**Supplement 6. Physical activity assessment across included studies.**

|  |  |
| --- | --- |
| **Subjective assessment** | **Number of studies (N = 8)** |
| Compliant vs non-compliant with exercise prescription | N = 5 (Chien, Chen, Garet, & Wang, 2014; Corvera-Tindel, Doering, Gomez, & Dracup, 2004; L. Evangelista et al., 2003; L. S. Evangelista, Berg, & Dracup, 2001; van der Wal et al., 2006) |
| Daily physical activity, measured using a validated scale, International Physical Activity Questionnaire (IPAQ) | N = 2 (Klompstra, Jaarsma, & Strömberg, 2018; Oka, Gortner, Stotts, & Haskell, 1996) |
| The European Heart Failure Self-care Behaviour Scale | N = 1 (Gallagher, Luttik, & Jaarsma, 2011) |
| Compliance rate | N = 1 (L. S. Evangelista et al., 2001) |
| **Objective assessment** | **Number of studies (N = 9)** |
| Energy expenditure average daily kcal, estimated using accelerometer | N = 4 (Chien et al., 2014; Lee et al., 2016; Moreno-Suarez, Liew, Dembo, Larbalestier, & Maiorana, 2019; Pozehl et al., 2018) |
| Daily accelerometry units – lowest tertile vs highest tertile | N = 1 (Snipelisky et al., 2017) |
| Average daily accelerometer units | N = 1 (Witham, Argo, Johnston, Struthers, & McMurdo, 2006) |
| Steps per day total, measured using accelerometer | N = 3 (Alosco et al., 2012; Dontje et al., 2014; Werhahn et al., 2019) |
| Duration, hours/day, measured using accelerometer | N = 1 (Werhahn et al., 2019) |

