mem=Memory, Conc=Concentration, Anx/Fear=Anxiety/Fear, Attr=Attractiveness, Str=Stress, +/-Feel=+/-Feelings, Att=Attitude (to PA), Cont=Control (perceived), Behav-Int=Behavioural Intention, S-Est=Self Esteem, Dep=Depression, Mot=Motivation, Aff+/-=Affect+/-, Soc-Inh=Social Inhibition, Res/Cop=Resilience/Coping, SPA=Social Physique Anxiety, Pref=Preferences. S1=Study 1, S2=Study 2. Afr-Am=African American, Hisp=Hispanic, Chi=Chines, Jap=Japanese, Euro-Am=European American

**Socioeconomic status.** Please see Table 2 for a summary of study demographics. The majority of articles, (k = 11) investigated findings relative to Caucasian or white women. The women were also identified by their residential location (not all sample groups resided in the study country), with six papers researching Australasian residents, six in the Americas, and three in European locations. Im et al (2017) and Im, Ham, Chee and Chee (2015) conducted two secondary analyses on women retrieved from quota sampling data (by

race/ethnicity) including those described as White, Hispanic, African-American and Asian. Similarly Dugan, Bromberger, Segawa, Avery & Sternfeld (2015) targeted women from these aforementioned ethnic/racial backgrounds. Half of the papers (k=7) indicated a medium/middle class socioeconomic background of which four also described a community dwelling population. An additional three studies indicated some community dwelling aspect,

*Table 2: Demographics*

| Demographic | Study Number* | Total |
|---|---|---|
| Australasian resident | 2, 3, 4, 5, 8, 9 | 6 |
| USA, Canada, Americas resident | 4, 6, 7, 10, 11, 12 | 6 |
| Europe, UK resident | 1, 4, 13 | 3 |
| Caucasian, White ethnicity | 1, 2, 3, 5, 6, 7, 9, 10, 11, 12, 13 | 11 |
| African American ethnicity | 6, 7, 12 | 3 |
| Hispanic Ethnicity | 6, 7, 12 | 3 |
| Eastern Asian ethnicity | 6, 7, 12 | 3 |
| Low Socioeconomic | N/A | 0 |
| Medium Socioeconomic | 1, 2, 3, 6, 7, 10, 11 | 7 |
| High Socioeconomic | N/A | 0 |
| Low Education | N/A | 0 |
| Medium Education | 1, 4, 5, 9, 12 | 5 |
| High Education | 1, 2, 6, 7, 10, 11 | 6 |
| Married/Partnership | 2, 3, 5, 6, 7, 10, 12 | 7 |
| Employed (full or part-time) | 1, 2, 4, 5, 9 | 5 |
| Community dwelling/based | 1, 2, 5, 8, 10, 11, 13 | 7 |

*Key to Study Numbers: as described in Table 1

by associated recruitment from sports centres and community organisations (i.e. Slaven & Lee, 1994). The educational level was indicated in eleven papers, with women receiving school education or more and six papers revealing a higher level of education such as tertiary, college or university. Being married or in a long term partnership was expressed as a co-variable in seven papers and full or part-time employment status was indicated in five.

**Menopausal status.** The results in Table 3 reveal that authors defined menopausal status in various different ways, using different descriptors to refer to the temporal aspect of menopause; Mid-life or Mid-age (k = 3), Menopausal or Menopausal Transition (k=3), Older/Post-menopausal (k=4), any or a combination of Pre, Peri, Post-menopausal (k=5). Two papers used descriptors falling into two categories Litchfield and Dionigi (2012), sampling both mid-life women and older women and Im et al (2017), describing mid-life and other detailed stages of the menopausal status; pre-, early peri-, late peri-, and post-menopausal women. For example, Slaven and Lee (1997) considered whether menopausal status revealed any differences in relation to mood, symptom reporting, HRT (hormone replacement therapy) or non-HRT use and exercise participation levels; regardless of menopausal status, exercisers scored more positively than non-exercisers.

