Impact of Clinical and Demographic Characteristics on Patient Preferences for Psoriasis Treatment Features: Results From a Discrete-Choice Experiment in a Multicountry Study

Supplemental Material

Marco Boeri, PhD[1], Daniel Saure, PhD[2], Christopher Schuster, MD[3,4], Julie Hill[5], Mariana Guerreiro[6], Kathleen Klein[7], Brett Hauber, PhD[7]

[1]RTI Health Solutions, Health Preference Assessment, Belfast, UK;

[2]Eli Lilly and Company, Bad Homburg, Germany;

[3]Eli Lilly and Company, Vienna, Austria;

[4]Department of Dermatology, Medical University of Vienna, Vienna, Austria

[5]Eli Lilly and Company, Basingstoke, United Kingdom;

[6]Eli Lilly and Company, Lisboa, Portugal;

[7]RTI Health Solutions, Health Preference Assessment, Research Triangle Park, NC, USA;

Short Title: Preferences for Psoriasis Therapeutic Options, Exploring Heterogeneity

Corresponding author: Marco Boeri, Forsyth House, Cromac Square, Belfast (UK) BT2 8LA; telephone: +44 (0)161 447 6016, e-mail: mboeri@rti.org

# Appendix A. Subgroup Analysis: Modeling Approach

It is important to note that preference heterogeneity is accommodated by the RPL model, but the source of heterogeneity is not explored. It is possible to further explore preference heterogeneity by estimating RPL models with subgroup analysis. In this study, to evaluate differences in preferences across multiple subgroup sets (Table 1 of the main text for more details), we used a dummy-coded variable to identify respondents who were part of a specific subgroup of interest. This identifier was interacted with each level of the study attributes, and all interaction terms were added to the RPL model specification. The interaction terms can be interpreted as the difference in preferences between a baseline group (not represented by the identifier dummy-coded variable) and a subgroup of interest. Thus, a joint test of significance of all interaction terms provided the necessary information to determine whether preferences were different between these subgroups. For subgroups in which patients could be categorized into one of two mutually exclusive subgroups (e.g., age and gender), analyses were conducted by interacting each attribute level in the model with a dummy-coded variable to identify respondents who were part of one subgroup in a pair and adding all interaction terms to the original RPL model. For the subgroup sets with three subgroups (e.g., marital/relationship status and psoriasis severity), two sets of dummy-coded interaction terms were included. For country of residence, four sets of dummy-coded interaction terms were included. The estimated parameters on the interaction terms can be interpreted as the difference in preferences between the subgroup of interest (dummy variable = 1) and the reference group (dummy variable = 0). Finally, systematic differences were tested between two subgroups at a time with a Wald test (e.g., by testing the hypothesis that all coefficients on the dummy-variable interactions were zero). Systematic differences in preferences between subgroups in each pair were tested using a Wald test to jointly test of the significance of all interaction terms in the model (Greene, 2012).

REFERENCE

Greene WH. Econometric Analysis. 7th International Ed. Boston: Pearson; 2012.

Appendix B. Full Subgroup Analysis: Preference Weights

Figure B-1.   Random-Parameters Logit Preference Weights Subgroup by Country (N = 1,123; UK vs Canada, *P* value = 0.210; UK vs France, *P* value < 0.001; UK vs Italy, *P* value < 0.001; UK vs Spain, *P* value = 0.141)
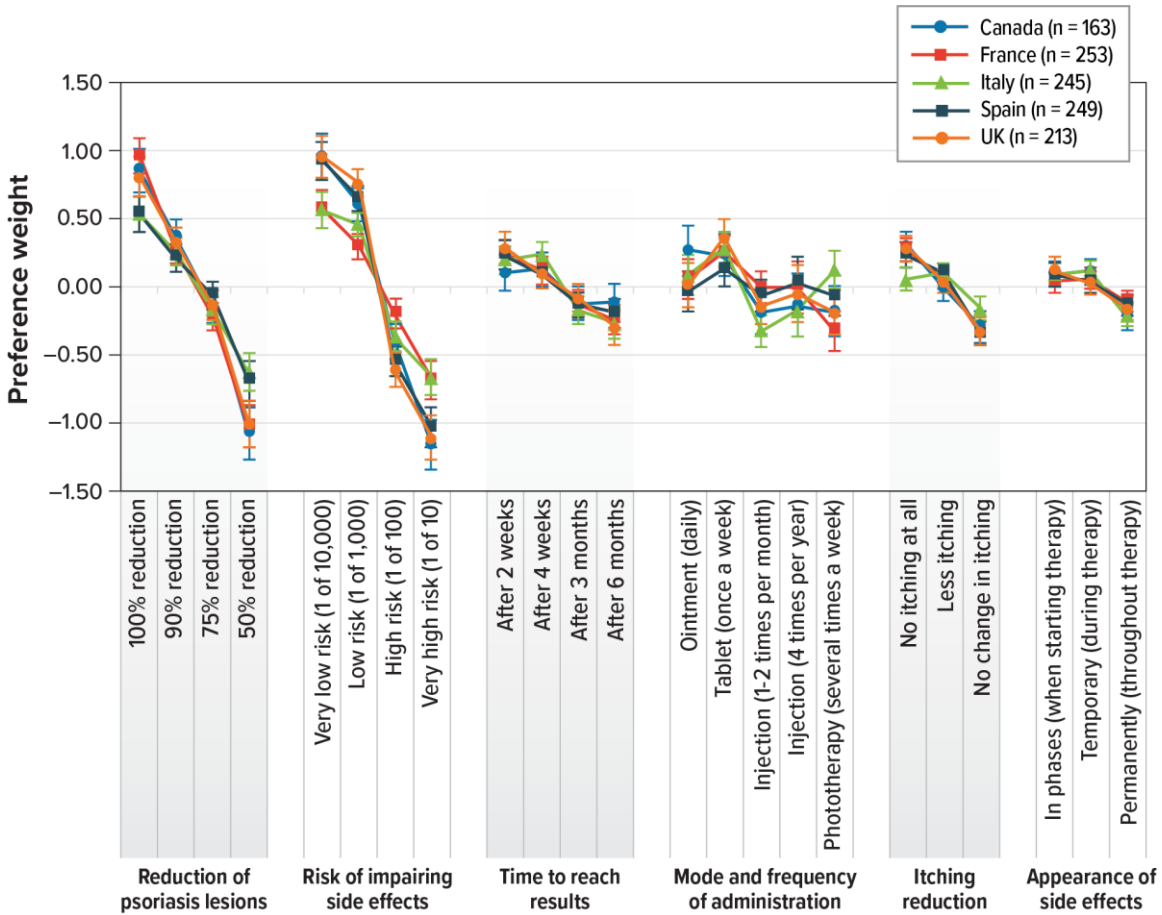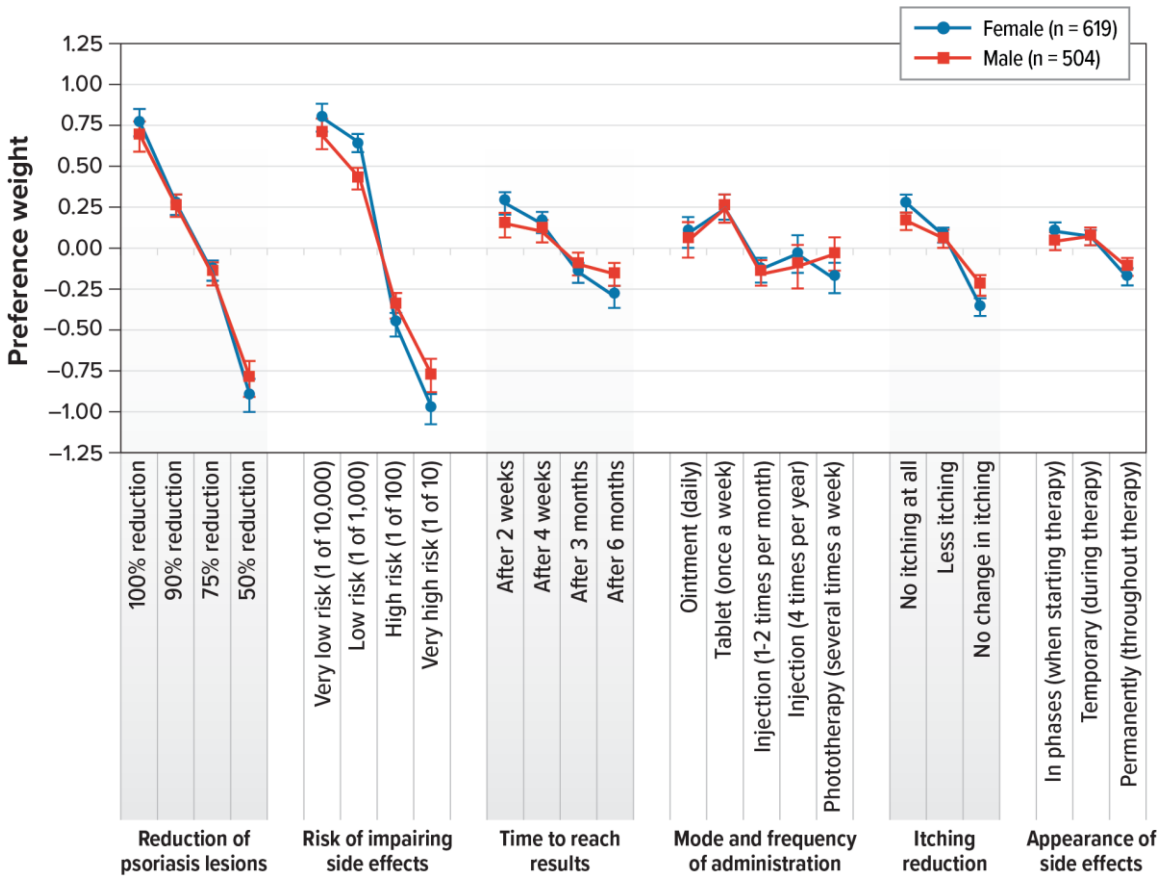

UK = United Kingdom.