**The assessment of barriers and enablers across included studies.**

| **Construct** | ***Construct and physical activity assessment*** |
| --- | --- |
|  |  |
| **Age** | *Years*  *Compliant vs non-compliant with exercise prescription)* (Chien, Chen, Garet, & Wang, 2014; L. Evangelista et al., 2003; L. S. Evangelista, Berg, & Dracup, 2001)      *Daily accelerometry units – lowest tertile vs highest tertile* (Snipelisky et al., 2017) |
| Years  *Average daily accelerometer units*(Witham, Argo, Johnston, Struthers, & McMurdo, 2006)  *Energy expenditure average daily kcal* (Chien et al., 2014; Lee et al., 2016; Pozehl, Mcguire, et al., 2018)  *Steps per day total*(Alosco et al., 2012; Dontje et al., 2014)*, IPAQ scale*(Klompstra, Jaarsma, & Strömberg, 2018) |
| **Comorbidity** | Charlson Comorbidity Index  *Compliant vs non-compliant with exercise prescription*(Corvera-Tindel, Doering, Gomez, & Dracup, 2004) |
| Charlson Comorbidity Index  *Energy expenditure, average daily kcal*(Pozehl, Mcguire, et al., 2018) |
| **Social support** | High(>9) vs low(<=9) perceived social support scale score  *The European Heart Failure Self-care Behaviour Scale score2* (Gallagher, Luttik, & Jaarsma, 2011) |
| *--* |
| **Negative attitude** | *--* |
| Negative Attitude Scale*3*  *Energy expenditure (average daily kcal)*(Pozehl, Mcguire, et al., 2018) |
| **Positive attitude** | *--* |
| Positive Attitude Scale*4*  *Energy expenditure, average daily kcal* (Pozehl, Mcguire, et al., 2018) |
| **Six-minute Walking Test (6MWT)** | Meter/minute  *Compliant vs non-compliant with exercise prescription*(Corvera-Tindel et al., 2004)  *Daily accelerometry units – lowest tertile vs highest tertile*(Snipelisky et al., 2017) |
| Meter/minute  *Average daily accelerometer units*(Witham et al., 2006)  *Energy expenditure (average daily kcal)* (Pozehl, Mcguire, et al., 2018)  *Steps per day total*Werhahn et al. (2019) |
| **Physical functioning (self-report)** | Scale score (MOS SF-36)5  *Compliant vs non-compliant with exercise prescription*(L. S. Evangelista et al., 2001)  Scale score (KCCQ)6  *Daily accelerometry units – lowest tertile vs highest tertile*(Snipelisky et al., 2017) |
| Scale score (KCCQ)6  *Energy expenditure and steps per day* (Pozehl, Mcguire, et al., 2018; Werhahn et al., 2019) |
| **Symptoms** | *--* |
| KCCQ6, total symptom score (symptom subscale)  *Energy expenditure*(Pozehl, Mcguire, et al., 2018) |
| **Left Ventricular Ejection Fraction (LVEF), %** | Percentage, %  *Compliant vs non-compliant with exercise prescription*(Corvera-Tindel et al., 2004) |
| Percentage, %  *Energy expenditure*(Chien et al., 2014; Lee et al., 2016; Pozehl, Mcguire, et al., 2018)  *Steps per day*(Dontje et al., 2014; Werhahn et al., 2019) |
| **Self-efficacy** | *--* |
| An unspecified self-efficacy scale score  *A single-item exercise scale*(Klompstra et al., 2018)  Self-efficacy scale*7*  *Energy. Expenditure8* (Lee et al., 2016)  Self-efficacy scale*9* score  *Daily energy expenditure*(Chien et al., 2014)  Self-efficacy scale  *Steps per day, total*(Dontje et al., 2014)  Self-efficacy scale*10*  *Daily physical activity 11* (Oka, Gortner, Stotts, & Haskell, 1996)  KCCQ self-efficacy score  *Energy expenditure, kcal*(Pozehl, Mcguire, et al., 2018) |
| **Depression** | Presence of clinical depression  *Daily accelerometry units – lowest tertile vs highest tertile*(Snipelisky et al., 2017)  Hospital Anxiety and Depression scale (HADS) subscale score  *Compliant vs non-compliant with exercise prescription* (Corvera-Tindel et al., 2004)  Centre for Epidemiology Surveys-Depression scale (CES-D)  *Compliant vs non-compliant with exercise prescription* (van der Wal, van Veldhuisen, Veeger, Rutten, & Jaarsma, 2010) |
| HADS score  *Total steps/day*(Alosco et al., 2012)  HADS score  *Accelerometry counts*(Witham et al., 2006)  PROMIS-29 score  *Energy expenditure, kcal*(Pozehl, Mcguire, et al., 2018) |
| **Digoxin prescription** | *Compliant vs non-compliant with exercise prescription*(Corvera-Tindel et al., 2004) |
| *--* |
| **Doppler estimated filling pressure** | *Daily accelerometry units – lowest tertile vs highest tertile*(Snipelisky et al., 2017) |
| *--* |
| **Dysphoria** | MAACL emotional dysphoria score  *Compliant vs non-compliant with exercise prescription*(Corvera-Tindel et al., 2004) |
| *--* |
| **Education** | Education above junior  *Energy expenditure*(Chien et al., 2014)  College or over  *Energy expenditure MET/min/week*(Lee et al., 2016)  College or over  *Compliance rate*(L. S. Evangelista et al., 2001)  Post-secondary degree  *Energy expenditure, kcal*(Pozehl, Mcguire, et al., 2018) |
| Years  *Accelerometer, steps per day*(Alosco et al., 2012) |
| **Employment** | Yes vs no  *Energy expenditure* (Lee et al., 2016; Pozehl, Mcguire, et al., 2018) |
| *--* |
| **Ethnicity** | Caucasian vs non-Caucasian  *Daily accelerometry units – lowest tertile vs highest tertile*(Snipelisky et al., 2017)  *Energy expenditure* (Pozehl, Mcguire, et al., 2018) |
| *--* |
| **HF duration** | Years  *Compliant vs non-compliant with exercise prescription*(Corvera-Tindel et al., 2004) |
| Years  *Energy expenditure total*(Lee et al., 2016) |
| **HFrEF (Yes)** | HFrEF vs HFpEF  *Energy expenditure, kcal*(Pozehl, Mcguire, et al., 2018) |
| -- |
| **pro-BNP** | -- |
| ng/mL  *Duration, hours/day*(Werhahn et al., 2019) |
| **Hostility** | MAACL hostility score  *Compliant vs non-compliant with exercise prescription*(Corvera-Tindel et al., 2004) |
|  |
| **Income** | *--* |
| Above poverty  *Energy expenditure*(Lee et al., 2016) |
| **Left Atrial Volume index (LAV)** | l/m2  *Daily accelerometry units – lowest tertile vs highest tertile*(Snipelisky et al., 2017) |
| *--* |
| **Left Ventricular Assist Device (LVAD)** | Pre-post LVAD  *Energy expenditure total* (Moreno-Suarez, Liew, Dembo, Larbalestier, & Maiorana, 2019) |
| *--* |
| **Left Ventricular Remodelling (LVR)** | Relative myocardial wall thickness  *Daily accelerometry units – lowest tertile vs highest tertile*(Snipelisky et al., 2017) |
| *--* |
| **Partner** | Living with a spouse, Yes vs No  *Daily energy expenditure*(Chien et al., 2014)  Marital status  *Compliance rate*(L. S. Evangelista et al., 2001) |
| *--* |
| **PeakVO2** | mL/kg/min  *Compliant vs non-compliant with exercise prescription*(Corvera-Tindel et al., 2004) |
| mL/kg/min  *Steps/day, total*(Werhahn et al., 2019) |
| **Perceived exertion** | *--* |
| *IPAQ scale*(Oka et al., 1996) |
| **Quality of Life (QoL)** | KCCQ scale6 total score  *Daily accelerometry units – lowest tertile vs highest tertile* (Snipelisky et al., 2017) |
| KCCQ scale 5 total score  *Energy expenditure*(Lee et al., 2016; Pozehl, Mcguire, et al., 2018) |
| **Renal function** | Estimated glomerular filtration rate (eGFR) ml/min  *Accelerometer unitslowest tertile vs highest tertile*(Snipelisky et al., 2017) |
| *--* |
| **Smoking** | *--* |
| Smoking (yes vs no)  *Energy expenditure*(Lee et al., 2016) |
| **Symptom distress** | -- |
| MSAS-SF 12*Energy expenditure, total daily* (Chien et al., 2014) |