*Table 3: Menopausal status*

| Menopausal Status or Life Stage Descriptor | Study Number* | Total |
|---|---|---|
| Mid-Life or Mid-Age Women | 1, 6, 7 | 3 |
| Menopausal or Menopausal Transition | 2, 12, 13 | 3 |
| Post-Menopausal or Older Women | 2, 3, 10, 11 | 4 |
| Multiple Stages (Pre, Peri, Post) of Menopausal Status | 4, 5, 6, 8, 9 | 5 |

*Key to Study Numbers: as described in Table 1

**Sport or physical activity**. Papers that focussed on sport and/or the team or competitive nature of sport were of special interest. One paper exclusively focussed on team sport, Lenneis and Pfister (2017). Three articles considered sport; Im et al (2017), Im et al (2015) and Carels, Berger and Derby (2006). Litchfield and Dionigi (2012) discussed sport participation and Dionigi (2010) considered masters sport. It remains disappointing that amongst this group, the number of papers mentioning sport in the abstract or introduction is six. And within Table 4 below, while six studies are represented by descriptors using the word sport, as an example to highlight the contrary, Study Number 4 by Ussher, Mount, Greenberg, Goodair and Perz (2009) which makes a purposive selection of competitive

masters swimmers, would not be included had a deeper investigation of the abstract and main body text not been made. In short, it is as a result of deeper content screening that sport associations were found in the other seven papers.

*Table 4: Sport or physical activity descriptor*

| Sport/Physical Activity Descriptor** | Study Number * | Total |
|---|---|---|
| Physical Activity | 1, 4, 5, 6, 7, 9 11, 12 | 8 |
| Team Games or Team Sport | 1 | 1 |
| Sport | 6, 7, 11 | 3 |
| Sports Participation | 2 | 1 |
| Masters Sport | 3 | 1 |
| Exercise | 5, 7, 8, 11, 13 | 5 |
| Leisure Time Physical Activity | 10 | 1 |

*Key to Study Numbers: as described in Table 1

**Descriptions of the Sport and Physical Activity criteria are included in the Methods section above

**Psychological markers.** Considering the various psychological markers described, Table 5 illustrates general psychological themes under which the studies included more detailed descriptors (see also, Table 1), constructs or items. Nine papers included topic descriptors associated with motivation and commitment. For example, influence, barriers

*Table 5: Psychological themes*

| Psychological Theme | Study Number* | Total |
|---|---|---|
| Motivation + Commitment | 1, 2, 3, 4, 6, 7, 9, 10, 13 | 9 |
| Anxiety + Stress | 1, 2, 4, 5, 7, 8, 9, 10, 11, 12 | 10 |
| Cognitive Processes | 1, 3, 4, 5, 6, 8, 9, 11, 13 | 9 |
| Social Psychology | 1, 2, 3, 4, 5, 6, 9, 10 | 8 |
| Psychological Well Being/Health | 1, 4 | 2 |
| Motor Skills | 3 | 1 |

*Key to Study Numbers: as described in Table 1

to PA, competition, enjoyment, (intrinsic) motivation, social influence and preferences (as a reason to participate in PA). Under anxiety and stress, ten articles described items such as depression, anger, (homo)phobia, fears and a description of the D-Type personality and its

associations with depressive symptoms is expanded upon by Borkoles et al (2015). Cognitive processes featured in nine papers; covering items such as normative expectations and behaviours (subjective/objective), selfishness, preferences (as a form of cognitive processing and decision making), coping and control (learning new behaviours/skills such as mindfulness training) also by Borkoles et al (2015). Eight studies discussed items that might fall into the theme of social psychology with variables relating to social cognitive theory (Bandura, 1986), self/body-esteem, social physique anxiety (Hart, Leary & Rejeski, 1989), confidence, identity management (ethnicity/culture) and social inclusion (Litchfield & Dionigi, 2012). Two papers consider a more general view of psychological well-being and health behaviours (Lenneis & Pfister, 2017) taking a qualitative approach to analysing lived experiences of twenty three women during a floorball team-playing intervention. Ussher et al (2009) address wider psychological symptoms and implications of the menopausal experience on women masters swimmers. Finally, the only paper to reveal any association with the psychological theme of motor skills, or motor skills training, is Dionigi (2010) with commentary relating to bodily competence, performance and ability.

**Study design.** The three qualitative studies utilised semi-structured interviews as a (primary) means of data collection. Each of these papers then describes a process of coding and extracting themes as follows; Lenneis and Pfister (2017), used a system of theoretically informed reading inspired by Kvale and Brinkmann, 2015. Litchfield and Dionigi (2012) describe the constant comparison method (Strauss & Corbin, 2015) in their analysis where case-study interview transcripts were compared to previously retrieved in-depth qualitative data by Dionigi (2010). This had been coded following an interpretive approach (Taylor, Bogdan & DeVault, 2016). Both papers penned by Dionigi illustrate the use of purposeful population selection. The quantitative articles contained five cross-sectional design studies, two papers performing secondary analyses, one of which was a cluster analysis (Im et al,

2017), a longitudinal observational study, an observational intervention and an observational survey.