Note: The vertical bars surrounding each mean preference weight denote the 95% confidence interval (computed by delta method).

Results suggest that the patterns of the preference estimates are similar across countries, although lesion reduction was considered relatively more important to respondents in France, Canada, and the United Kingdom (UK) than to respondents in Italy and Spain; Achieving no itching was less important to respondents from Italy; and reducing the risk of impairing side effects was relatively more important to respondents in the UK, Spain, and Canada. It is important to note that scale and preference heterogeneity are confounded in the model specification used; therefore, some small differences may be a difference in scale (preference variability) rather than a difference in preferences.
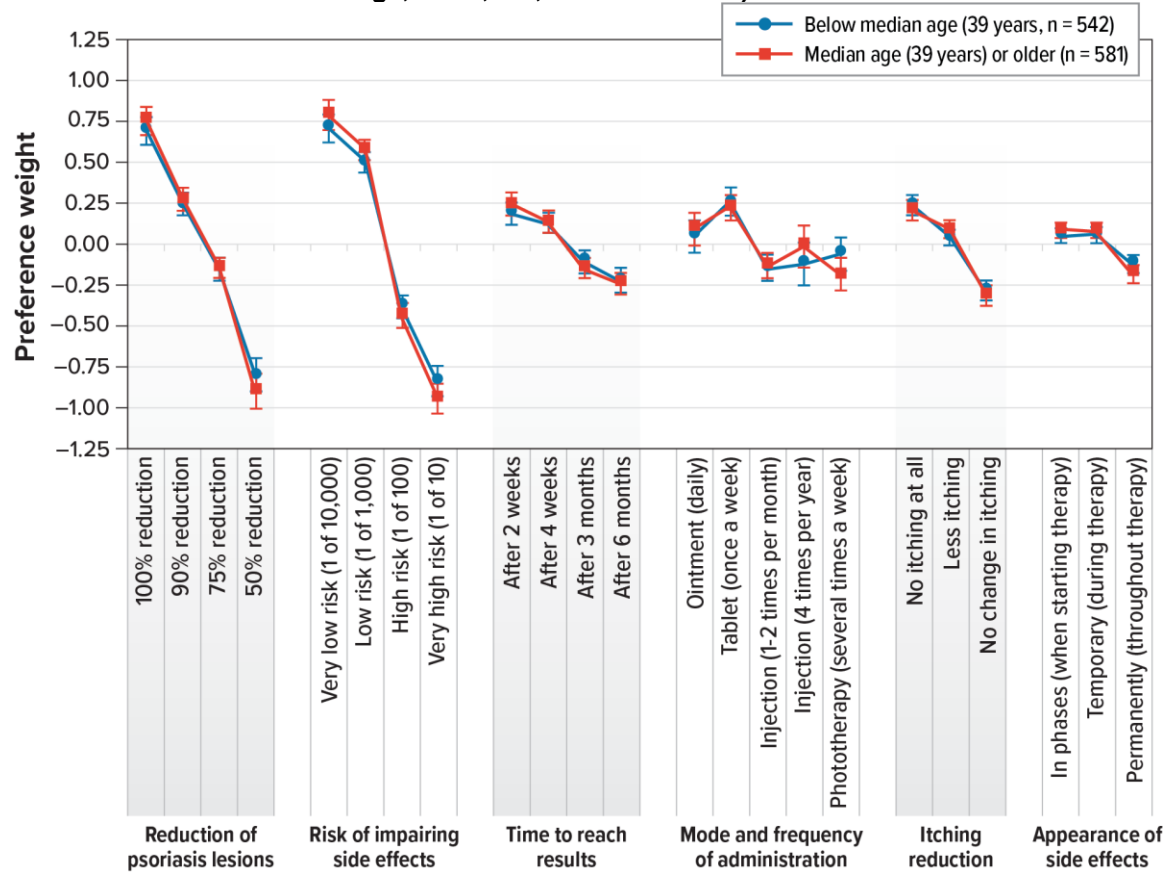
Figure B-2.   Random-Parameters Logit Preference Weights Subgroup by Gender (N = 1,123; *P* value < 0.001)

Note: The vertical bars surrounding each mean preference weight denote the 95% confidence interval (computed by delta method).

Results suggest that, compared with male respondents, female respondents were more risk averse (for risk of impairing side effects) and placed more importance on shorter time to reach results. It is important to note that scale and preference heterogeneity are confounded in the model specification used; therefore, some small differences may be a difference in scale (preference variability) rather than a difference in preferences.

Figure B-3.   **Random-Parameters Logit Preference Weights Subgroup 1 by Age (Median 39 Years of Age, N = 1,123; *P* value = 0.439)**
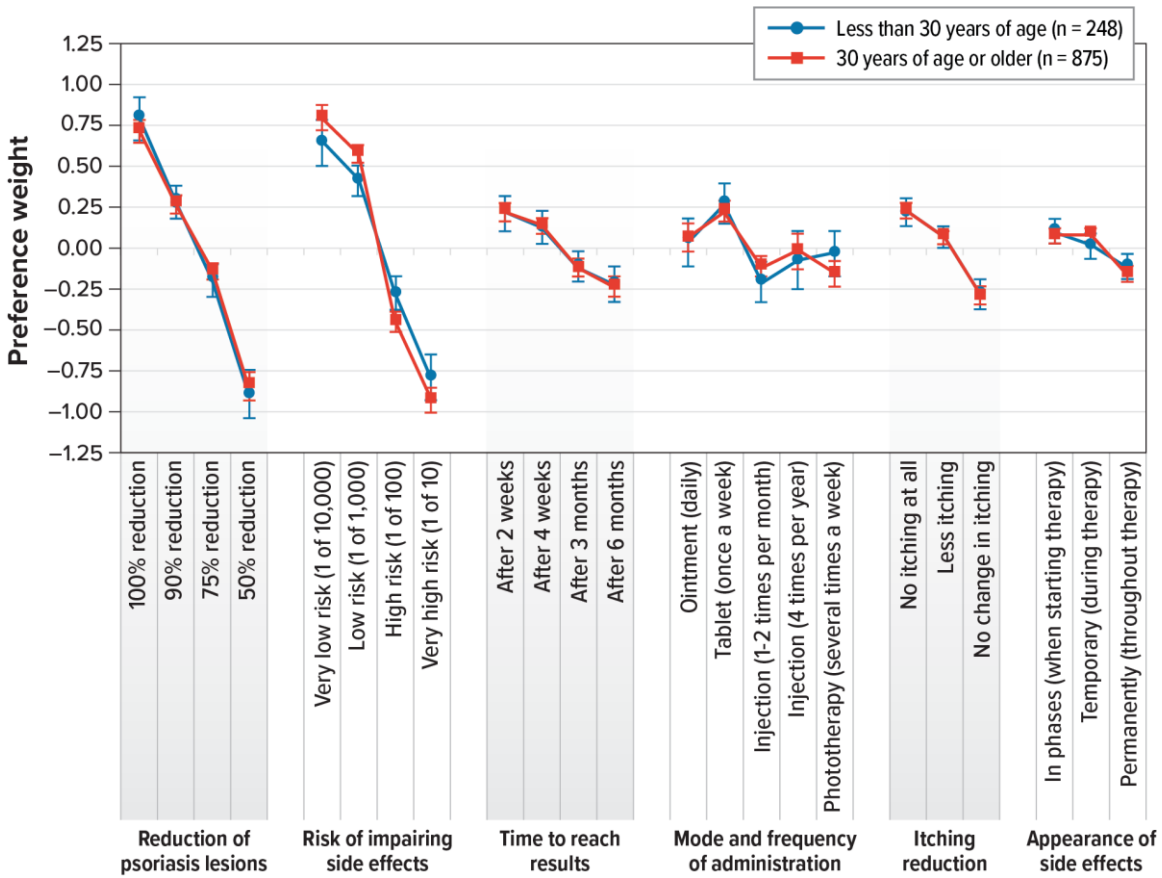

Note: The vertical bars surrounding each mean preference weight denote the 95% confidence interval (computed by delta method).

