Table 1: Inclusion and exclusion criteria for systematic review

Factor	Inclusion Criteria	Exclusion Criteria
Behaviour	• Seasonal influenza vaccination uptake behaviours or intentions.	• Studies not related to a behavioural outcome (e.g. those determining medical efficacy of the vaccine). • Studies focussing other types of influenza (e.g. pandemic, swine).
Psychological Factors	• Studies that draw on a relevant psychosocial or psychological model when explaining vaccination behaviour.	• Studies that do not draw on an appropriate psychosocial or psychological theory in their assessment of psychological factors.
Population	• Adults (aged ≥16 years) with a physical health condition where flu vaccination is recommended by Health Protection Scotland (see appendix g04). • Studies conducted in samples of older adults with a high-risk condition are eligible for inclusion.	• Studies in paediatric populations (≤ 15 years) or other clinical at-risk groups (e.g. pregnant women, health care workers, healthy elderly adults, residents in long-term facilities). • Studies targeting health-care professionals or organisational-level practices rather than individual perceptions.
Date	Studies published from any date until August 2018.	N/A
Language	Studies published in the English language.	Studies not published in the English language.
Study type	Empirical research studies (qualitative & quantitative).	Editorials, letters, protocol papers and systematic reviews.

Table 2: Summary of studies included in the systematic review

Study (year) ***country***	**Population (N)** *Gender* *Age*	**Constructs of Psychological Model (s) used**	**Application/ measurement of psychological constructs**	**Design**	**Measurement of vaccination uptake (reported uptake in sample)** ***measurement tool***	**Main findings**	**Quality rating (MMAT)**
Verger et al. (2018) *France*	Diabetes patients (19) *M=9, F=10* *18-34 years (10.5%) 35-49 years (10.5%) 50-64 years (36.8%) 65+ years (42.1%)*	Health Belief Model	HBM mentioned in introduction/ discussion	Qualitative. Themes generated for whole sample. Quotes presented separately for vaccinated and unvaccinated participants	Self-reported vaccine uptake during previous season (8 unvaccinated and 11 vaccinated) *interview question*	Vaccination decisions were anchored in past experience. Compensatory health beliefs and misbeliefs about vaccination contributed to non-uptake.	*****
Payaprom et al. (2011) *Thailand*	Individuals with one or more chronic diseases for which vaccination is recommended including diabetes heart disease, asthma (201; HAPA intervention group N=99, standard leaflet group N=102) *F=66.7%, M=33.3%* *Mean age: 62.4 years*	Health Action Process Approach	Knowledge, outcome expectancies, self-efficacy, risk perception, action planning (implementation intentions) measured using a reliable but non-validated self-report questionnaire.	Controlled before and after trial Variables compared within groups at T1 and T2 and between groups. Regression analyses used to identify predictors of vaccination intentions & behaviour	Self-reported vaccination status two months after the intervention (87.06%) and vaccination intentions *questionnaire*	Planning (β=.17, p=.003) change in outcome expectancies (β=.40, p<.001) and self-efficacy in arranging time and transportation (β=.31, p<.001) were significant predictors of vaccination intentions in multivariate analysis. Vaccine intentions (OR=3.89, p<.001) and self-efficacy (OR=1.70, p=.016) for arranging time and transport predicted behaviour in a multivariate logistic regression	***
Adams, Hall & Fulghum (2014) *USA*	Chronic kidney disease patients receiving haemodialysis (215) *Gender not reported* *Mean age: 59.4 years*	Health Belief Model	All HBM constructs measured using a self-report questionnaire validated by an expert panel	Descriptive, cross-sectional Comparison between vaccinated and unvaccinated participants on HBM domains	Self-reported receipt of the vaccine in the past (52.56%) *questionnaire*	Participants who received vaccine reported lower mean barriers (1.64 vs 1.88, p=.002, Cohen's d=-0.27). Other HBM domains were not significantly different between groups.	**