*Table 6: Study Design*

| Study Design | Study Number* | Total |
|---|---|---|
| Qualitative Intervention | 1 | 1 |
| Qualitative Purposive | 2, 3 | 2 |
| Quantitative Cross-Sectional | 4, 5, 8, 9, 10 | 5 |
| Quantitative Secondary Analysis | 6, 7** | 2 |
| Quantitative Observational, Intervention | 11 | 1 |
| Quantitative Observational, Longitudinal | 12 | 1 |
| Quantitative Observational, Survey | 13 | 1 |

*Key to Study Numbers: as described in Table 1

**cluster analysis

**Data collection and measures.** To enable the reader to establish the range of data collection methods and measures the authors utilised in performing their research, a summary of psychological measures and typical physiological and physical measures follows. Whilst in the previous reports of variables, groups of papers reporting on similar topics have been established, in this area there are only three studies using the same measure; the POMS (Profile of Mood States, McNair, Lorr & Droppleman, 1971) featured in three papers (see Table 7) as a measure of fluctuations in mood such as tension, anxiety and depression, bearing relevance to the hypotheses of the articles. Other measures included in the documents are the DIMW, Depression Index for Midlife Women; this instrument was adopted from the MSI, Midlife Women's Symptom Index (Im, 2006). Also used to assess depression were the DS14 measure of Type-D (depressive) personality (Denollet, 2005) featuring in Borkoles et al's (2015) study and the CES-D, Centre for Epidemiology Studies Depression Scale (Radloff, 1977). Considering self-efficacy in the physical domain, Im et al (2017) utilised the PAAI, the Physical Activity Assessment Inventory (Haas & Northam 2010) alongside the BHAS (Stuifbergen & Becker, 1994), Barriers to Health Activities Scale and the QASPB

which contains Questions on Attitudes toward Physical Activity, Subjective Norm, Perceived Behavioural Control, and Behavioural Intention (Armitage, 2005). An adapted version of Perz' (1997) Menopause Symptom List 1997 includes questions on both psychological and physical symptoms similar to the WHQ (Hunter 1992), Women's Health Questionnaire, which were used respectively by Ussher et al (2009) and Slaven and Lee (1997). The two remaining instruments are the SPAS, Social Physique Anxiety Scale (Hart et al, 1989) measuring our self-perceptions about how others see us physically; this was used by Ransdell, Wells, Manore, Swan and Corbin (2008), and The Medical Outcomes Study Social Support Survey (Sherbourne & Stewart, 1991) featuring in Dugan et al's (2015) paper.

*Table 7: Psychological Measures*

| Psychological Measure | Study Number * | Total |
|---|---|---|
| Profile of Mood States (POMS) | 5, 8, 11 | 3 |
| Depression Index for Midlife Women, DIMW | 7 | 1 |
| Measure of Type-D (depressive) personality, DS14 | 9 | 1 |
| Centre for Epidemiology Studies Depression Scale, CES-D | 12 | 1 |
| Physical Activity Assessment Inventory, PAAI | 6 | 1 |
| Barriers to Health Activities Scale, BHAS | 6 | 1 |
| Questions on Attitudes toward Physical Activity, QASPB | 6 | 1 |
| Social Physique Anxiety Scale, SPAS | 10 | 1 |
| The Medical Outcomes Study Social Support Survey | 12 | 1 |
| Menopause Symptom List | 4 | 1 |
| The Women's Health Questionnaire, WHQ | 5 | 1 |