Results suggest that respondents below the median age are not systematically different from respondents of median age or older. It is important to note that scale and preference heterogeneity are confounded in the model specification used; therefore, some small differences may be a difference in scale (preference variability) rather than a difference in preferences.
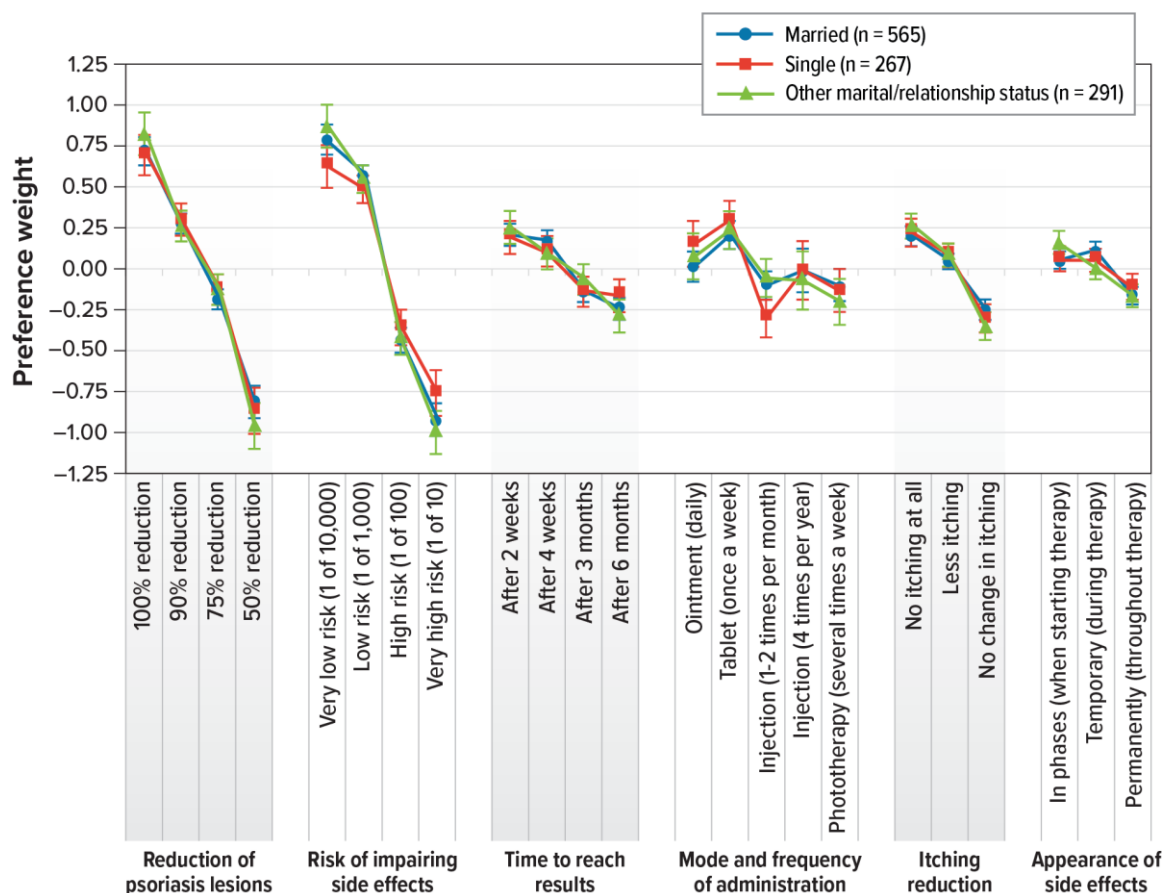
Figure B-4.   Random-Parameters Logit Preference Weights Subgroup 2 by Age (30 Years of Age, N = 1,123; *P* value = 0.104)

Note: The vertical bars surrounding each mean preference weight denote the 95% confidence interval (computed by delta method).

When reducing the threshold of age for the definition of younger respondents at 30 years of age, results are still not statistically significantly different. However, younger respondents appear less risk averse and prefer phototherapy. It is important to note that scale and preference heterogeneity are confounded in the model specification used; therefore, some small differences may be a difference in scale (preference variability) rather than a difference in preferences.

Figure B-5. **Random-Parameters Logit Preference Weights Subgroup by Marital/Relationship Status (N = 1,123; married vs. other marital/relationship status, *P* value = 0.157; single vs. other marital/ relationship status, *P* value = 0.041)**

Note: The vertical bars surrounding each mean preference weight denote the 95% confidence interval (computed by delta method).

Results suggest that respondents who are single are less inclined to use 1 or 2 injections per month; however, the preferences for injections four times a year were similar across the three subgroups. It is important to note that scale and preference heterogeneity are confounded in the model specification used; therefore, some small differences may be a difference in scale (preference variability) rather than a difference in preferences.

Figure B-6. **Random-Parameters Logit Preference Weights Subgroup by BSA Affected (N = 1,123; BSA <3% vs. BSA 3% to 10%, *P* value = 0.004; BSA <3% vs. BSA >10%, *P* value = 0.056)**
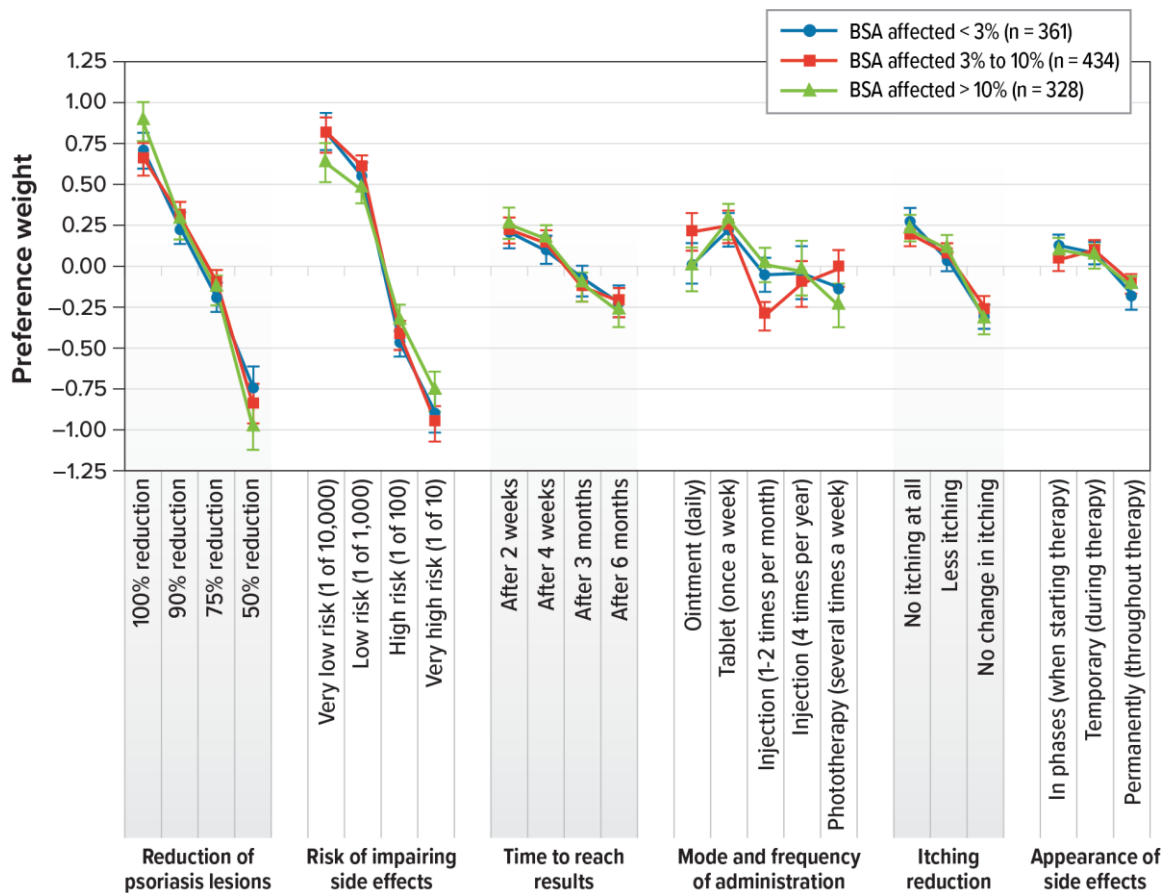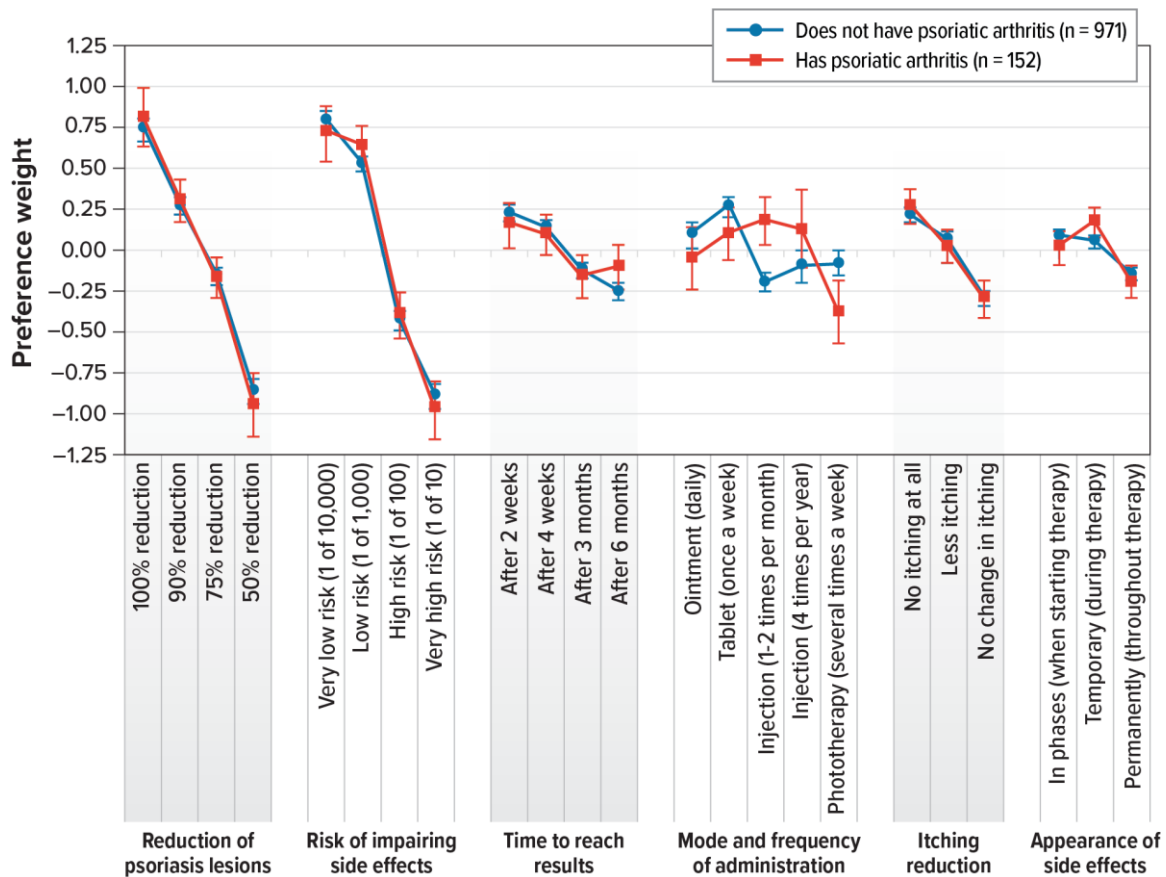