Yu et al. (2014) *Taiwan*	Adults with Type 2 diabetes (691) *M=48.0%, F=52.0%* *Mean age: 64.7 years (SD=10.7)*	Health Belief Model	All HBM constructs measured using a reliable self-report questionnaire. Face validity was checked.	Cross-sectional Comparison between vaccinated and unvaccinated participants on HBM domains Regression analysis to identify predictors of behaviour	Self-reported receipt of the vaccine in the previous season (35%) *questionnaire*	Vaccinated individuals reported higher benefits (19.57 vs 17.29, p<.001, Cohen's d=0.59), lower cues to action (13.63 vs 14.56, p=.018, Cohen's d=-0.19) and lower barriers (16.49 vs 21.44, p<.001, Cohen's d=-0.90) than unvaccinated participants. Higher perceived benefits (OR=1.13 P<.001) and lower perceived barriers (OR=0.86, p<.001,) were significant predictors of vaccination uptake in multivariate analysis.	***
Turner et al. (2015) *Canada*	Patients with implantable cardiac defibrillators (229) *Vaccinated group: M=87%, F=13% Mean age: 71 years* *Unvaccinated group: M=79%, F=21% Mean age: 65 years*	Health Belief Model (barriers & cues to action)	HBM outlined in introduction. Only four questions asked exploring; perceived lack of effectiveness and side effects (costs) and accessibility (cues)	Cross-sectional Differences between vaccinated and unvaccinated groups compared using rank agreement Statistical predictors of vaccination were identified	Self-reported receipt of the vaccine in the previous season (78%) *questionnaire*	Vaccinated individuals more likely to disagree with 'the flu shot will make me sick' (Cohen's d=0.77) and 'the flu shot is not effective' (Cohen's d=0.31). Disagreement with the statement 'the flu vaccine will make me sick' was the only factor independently associated with vaccination uptake in multivariate regression (OR=5.56, p=.01)	**
Cheung & Mak (2016) *Hong Kong*	Chronic respiratory disease (255) *18-40 years (14.1%) 41-54 years (16.9%) 55-64 years (33.3%) 65+ years (35.7%)* *M=68.2%, F=31.8%*	Health Belief Model and the model of Psychological Flexibility	All HBM dimensions and psychological flexibility were measured using valid self-report questionnaires	Cross-sectional Comparisons were made between vaccinated and unvaccinated individuals Statistical predictors of vaccination were identified	Self-reported receipt of the vaccine in the previous season (32.9%) *questionnaire*	Vaccinated participants reported significantly higher susceptibility 2.51 vs 2.25, p<.001, Cohen's d==0.72), severity (2.67 vs 2.32, p<.001, Cohen's d=1.02), cues to action (2.48 vs 2.26, p=.005, Cohen's d=0.39) and lower psychological inflexibility (33.35 vs 45.90, p<.001, Cohen's d=.039) than unvaccinated participants. Perceived susceptibility (OR=3.04, p=.015), severity (OR=3.04, p=.004) and psychological flexibility (OR=49.37, p<.001) were significant predictors of vaccination uptake in a multivariate regression model.	**

Lyn-Cook, Halm & Wisnivesky, (2007) *USA*	Individuals with persistent asthma (167) *Vaccine adherents: F=88%, M=12%* *Vaccine non-adherents: F=84%, M=16%* *48.5 years (13.3SD)*	Health Belief Model	All HBM constructs measured using a self-report questionnaire validated by previous research	Cross-sectional Comparisons were made between each health belief for vaccinated and unvaccinated individuals Statistical predictors of vaccination were identified	Self-reported receipt of the vaccine in the previous season (71%) *questionnaire*	Vaccinated participants scored significantly higher than unvaccinated participants on 3/4 items measuring benefits, on all items measuring cues to action. They scored lower on 3/4 measures of barriers. There were no significant differences for susceptibility or severity. HP recommendation (OR=14.71, p<.001) and the belief that the vaccine protects against asthma attacks (OR=7.21, p=.001) predicted vaccination adherence in multivariate analyses.	*****
Keenan, Campbell & Evans (2007) *UK*	Asthma (136) *M=40.4%, F=59.6%* *Median age: 44.5 years*	Health Belief Model	All HBM constructs measured using non-validated questionnaire. Some domains measured with one item	Cross sectional Individual beliefs compared between vaccinated and unvaccinated participants Regression analysis to determine predictors	Self-reported receipt of the vaccine in the previous season (40.2%) *questionnaire*	There were significant differences between groups on all beliefs about the influenza vaccine with the exception of current perceived health status (a susceptibility item). Belief that influenza complications are dangerous (OR=1.34, p=.023), belief in vaccine efficacy (OR=4.06, p<.001) and HP recommendations (OR=2.30, p=.021) predicted uptake. Disagreement with the statement 'influenza is not a serious problem for me (OR=0.74, p=.03) and 'the vaccine can make you unwell' (OR=0.72, p=.024) also predicted uptake.	**
Chong, Kim, Lee & Lee (2018) *South Korea*	Chronic kidney disease patients who have received a kidney transplant (180) *M=67.8%, F=32.2%* *Age <45: 33.3%* *Age ≥ 45: 66.7%* *Duration after transplant:* *<10 years: 62.8%* *≥ 10 years:37.2%*	Health Belief Model	All HBM constructs measured using a reliable self-report questionnaire. Face and content validity were checked	Cross-sectional Regression analysis to identify predictors of vaccine behaviour	Self-reported receipt of the vaccine in the previous season (47.2%) *questionnaire*	Lower perceived barriers (OR=0.44, p=.019) and higher perceived benefits (OR=2.77, p=.006) were significant predictors of vaccine receipt in a multivariate analysis.	**