References:

Alosco, M. L., Spitznagel, M. B., Miller, L., Raz, N., Cohen, R., Sweet, L. H., … Gunstad, J. (2012). Depression is associated with reduced physical activity in persons with heart failure. *Health Psychology*, *31*(6), 754–762. https://doi.org/10.1037/a0028711

Chien, H.-C., Chen, H.-M., Garet, M., & Wang, R.-H. (2014). Predictors of physical activity in patients with heart failure: a questionnaire study. *The Journal of Cardiovascular Nursing*, *29*(4), 324–331. https://doi.org/10.1097/JCN.0b013e31828568d6

Corvera-Tindel, T., Doering, L. V., Gomez, T., & Dracup, K. (2004). Predictors of noncompliance to exercise training in heart failure. *The Journal of Cardiovascular Nursing*, *19*(4), 269–77; quiz 278. https://doi.org/10.1097/00005082-200407000-00006

Dontje, M. L., van der Wal, M. H. L., Stolk, R. P., Brügemann, J., Jaarsma, T., Wijtvliet, P. E. P. J., … de Greef, M. H. G. (2014). Daily physical activity in stable heart failure patients. *The Journal of Cardiovascular Nursing*, *29*(3), 218–226. https://doi.org/10.1097/JCN.0b013e318283ba14

Evangelista, L., Doering, L. V., Dracup, K., Westlake, C., Hamilton, M., & Fonarow, G. C. (2003). Compliance behaviors of elderly patients with advanced heart failure. *The Journal of Cardiovascular Nursing*, *18*(3), 197–206; quiz 207. https://doi.org/10.1097/00005082-200307000-00005