BSA = body surface area.

Note: The vertical bars surrounding each mean preference weight denote the 95% confidence interval (computed by delta method).

Results suggest that respondents with a BSA > 10% placed more importance on reduction of psoriasis lesions, while respondents with a BSA between 3% and 10% are more averse to the use of injections once or twice per month. It is important to note that scale and preference heterogeneity are confounded in the model specification used; therefore, some small differences may be a difference in scale (preference variability) rather than a difference in preferences.
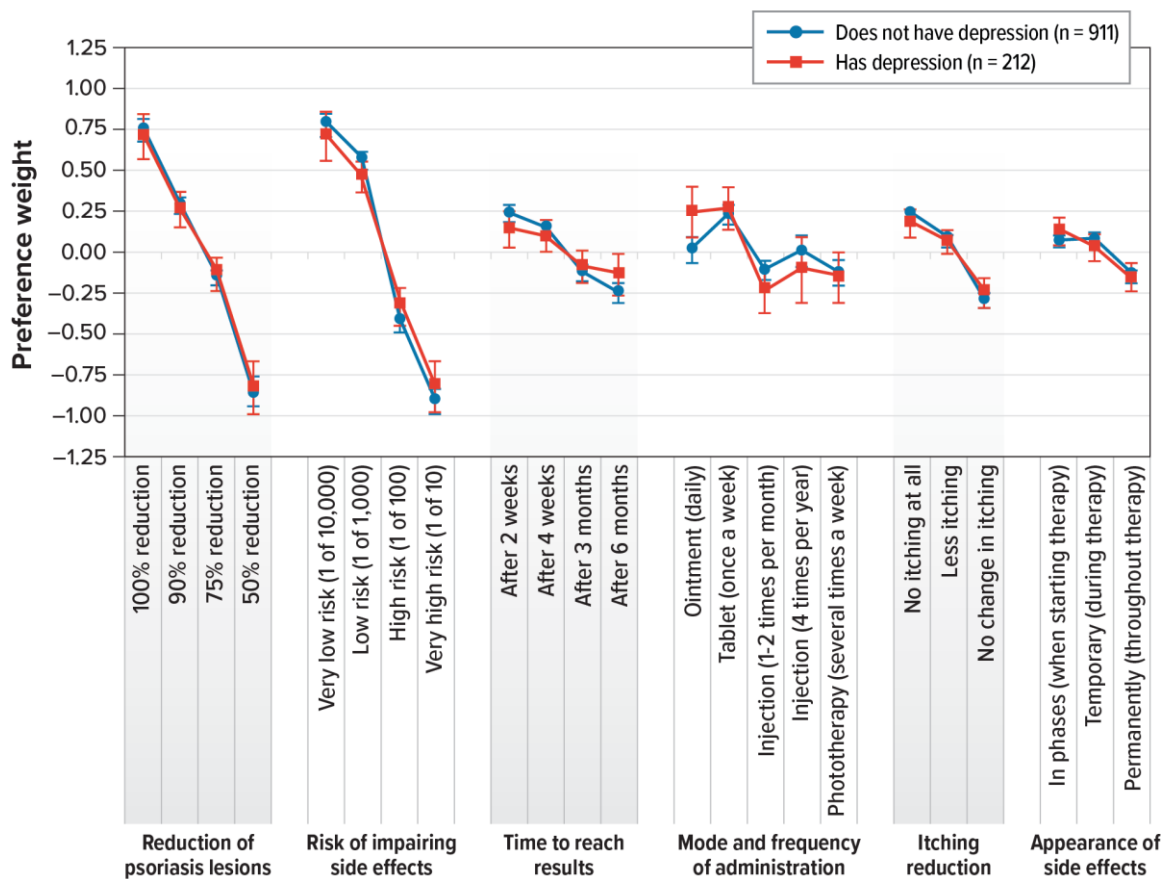
Figure B-7.   Random-Parameters Logit Preference Weights Subgroup by Comorbidity–Psoriatic Arthritis (N = 1,123; *P* value < 0.001)

Note: The vertical bars surrounding each mean preference weight denote the 95% confidence interval (computed by delta method).

Results suggest that respondents with psoriatic arthritis prefer frequent injections taken 1-2 times per month and are averse to using phototherapy treatments. It is important to note that scale and preference heterogeneity are confounded in the model specification used; therefore, some small differences may be a difference in scale (preference variability) rather than a difference in preferences.
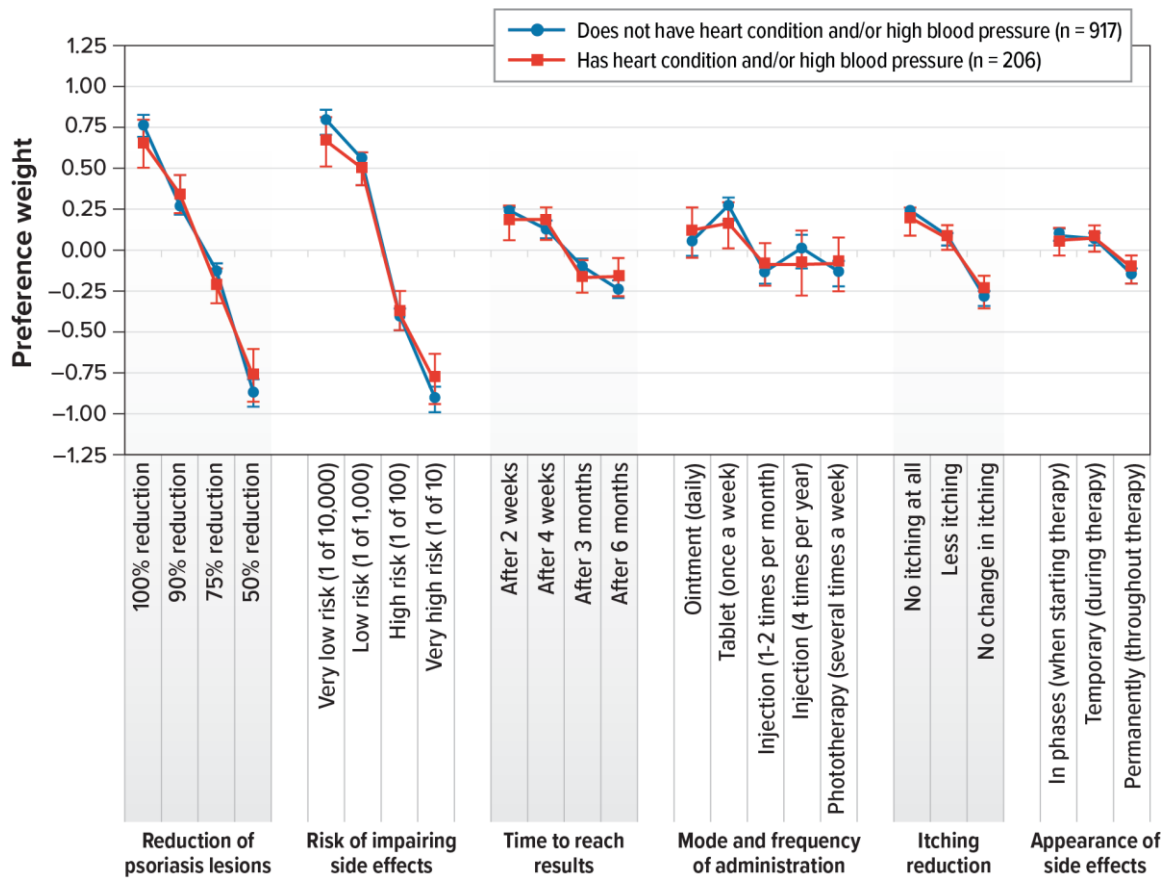
**Figure B-8.   Random-Parameters Logit Preference Weights Subgroup by Comorbidity –
Depression (N = 1,123; _P_ value = 0.233)**

Note: The vertical bars surrounding each mean preference weight denote the 95% confidence interval (computed by delta method).