Tsui et al. (2013) *Hong Kong*	People with one of the following conditions; hypertension, diabetes, heart, renal, liver disease, cancer, CRD (704) *M=33.5%, F=66.5%* *Age: <40 years (10.8%)* *40-49 years (21.5%)* *≥50 years (67.8%)*	Health Belief Model	Measured all HBM domains. A non-validated questionnaire informed by the HBM model tested; perceived effectiveness (benefit), side-effects (barriers), susceptibility, severity and vaccine facilitators (cues). Vaccine knowledge and willingness to pay were also assessed.	Cross-sectional Regression analyses used to determine predictors of; lifetime vaccination behaviour, vaccination during the last year and future intentions.	Self-reported intentions (32.9%), self-reported receipt of the vaccine in lifetime (35.8%) and previous season (22.7%) *questionnaire*	Knowledge that IV is required annually (OR=3.83), perceived severity of influenza (OR=3.72), uncertainty about the consequences of influenza (OR=4.35), or the severity for chronically ill people (OR=3.45), willingness to pay $1-$150HK (OR=2.05) or <$150HK (OR=2.26) and HP recommendation (OR=5.23) predicted lifetime vaccination behaviour in multivariate analysis Knowledge that IV is required annually (OR=4.04), perceived severity of flu (OR=2.82) and HP recommendation (OR=3.25) were associated with uptake during last season. Perceived side effects (OR=0.35) and uncertainty about side effects (OR=0.23) predicted non-uptake. Knowledge about IV reducing risks (OR=1.70), knowledge that IV is required annually (OR=6.68), perceived severity (OR=2.34), willingness to pay $1-$150HK (OR=2.53) or <$150HK (OR=2.05) and HP recommendation (OR=2.85) predicted future intentions. Perceived side effects (OR=0.42) and uncertainty about side effects (OR=0.31) predicted lower intentions.	**
Gallagher, Luttik & Jaarsma (2011) *Netherlands*	Patients with heart failure (333) *M=66%, F=34%* *Mean age: 72 years (SD=11)*	Framework of Social Support	The framework was described in the introduction and the questionnaire was designed based on this model. The instrument was not validated but showed good reliability	Cross-sectional Participants were divided into three groups according to level of social support being received (low, medium, high). Groups were compared	Self-reported uptake of the vaccine each year (uptake rate not reported) *questionnaire*	Participants with high vs. low levels of social support more likely to have received a vaccination (1.91 vs 1.43, p=.007, Cohen's d=0.19). No effect was found for high vs. medium or medium vs. low support).	****

Bundesmann & Kaplowitz (2011) *USA*	Type 2 diabetes patients (1438) *M=59.4%, F=50.6%* *Mean age: 68.2 years*	Health Belief Model (cues to action)	The model was described in the introduction. The cues to action domain was loosely assessed through participant recall of provider behaviour	Cross-sectional Comparisons were made between vaccinated and unvaccinated individuals	Self-reported receipt of the vaccine in the past 12 months (65.9%) *telephone questionnaire*	The combined effect of three provider variables (information, modelling and exposure to a diabetes educator) was significantly associated with vaccine receipt ($X^2(3)=7.7$, $p<.01$).	**

IV= influenza vaccination; HP = health provider; CRD= Chronic Respiratory Disease; HBM= Health Belief Model

Quality assessment key: *very poor quality (20%), **poor quality (40%) ***medium quality (60%), ****high quality (80%), *****very high quality (100%).

Cohen's d effect sizes: d=0.2 (small), d=0.5 (medium), d=0.8 (large); Cohen's f^2 effect sizes: $f^2 \geq 0.02$ (small), $f^2 \geq 0.15$ (medium), $f^2 \geq 0.35$ (large)

Figure 1: PRISMA flow diagram of paper search and selection process (Moher, Liberati, Tetzlaff & Altman, 2009)