Evangelista, L. S., Berg, J., & Dracup, K. (2001). Relationship between psychosocial variables and compliance in patients with heart failure. *Heart & Lung : The Journal of Critical Care*, *30*(4), 294–301. https://doi.org/10.1067/mhl.2001.116011

Gallagher, R., Luttik, M.-L., & Jaarsma, T. (2011). Social support and self-care in heart failure. *The Journal of Cardiovascular Nursing*, *26*(6), 439–445. https://doi.org/10.1097/JCN.0b013e31820984e1

Klompstra, L., Jaarsma, T., & Strömberg, A. (2018). Self-efficacy Mediates the Relationship Between Motivation and Physical Activity in Patients With Heart Failure. *The Journal of Cardiovascular Nursing*, *33*(3), 211–216. https://doi.org/10.1097/JCN.0000000000000456

Lee, H., Boo, S., Yu, J., Suh, S.-R., Chun, K. J., & Kim, J. H. (2016). Physical Functioning, Physical Activity, Exercise Self-Efficacy, and Quality of Life Among Individuals With Chronic Heart Failure in Korea: A Cross-Sectional Descriptive Study. *The Journal of Nursing Research : JNR*. https://doi.org/10.1097/jnr.0000000000000150

Moreno-Suarez, I., Liew, S., Dembo, L. G., Larbalestier, R., & Maiorana, A. (2019). Physical Activity Is Higher in Patients with LVADs Compared to Chronic Heart Failure. *Medicine and Science in Sports and Exercise*. https://doi.org/10.1249/MSS.0000000000002104

Oka, R. K., Gortner, S. R., Stotts, N. A., & Haskell, W. L. (1996). Predictors of physical activity in patients with chronic heart failure secondary to either ischemic or idiopathic dilated cardiomyopathy. *The American Journal of Cardiology*, *77*(2), 159–163. https://doi.org/10.1016/s0002-9149(96)90588-3

Pozehl, B. J., Mcguire, R., Duncan, K., Hertzog, M., Deka, P., Norman, J., … Keteyian, S. J. (2018). Accelerometer-Measured Daily Activity Levels and Related Factors in Patients With Heart Failure. *The Journal of Cardiovascular Nursing*, *33*(4), 329–335. https://doi.org/10.1097/JCN.0000000000000464

Snipelisky, D., Kelly, J., Levine, J. A., Koepp, G. A., Anstrom, K. J., McNulty, S. E., … Redfield, M. M. (2017). Accelerometer-Measured Daily Activity in Heart Failure With Preserved Ejection Fraction: Clinical Correlates and Association With Standard Heart Failure Severity Indices. *Circulation. Heart Failure*, *10*(6), e003878. https://doi.org/10.1161/CIRCHEARTFAILURE.117.003878

van der Wal, M. H. L., Jaarsma, T., Moser, D. K., Veeger, N. J. G. M., van Gilst, W. H., & van Veldhuisen, D. J. (2006). Compliance in heart failure patients: the importance of knowledge and beliefs. *European Heart Journal*, *27*(4), 434–440. https://doi.org/10.1093/eurheartj/ehi603

Werhahn, S. M., Dathe, H., Rottmann, T., Franke, T., Vahdat, D., Hasenfuß, G., & Seidler, T. (2019). Designing meaningful outcome parameters using mobile technology: a new mobile application for telemonitoring of patients with heart failure. *ESC Heart Failure*, *6*(3), 516–525. https://doi.org/10.1002/ehf2.12425

Witham, M. D., Argo, I. S., Johnston, D. W., Struthers, A. D., & McMurdo, M. E. T. (2006). Predictors of exercise capacity and everyday activity in older heart failure patients. *European Journal of Heart Failure*, *8*(2), 203–207. https://doi.org/10.1016/j.ejheart.2005.03.008