Results suggest respondents who have depression do not have statistically significantly different preferences compared to those who do not. However, respondents who have depression appear to prefer a daily ointment treatment. It is important to note that scale and preference heterogeneity are confounded in the model specification used; therefore, some small differences may be a difference in scale (preference variability) rather than a difference in preferences.

**Figure B-9.   Random-Parameters Logit Preference Weights Subgroup by Comorbidity –
Heart Condition and/or High Blood Pressure (N = 1,123; *P* value = 0.561)**

Note: The vertical bars surrounding each mean preference weight denote the 95% confidence interval (computed by delta method).

Results suggest that respondents who have a heart condition and/or high blood pressure do not have statistically significantly different preferences compared to those who do not; preferences appear to be relatively similar between the two groups of respondents. It is important to note that scale and preference heterogeneity are confounded in the model specification used; therefore, some small differences may be a difference in scale (preference variability) rather than a difference in preferences.

Figure B-10.   Random-Parameters Logit Preference Weights Subgroup by Face Psoriasis (N = 1,123; *P* value = 0.054)
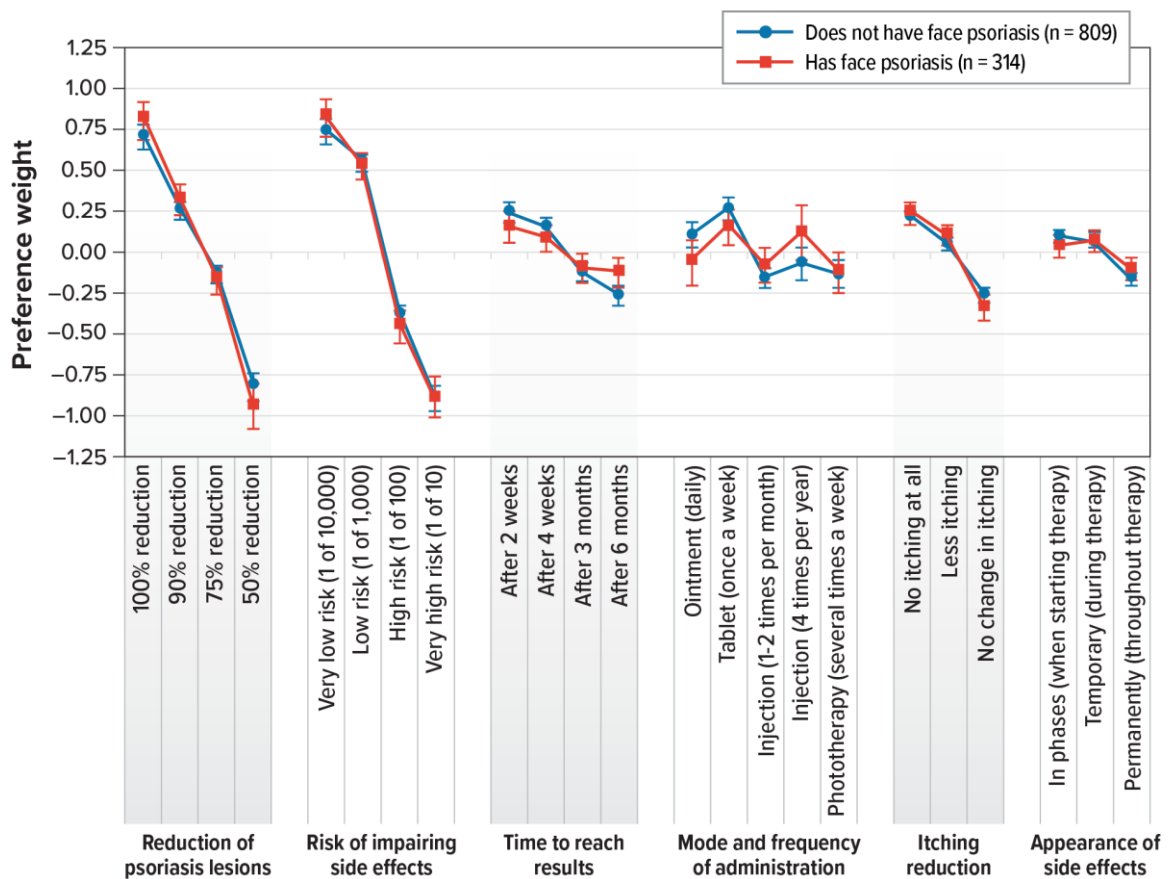
Note: The vertical bars surrounding each mean preference weight denote the 95% confidence interval (computed by delta method).

Results suggest that respondents who have face psoriasis do not have statistically significantly different preferences compared to those who do not. However, it appears respondents who have face psoriasis appear to prefer injections 4 times per year and reaching results before 6 months. It is important to note that scale and preference heterogeneity are confounded in the model specification used; therefore, some small differences may be a difference in scale (preference variability) rather than a difference in preferences.

Figure B-11.   Random-Parameters Logit Preference Weights Subgroup by Nail Psoriasis (N = 1,123; *P* value < 0.001)
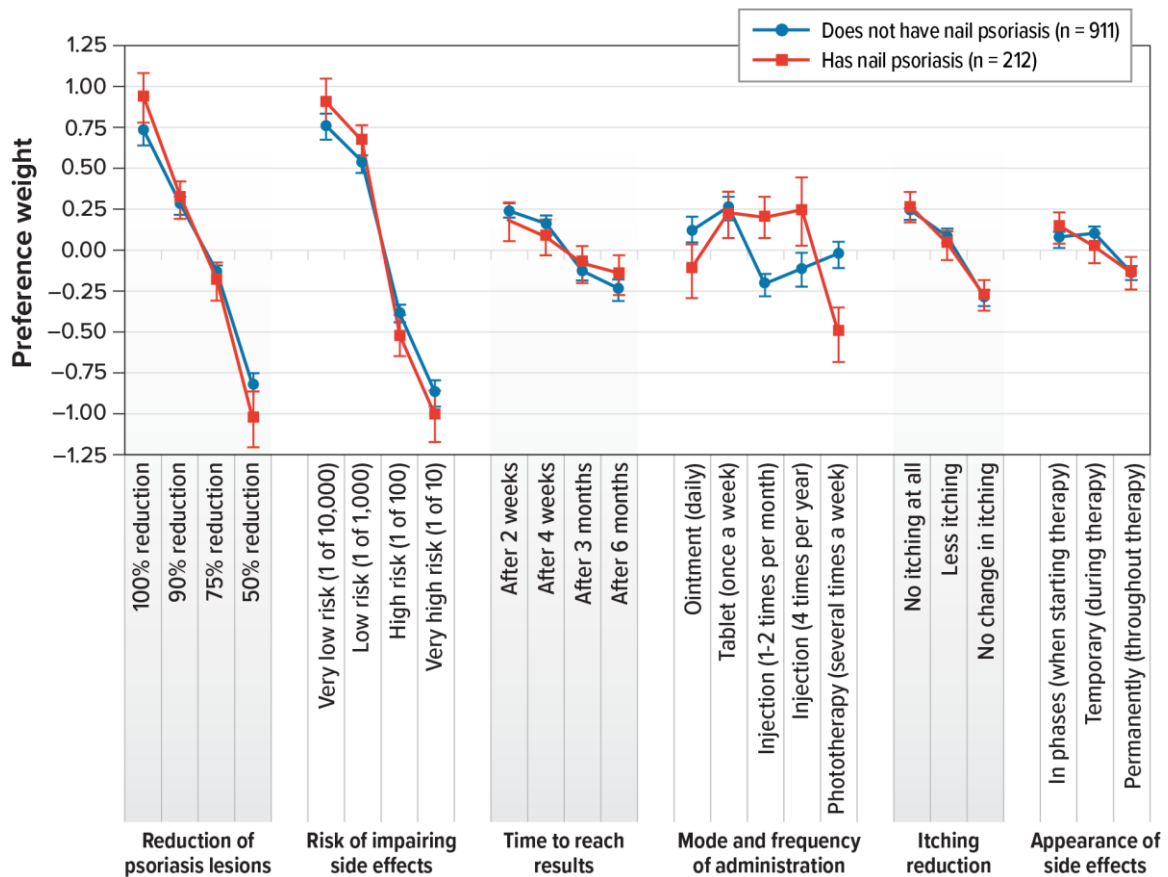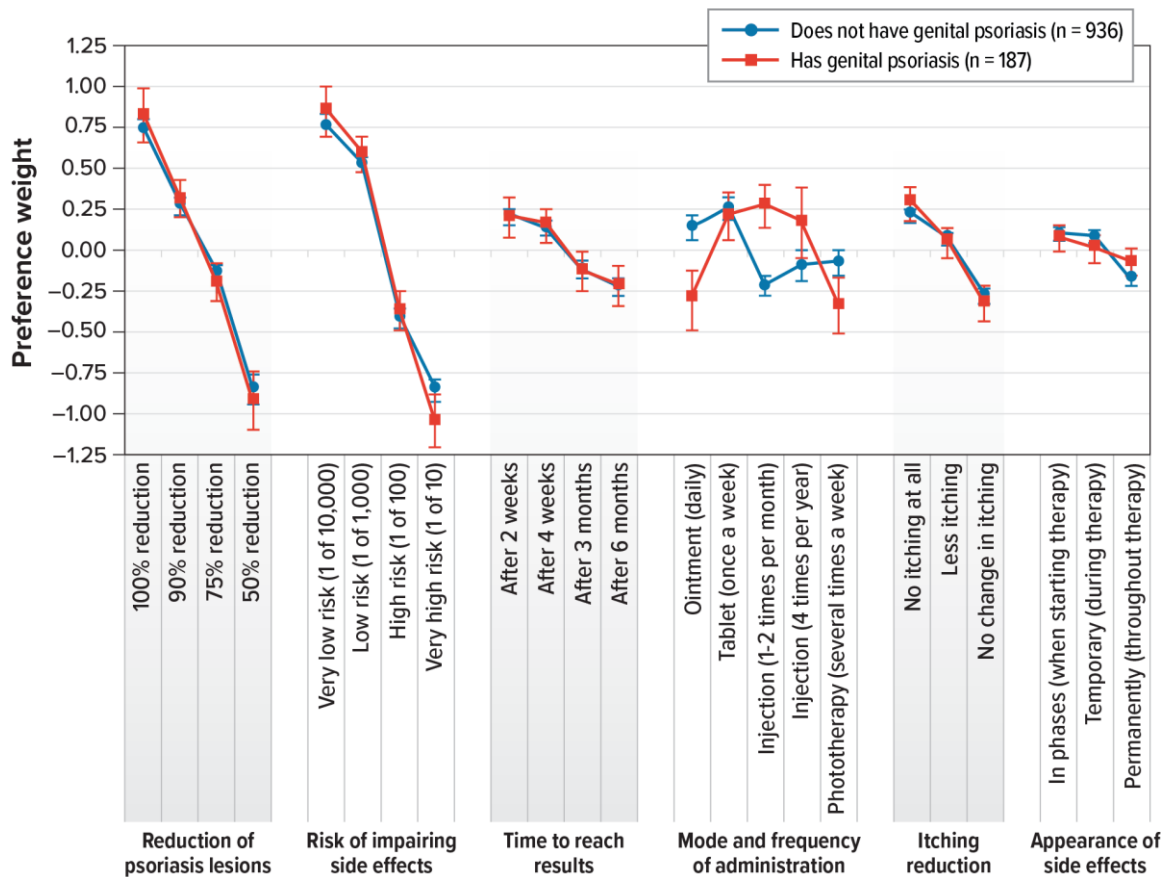