*Key to Study Numbers: as described in Table 1

The physical, physiological and other measures were similarly varied across the thirteen studies. Two measures featured in numerous papers; the first being the KPAS, Kaiser Physical Activity Scale (Ainsworth, Sternfeld, Richardson, & Jackson, 2000) utilised in four studies. Its use has proven to be one of the defining criteria for inclusion of studies within this review due to its use of questions which measure sport/exercise (as well as physical activity in other domains such as housework). The other measure occurring more than once is

the post-50 3-S fitness test (Bell, 1985) used on two occasions by Slaven and Lee (1997, 1994). Similarly, forming part of the reason for study inclusion, two papers made use of Paffenbarger's sport-related instrument, the PPAQ also known as the CAQ, Paffenbarger Physical Activity Questionnaire or College Alumni Questionnaire (Paffenbarger, Wing & Hyde 1978). Another fitness test used was described as a GXT, graded exercise test, to measure functional capacity in terms of Heart Rate and VO2 (amount of oxygen) uptake. Other typical measures were taken referring to menopausal status, either by simple 'yes' or 'no' answers to a single question, "are you menopausal?" or via validated instruments such as the Greene Climacteric Scale (Greene, 1976) and the Menopause Symptom List (Perz, 1997). Anthropometric measures such as BMI (Body Mass Index, measured in kg/m2) and Body composition (skinfold measures and waist to hip ratio measures) featured regularly. Finally, Carels et al (2006) made use of accelerometer feedback and participant diaries/logbooks of activity.

## Results

### Inclusions; Physical activity, Psychology and Quality of Life

Within this group of fifty four documents, over 50000 women (k = 50405) were represented with ages ranging from 35-75years. The main abstract or keyword terms to describe PA were as follows; twenty two articles used Physical Activity, nine articles used Exercise alone, ten focused on Physical Activity and Exercise, three considered Physical Exercise, two described Exercise and Aerobic Training. Of all the remaining articles, the terms used were Aerobic Exercise and Aerobic Dance, Cardiorespiratory Fitness and Physical Activity, Circuit Training, Exercise Training, Exercise and Aerobic Training, Physical Activity and Resistance Training, Physical Activity and Physical Exercise, Physical Fitness, Physical Activity Goals, and two of the papers used three descriptors; Physical Fitness, Exercise and Physical Activity and Physical Activity, Exercise and Fitness.

The range of psychological markers or variables is extensive. To illustrate the frequencies of the most commonly occurring items, the data was processed in SPSS Statistics version 23; QOL (or Health Related or Menopausal QOL) appeared in twenty three articles; depression in twenty one studies; general psychological symptoms in fifteen; psychosomatic or psychosocial in fourteen; anxiety seen in eleven papers; esteem (global, self or body) and mental health and well-being featuring in nine; self or physical self-efficacy featuring in eight articles; mood, stress and affect (positive or negative) appeared in seven studies and attitude (towards physical activity or exercise) in four papers. Study design was largely devoted to quantitative methods (k=49), with three authors following qualitative processes and two papers utilising mixed methods. Seventeen of the quantitative studies described randomised controlled trial procedures. Unless otherwise stated, the population groups were mainly Caucasian, educated, community dwelling women recruited via newspaper advertising, internet, local shops, surgeries or clinics, workplaces and community or sport centres. An example of a more purposive selection is that related to inclusion of the variable Neighbourhood Characteristics amongst a group of African-American women (Wilbur et al 2009). This summary of results is not exhaustive and merits further investigation.

## Discussion

The main aims of this review were twofold, (1) to establish the current depth of information about and understanding of menopause and sport and (2) to illustrate the relationships that exist between psychological markers, mid-life women experiencing menopause and their associated participation in sport or sport-related activities. Across both groups of papers, sport-associated and physical activity-associated, there is a moderate association between participating in sport and this relating to ameliorating the psychological symptoms of menopause. By revealing the wide variety of ages and menopausal or mid-life

stages, these fundamental aspects begin to form a picture of the range of individual, complex issues experienced.

**Outcomes, critical responses and applied implications.** Slaven and Lee (1994,1997) considered results from two studies both demonstrating that exercise (on exercisers in study one, and the immediate effect of exercise in study two) resulted in a more positive or enhanced mood; suggesting that exercise may lead to short term, beneficial effects on the alleviation of psychological symptoms of menopause, but also noting the cross-sectional design of their study cannot determine whether exercise is the direct cause. This presents an opportunity for subsequent research to improve upon the study design and test for causal hypotheses. Daley et al (2010) reported that 75.9% of study respondents considered exercise an acceptable alternative to HRT. Their preferred activities were walking (96.5%), swimming and dancing. The least preferred options were team sports (72.5%), jogging/running and racquet sports. Interestingly and ironically, given that women selected walking, swimming and dancing as preferences, they also wanted these to be delivered by personal trainer or via DVD. This gap between women's expectations and practical solutions is startling (there are few personal sports coaches offering one-to-one walking programmes and the perceived value to the participant and actual cost to the service provider, is respectively low and high making it unviable). It is more likely that personal coaching or individual attention would be delivered during participation in team or competition sports. However, if this is what women are saying, then consideration of this dilemma ought to be included to ensure future design success of interventions. Im et al (2017) considered perceived barriers to PA, and in association, women's physical activity self-efficacy and social influences. In their cluster analysis, Cluster 1: high active living and sports/exercise group contained 48% (of N = 542) of participants. This unusual perspective of classifying women by PA levels, and accounting for typical determining factors as to how they came to