Note: The vertical bars surrounding each mean preference weight denote the 95% confidence interval (computed by delta method).

Results suggest that respondents who have nail psoriasis prefer injections compared to those who do not have nail psoriasis. Additionally, those who have nail psoriasis are less inclined to use phototherapy several times a week or a daily ointment. Those who do not have nail psoriasis prefer appearance of side effects improvements from permanently to temporary (during their treatment), while those who have nail psoriasis do not have a strong preference between the levels of side-effect appearances. It is important to note that scale and preference heterogeneity are confounded in the model specification used; therefore, some small differences may be a difference in scale (preference variability) rather than a difference in preferences.

Figure B-12.   Random-Parameters Logit Preference Weights Subgroup by Genital Psoriasis (N = 1,123; *P* value < 0.001)

Note: The vertical bars surrounding each mean preference weight denote the 95% confidence interval (computed by delta method).

Results suggest that respondents who have genital psoriasis prefer injections compared to those who do not have genital psoriasis. Additionally, those who have genital psoriasis are less inclined to use phototherapy several times a week or a daily ointment. It is important to note that scale and preference heterogeneity are confounded in the model specification used; therefore, some small differences may be a difference in scale (preference variability) rather than a difference in preferences.

Figure B-13. Random-Parameters Logit Preference Weights Subgroup by Current Use of Systemics (N = 1,123; *P* value < 0.001)
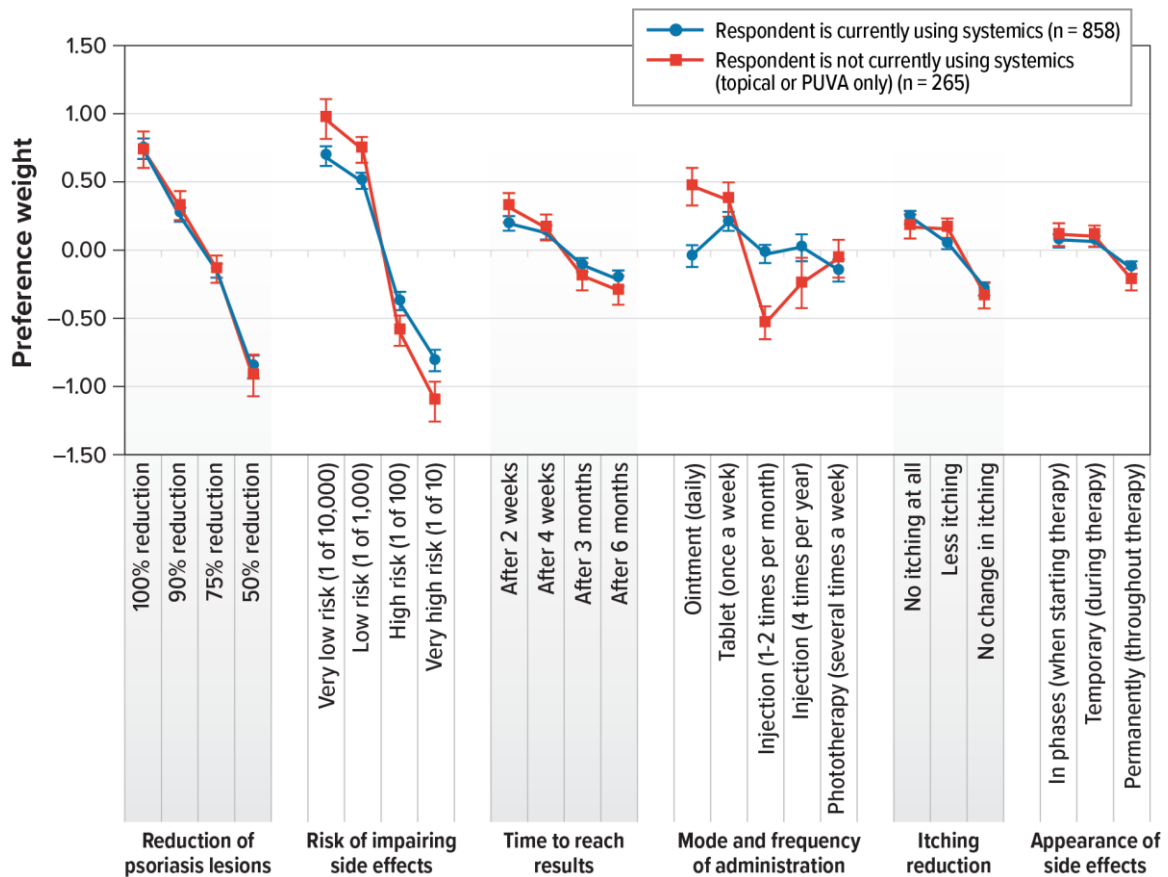
Note: The vertical bars surrounding each mean preference weight denote the 95% confidence interval (computed by delta method).

Results suggest that respondents who do not currently use systemics (topical or PUVA only) are more risk adverse, prefer a daily ointment treatment, and are less inclined to use 1 or 2 injections per month. Additionally, those who are currently using systemics have a stronger prefer to reduce itching from less itching to no itching, while those who do not currently use systemics are indifferent between having no itching and having less itching, but both levels are preferred to no changes in itching by both groups. . It is important to note that scale and preference heterogeneity are confounded in the model specification used; therefore, some small differences may be a difference in scale (preference variability) rather than a difference in preferences.

Figure B-14. Random-Parameters Logit Preference Weights Subgroup by Exclusive Current Use of Biologics (No Other Medicine, N = 1,123; *P* value < 0.001)
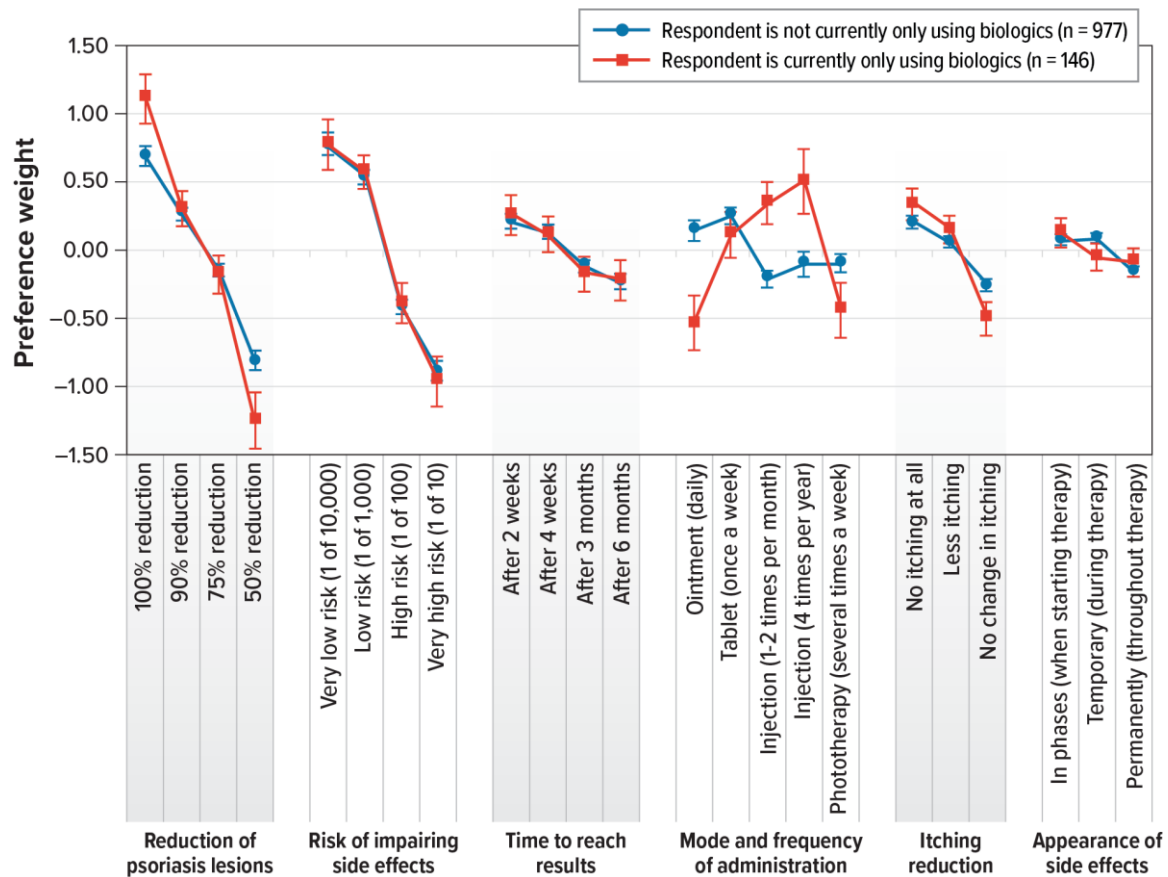
Note: The vertical bars surrounding each mean preference weight denote the 95% confidence interval (computed by delta method).