be in the cluster groups, allowed the authors to reveal that intrinsic motivation (one's internally driven desire or willingness) to exercise is closely associated with cultural and ethnic beliefs about physical activity. Cluster 1 had lower perceived barriers (to PA) scores, higher self-efficacy and social influence scores (all $p < 0.05$) and more positive attitude scores. In socioeconomic terms, Cluster 1 had higher income, Clusters 2 and 3 both indicated no access to health care and high scores of perceived barriers to PA. Pertinent to these findings is the conclusion that healthcare or sports professionals should carefully consider ethnic, cultural and preconceived perceptions about women's PA levels before designing adaptive interventions.

Depression and depressive symptoms were the psychological foci of articles by Im et al (2015) and Dugan et al (2015). Respectively, they reported negative correlations between depressive symptom scores and physical activity, active living and sports/exercise (all $p < .01$) and women reaching recommended PA guidelines (USA) or 'below' PA guidelines, as compared to inactivity, were less likely to experience high depressive symptoms. Furthermore, Borkoles et al (2015) suggested that inherent depressive symptoms of Type-D personality were associated with negative health outcomes as compared to non-Type-D women who associated with less psychological and climacteric symptoms. In light of these three outcomes, and given that women in Dugan et al (2015) reported amongst their specific activities; team sport and individual sport, one recommendation might be for practice-based professionals to consider ways of incorporating psychological skills training or counselling in combination with regular participation in sport and exercise.

Social physique anxiety was investigated by Ransdell et al (1998). Unsurprisingly, less active women by measure of LTPA, with more body fat and upper body fat distribution, had higher SPA. Again, the applied implications for those delivering or designing interventions for women in these categories, experiencing post-menopausal symptoms, must be to consider the

psychological effects of SPA such as low self-esteem. Carels et al (2006) reported significant decreased mood state outcome scores ($p < .05$) immediately after a graded exercise test (GXT) for tension-anxiety, depression-dejection, anger-hostility and confusion-bewilderment. However, associations between subsequent planned (and unplanned) activities revealed complex and bewildering findings, admitted by the authors as, "surprising and difficult to interpret." One potential route for intervention design might involve establishing an individual's mood state via baseline measurements (utilising a simplified POMS) prior to exercise, and then include a timely (momentary) positive affect measure to enhance their mood, intention or motivation to participate in PA. Thus hypothesising that immediate mood enhancement affect will increase participation levels.

The women in Ussher et al's (2009) study assessed their menopausal status relative to negative affect on swimming performance and attitude towards swimming. The stage of menopause, i.e. pre, peri or post, most affected their amount of swimming: post-menopausal women swam most (11.3 hours) and peri-menopausal, least (7.9 hours). The effects of menopause were felt negatively in relation to actual swimming performance (24% of respondents), intensity of training associated with menopause status ($p = 0.003$), and confidence to compete and enjoyment. The limitations of this study were numerous; its focus on negative aspects of menopause, a single sport and a homogenous, highly physically active population. However, comparing this highly active, competitive group of swimmers to the previously sedentary women in Lenneis and Pfister's (2017) qualitative floorball intervention reveals startling differences in experiences; this being invaluable to the researcher. The highly active group of swimmers reported negative impacts of menopause on their sport participation versus the previously sedentary group of mid-life women who reported the fun, enjoyable and life-enhancing experience of team sport on their health. Considering the implications of these contrasting reports on improving women's health during menopause, it

is vital that practitioners account for the perspective from which women view their experiences, their current physical activity levels and stage of menopause when advising on how to ameliorate for it. Finally, Dionigi (2010) and Litchfield and Dionigi (2012) consider how sport amongst a mid-age and older female population provides them with opportunities to redefine themselves both socially; through belonging and engagement, freedom, empowerment (resistance and ability to fight back) and independence, and physically; through bodily competence, redefining the perceived normative expectations of success or performance and seeing beyond the physical embodiment and medical realm of being female (Vertinksy, 1998).