Results suggest that respondents who are currently only using biologics have a stronger preference for reducing their psoriasis lesions, prefer injections, and are less inclined to use a daily ointment or phototherapy several times a week. Respondents who are currently only using biologics also have a stronger preference for reducing itching. It is important to note that scale and preference heterogeneity are confounded in the model specification used; therefore, some small differences may be a difference in scale (preference variability) rather than a difference in preferences.
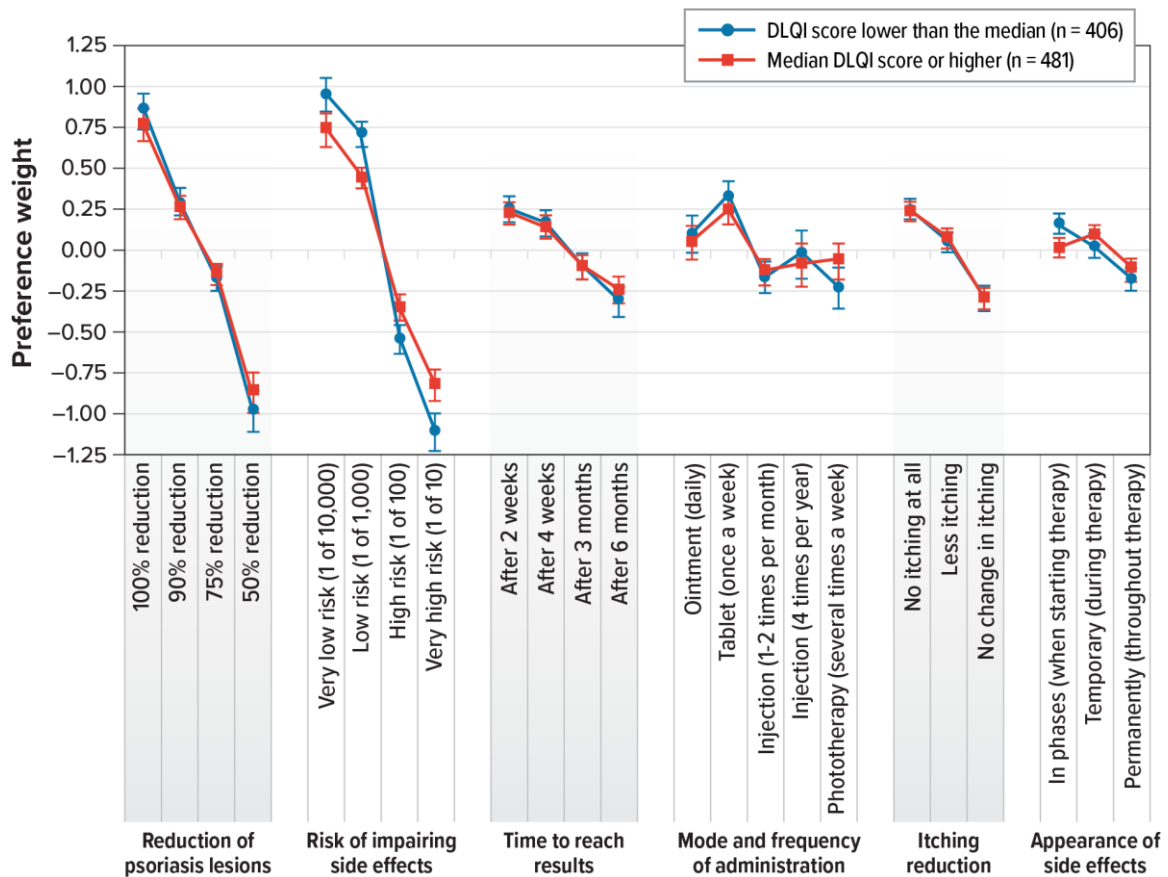
Figure B-15. **Random-Parameters Logit Preference Weights Subgroup by Current Use of Conventional Systemics and Topical/PUVA only (N = 1,123; *P* value = 0.003)**
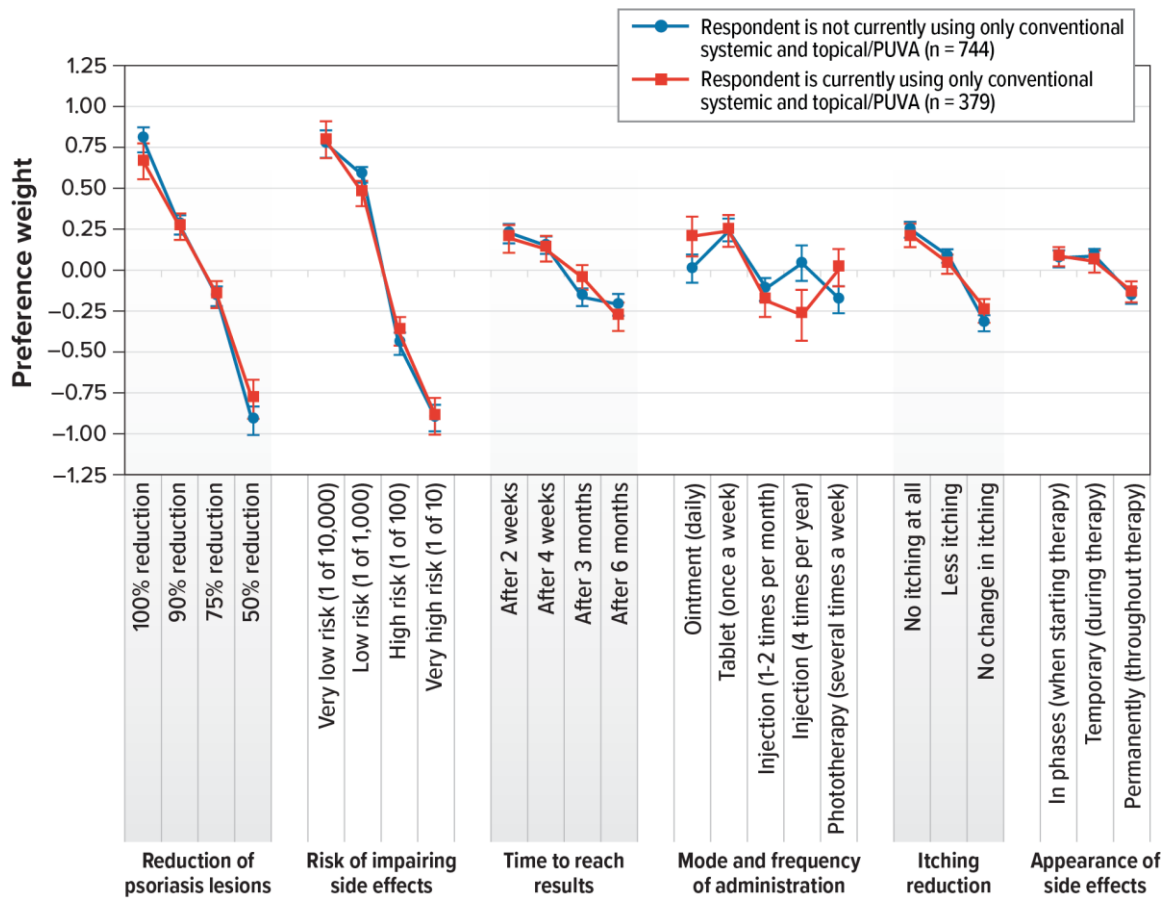
Note: The vertical bars surrounding each mean preference weight denote the 95% confidence interval (computed by delta method).

Results suggest that respondents who do not currently use only conventional systemic and topical/PUVA are more inclined to take injections 4 times per year and prefer tablets once a week to daily ointment. Respondents who are currently using only conventional systemic and topical/PUVA prefer improvements in the time to reach results from after 6 months to after 3 months, while those who are not currently using only conventional systemic and topical/PUVA no not have a statistically significantly different preferences between the same duration levels. It is important to note that scale and preference heterogeneity are confounded in the model specification used; therefore, some small differences may be a difference in scale (preference variability) rather than a difference in preferences.

Figure B-16.   Random-Parameters Logit Preference Weights Subgroup by Overall DLQI Score (N = 887; *P* value < 0.001)
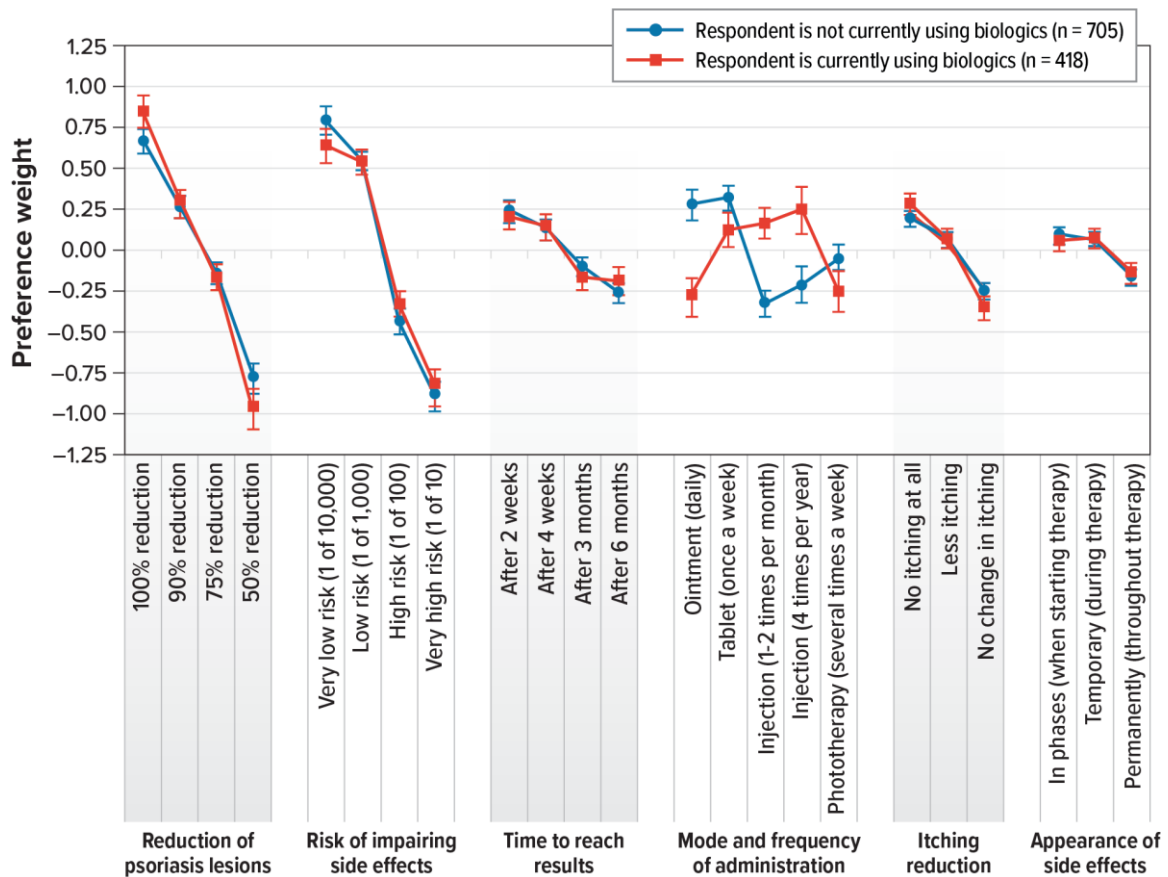

DLQI = Dermatology Life Quality Index.

Note: The vertical bars surrounding each mean preference weight denote the 95% confidence interval (computed by delta method).

Results suggest that respondents who scored lower than the median score are more risk adverse and prefer less appearances of side effects compared to those who scored the median score or higher. It is important to note that scale and preference heterogeneity are confounded in the model specification used; therefore, some small differences may be a difference in scale (preference variability) rather than a difference in preferences.

Figure B-17. Random-Parameters Logit Preference Weights Subgroup by Current Use of Biologics (N = 1,123; *P* value < 0.001)

Note: The vertical bars surrounding each mean preference weight denote the 95% confidence interval (computed by delta method).

Results suggest that respondents who are currently using biologics prefer injections and are less inclined to use ointments daily compared to those who are not currently using biologics. These respondents also prefer injections or taking a tablet once a week to using a daily ointment or phototherapy several times a week. Those who are not currently using biologics did not have a statistically significantly different preference between taking an ointment daily and a tablet once a week. Respondents who are currently using biologics did not demonstrate statistically significantly different preferences between reducing the risk of impairing side effects from low risk to very low risk nor did they demonstrate a statistically significantly different preference for improving the time to reach results from after 6 months to after 3 months, while respondents who do not currently use biologics did. It is important to note that scale and preference heterogeneity are confounded in the model specification used; therefore, some small differences may be a difference in scale (preference variability) rather than a difference in preferences.

Figure B-18. Random-Parameters Logit Preference Weights Subgroup by Overall Experience Using Biologics (N = 1,123; *P* value < 0.001)
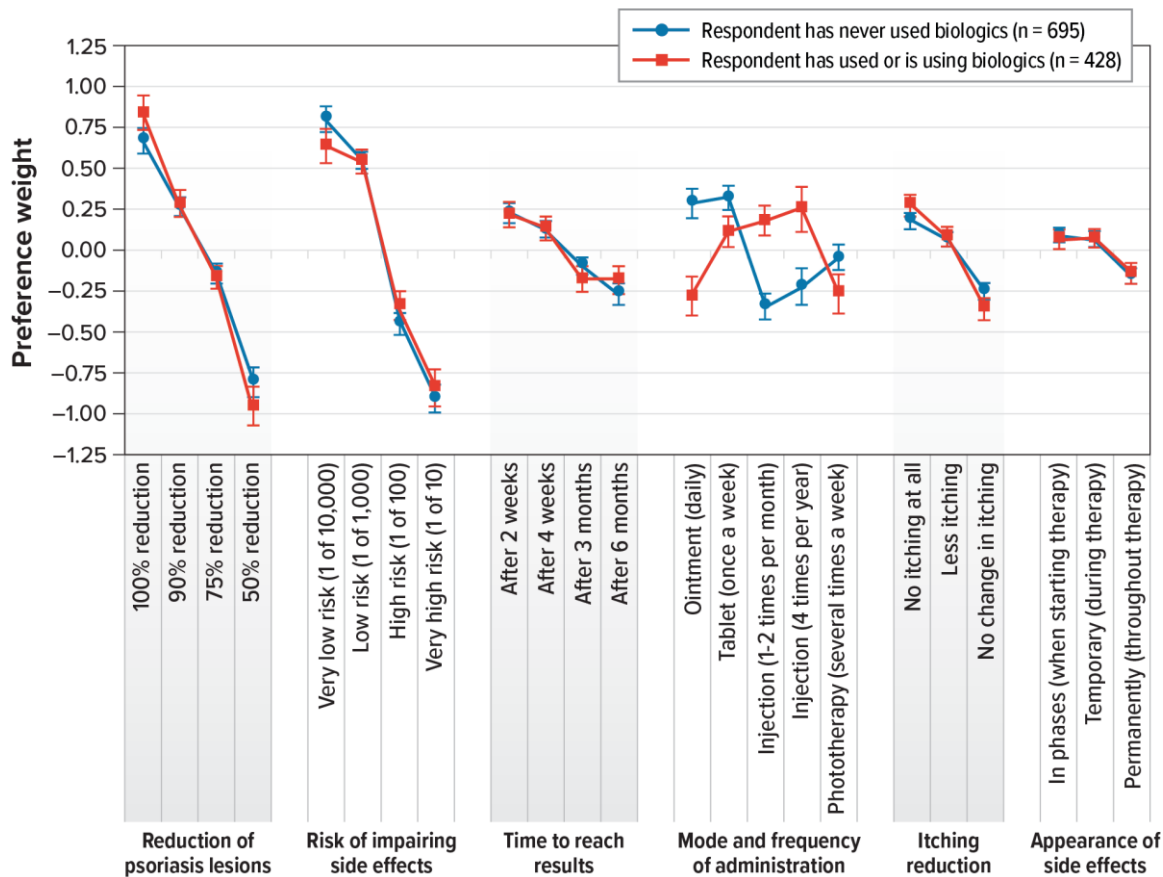
Note: The vertical bars surrounding each mean preference weight denote the 95% confidence interval (computed by delta method).

Results suggest that respondents who have ever used biologics prefer injections and are less inclined to use ointments daily, phototherapy several times a week, or a tablet once a week compared to those who have never used biologics. These respondents also prefer injections or taking a tablet once a week to using a daily ointment or phototherapy several times a week. Those who have never used biologics did not have a statistically significantly different preference between taking an ointment daily and a tablet once a week. Respondents who have ever used biologics did not demonstrate statistically significantly different preferences between reducing the risk of impairing side effects from low risk to very low risk nor did they demonstrate a statistically significantly different preference for improving the time to reach results from after 6 months to after 3 months, while respondents who have never used use biologics did. It is important to note that scale and preference heterogeneity are confounded in the model specification used; therefore, some small differences may be a difference in scale (preference variability) rather than a difference in preferences.