**Limitations.** The most commonly mentioned limitations in the studies are self-report questionnaires, measures and instruments described earlier. These measures carry risk of bias in so far as the individuals completing them may systematically rank themselves higher or lower than the actual case. For example, self-report BMI data might be biased towards a more favourable outcome if participants perceive themselves of reasonable weight compared to height, thus skewing overall results relative to this variable. Even if the measure is designed to assess objectively, participants may still provide false information. Authors most commonly reported on the construct validity and reliability of instruments using Cronbach's Alpha within their study settings, thus establishing confidence in the results. Similarly, relying on feedback from diaries or other forms of self-monitored data such as acceleromotor measures expose the data collection process to missed, misrecorded or falsified data. The authors' choice of measure is critical and bears significance on outcomes, most especially if the measure simply does not assess what it ought to. To include an example of this, the PAAI, (Haas & Northam, 2010), was designed as a comparative measure for women having experienced (breast) cancer or not, and whilst measures of physical activity are relevant to the study (Im et al, 2017), the issues pertaining to breast cancer treatment were not. The authors

point out that an adapted version of this measure was used to suit the population group and it remains important to consider this when reviewing articles both collectively and singularly. Recruitment of populations across the thirteen main papers varied, from purposive (Dionigi, 2010) and selective recruitment (i.e. based on criteria that women must be sedentary and willing to participate in team sport for research purposes, Lenneis & Pfister, 2017) for the qualitative studies, to open advertising in local or national media and within community based organisations or public facilities, i.e. sports or health centres. These wider recruitment options applied to the quantitative studies and resulted in volunteer cohorts whom, most likely, had vested interests in becoming involved. Subsequently, the results reported are limited to the research population groups within the scope of this review. The strengths of this systematic review are that it has followed a process recommended by PRISMA guidelines (Moher et al, 2009) and offers readers a replicable route for locating empirically published literature on the topic of menopause and sport or sport-relevant topics. Whilst it attempts to integrate large quantities of information from both qualitative and quantitative studies which struggle to find common ground in terms of language and definitions of terms, the creation of two categorical inclusion groups allowed an in depth examination of studies representing sport over physical activity. The summarised results presented from studies representing physical activity, together with omissions and exclusions (described earlier in the Procedure section) represent potentially interesting and favourable findings associating PA with alleviation of psychological symptoms of menopause. Taken together, these two groups of studies offer researchers a sound and robustly investigated basis upon which to establish further investigation.

**Conclusions and recommendations.** Papers in the Inclusions: sport and psychology group were published across a wide range of journals including the Western Journal of Nursing Research, International Journal of Interdisciplinary Social Sciences, Health

Psychology, the Journal of Women's Health and the Annals of Leisure Research. The authors were (are) largely academics working in universities and research centres relating to exercise, clinical science, sport, movement studies, public health and epidemiology, psychology and preventative medicine. For the hard-working researchers to create impact beyond academic publication, they must find a collective position for public engagement (Webb & Poliakoff, 2008). The summary outcomes of these studies indicate that dissemination of information is key to educating women and by providing a normative environment (Cialdini, 2003) for discussion about individual menopausal journeys, the process of learning about the potential of participation in sport and PA as fundamental (not optional) to good health can begin (Booth, Roberts & Laye, 2012). Targeting sports science organisations or sports governing bodies at practice-based level would encourage professional and public engagement with the issues. It is also pertinent that professionals working with mid-life or menopausal women establish a process of examining the paradigms of their participation in sport or PA beyond the norms and cultural/ethnic expectations of what it means to be a woman, as explained by Toffoletti & Palmer (2015), and the contrived, limited scope of interventions (Zakrajsek & Blanton, 2017). They ought also, to seek out women who have lived for and with sport, such as Chris Evert, as examples of what else might happen (Jamieson, 2016); so that advice and treatments appropriate to exact circumstances are given. In simple terms and relative to the behaviour of menopausal women; expectations, limitations and motivations define our cognitive behaviours and resultant physical behaviours to the extent that we may not execute a (physical) task because we worry what others may think of us whilst we are doing it (Banduras, 1986, Frederick & Morrison, 1996). This must change and so, we return to the question posed earlier; how to encourage women, and particularly those reaching menopause and mid-life to continue, or begin participating in sports or related PA and exercise?

The studies reveal that menopause may not be the issue and Atwood, McElgun, Celin and McGrath (2008) explain why the connotations of menopause cause women to baulk at its prospect, but is it worse than any other phase in their reproductive lives and why would it be more preventative to participation in sport? Marvan, Islas, Vela, Chrisler and Warren (2008) reveal stereotypically negative definitions from women about reaching puberty, menstruation, pregnancies, menopause and post-menopause. Equivocally, sport (participation) may not be the issue. Sport involves entertainment, socialising (avoidance of isolation), team spirit, physical activity; all more attractive prospects and representative of fun and well-being (Coalter, Allison & Taylor, 2000, as cited in Coalter, 2005, p.13). Is sport a distraction from symptoms of menopause and is that a bad thing? Conversely, if menopause is a distraction from sport, how can we ensure that sporty women remain involved and sedentary women don't use it as an excuse not to participate? To ensure that sport is for every woman, and as an hypothesis; how do we establish which sports suit women more? How also might we educate women primarily on the psychological benefits of participation, overcoming their counter-productive concerns about self-efficacy, self-esteem and other perceived barriers, as a means of achieving sought after physical or general health benefits (i.e. empirically established physiological benefits of exercise and PA as described by Chodzko-Zajko et al, 2009)? Many women's lives are saturated with excess and pressure to achieve success. We are overwhelmed by choice and rendered impotent as a result (Newcomb, 2017). We are led to believe (in developed countries) that convenience and comfort are optimal and in tandem, have experienced healthcare improvements supporting us into old age. The combined effect of these two situations is enormously challenging; associated health problems of ageing and trends towards sedentary life-styles creating massive public demand versus a service provision gap. It is clear from the collective results of this review, that unless we educate women in what being active really means and on how to make decisions about fundamental

necessities, then many will suffer chronic health problems as they reach menopause and beyond. As a final recommendation, the model below is proposed as a possible consultation tool for applied practitioners to find routes to improved participation in sports or PA, ensuring at every stage that individual circumstances are prioritised, thus leading to appropriate solutions (Figure 2).

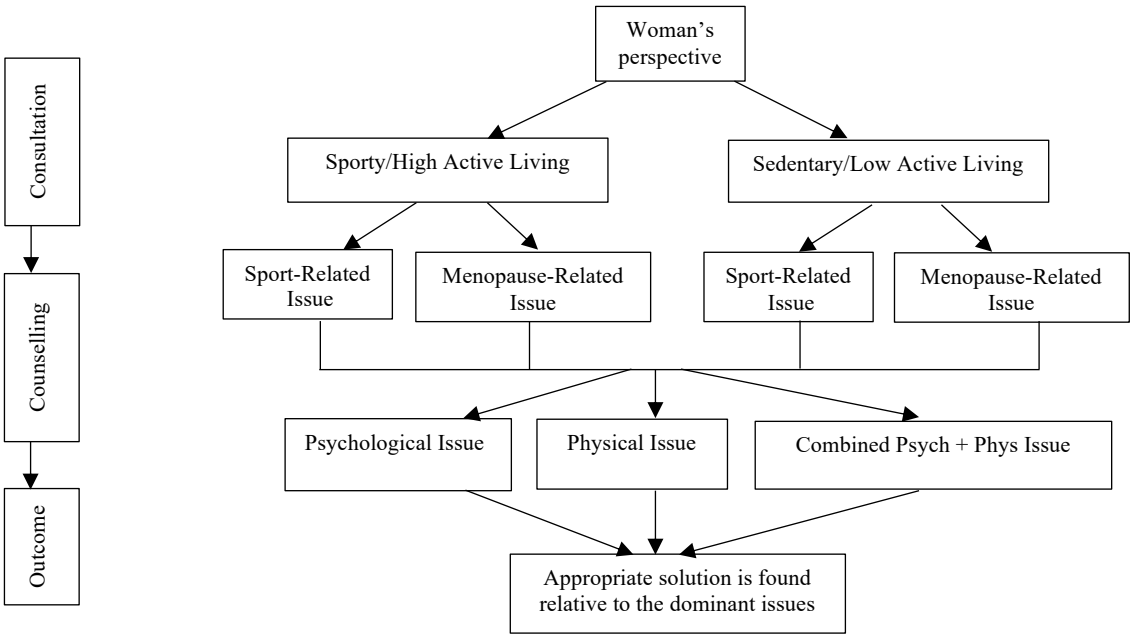


Figure 2

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